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Ecological Parameters of Settlement Patterns and Hierarchy in the Pre-Colonial Macassar Kingdom

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Abstract

An intensive survey of pre-Islamic and Islamic burial sites undertaken in 1986-87 near the old port-city of Macassar, South Sulawesi, plotted burial sites dating between the 14th and 17th centuries with respect to such major installations as fortifications within the locality. The surveyed areas are the coast flanking the city, the flat coastal plain and foothill valleys behind the city, and the area's main river.

19th and 20th century data from the same area suggest 300 to 800 people per cemetery site for the earlier centuries, depending on the density of the cemeteries. These figures indicate that 200,000 or more people inhabited the rural belt within 20 kilometres of Macassar at its mid-17th century peak, i.e. double the population within the city itself. Further, the population as a whole apparently grew five to tenfold between the 14th and 17th centuries. Despite the pronounced growth the distribution of the population remained fairly stable after the 15th century, suggesting that the strategic exploitation of the area's primary economic potentials (maritime resources and long-distance trade along the coast, wet-rice agriculture within the hinterland) was a precondition rather than a result of Macassar's state formation. State formation apparently involved the sustained intensification of the entire sweep of economic activities.

The clustering of sites based on geographical data identifies "natural" centres and their catchments, which correspond with the area's historically recorded central places and dependencies. These constants of the geopolitical landscape reflect the communities welded together through corporate adaptation to shared ecological conditions. In contrast, the trends towards political centralisation during the 16th and 17th centuries did not materialise in the rise of a clearly dominant central place. This reflects the fluid, even fragile nature of the elite strategic alliances which underwrote Macassar's centralisation.

Introduction

Macassar had established itself as a major port by 1544 when it was visited by the Portuguese merchant Antonio de Paiva (Bulbeck 1992:123-24). Under the protection of the abutting Makasar kingdoms Gowa and Tallok, both of which became sultanates in 1605, Macassar grew to become one of the archipelago's major cities by the mid-17th century (Reid 1993:73, 149). In 1667 the Dutch East India Company occupied the entrepot to control and profiteer its trade in spices and other lucrative items (Andaya 1981), ushering in Macassar's "colonial period". Macassar remained under foreign occupation until Indonesian independence, and since the 1960s has grown into a modern city. Its current name, "Ujung Pandang", comes from the name of the "precolonial" Makasar fort which the Dutch had occupied in 1667.

Information on the precolonial period comes to us not only from the European texts and maps (Andaya 1981; Reid 1983a), but also from the Gowa and Tallok *lontarak* (Mukhlis 1975). These compilations include passages written by the early 16th century and which incorporate oral

memories dating back to the 13th-14th centuries. The Makasar texts detail Gowa's territorial composition, and the elite's titles which generally carried one or more territorial connections. To provide these territorial data with explcit geographical meaning, I directed an intensive site survey covering 167 square kilometres of the districts abutting Ujung Pandang. 154 pre-colonial sites were mapped, including five brick palaces, three predominantly earth forts, two long brick walls along the coast, and places with burials dating between the 12th and 17th centuries (Bulbeck 1992). The survey team identified pre-Islamic burials from local reports of looted grave goods, and dated them from the tradeware caramics either kept in the villages or retrievable as sherdage from the looted areas.

The survey area centred on the past and present coastal plain of the Jeknekberang River, and the broad valleys of the major tributaries of the Tallok River (Figure 1). The land has been extensively moulded into bunded wet-rice fields which flood annually during the monsoonal torrents. Such a landscape of extensive rice fields in sunken locations, interspersed by houses, gardens and trees in higher locations, prevailed by the 17th century, as is clear from the Dutch reports (e.g. Andaya 1981:89-90, 172; Redi 1983a:119; Reid 1983b). Tallok's rulers sponsored land developments for wet rice throughout the 16th and early 17th centuries (Macknight 1983:102). Maros, slightly to the north, contains the oldest evidence for rice in Sulawesi, dated to 1490 BP (Glover 1985). These points suggest we may assume that wetland rice was the study area's staple crop throughout the historical period. Indeed, it seems unlikely that any other subsistence mode could account for the dense populations which can be reconstructed for Macassar's rural surrounds, as discussed below.

Population Size and Distribution

My strategy within the intensively surveyed area was to record every burial site in use between the 14th and 17th centuries. As the age of a cemetery could not be known before its inspection, all Islamic cemeteries within the survey area were visited, and at least some brief notes were taken. Comparing the 1985 population census with my notes on the functioning cemeteries in the three *kecamatan* which I had surveyed virtually in full, I estimated 1000 people per functioning cemetery. Applying the same estimate to the precolonial period suggested that the population in the surveyed area grew from around 60,000 in the 14th century to around 170,000 in the 17th century (Bulbeck 1992:13.3.2).

However, applying this ethnographically derived figure to previous centuries probably overestimates the earlier populations, as can be shown from the following considerations. Between 1930 (Allied Geographical Section 1945:175-85) and 1985, population densities per square kilometre have approximately doubled in those counties which I surveyed: Gowa (106, 198), Takalar (189, 321) and Maros (62, 133). Further, the 1930 population would also appear to have doubled since 1849. If the Dutch-governed "southern districts" mentioned in the 1849-50 *Koloniaal Verslag* (XXXVI:26-28) can be identified with Takalar and Jeneponto, then their population has grown from an estimated 70,000 in 1849, to 182,500 in 1930 and 432,000 in 1985. Similarly, if the "northern districts" of Maros and its hinterland can be identified with Maros and Pangkajene, then their population has grown from an estimated 120,000 in 1849, to 242,500 in 1930 and 439,000 in 1985. So we would expect a fourfold increase in the number of functioning cemeteries since the 19th century, if this parameter varied constantly with population size, but my survey data suggest a far more moderate increase varying between 25% and 50% (Table 1).

There are several reasons why an increase in number of cemeteries should lag behind rapid population growth. Firstly, unless associated with reduced fertility rates increased longevity will result in population growth (even though the reverse need not hold), i.e. a decline in the rate of "corpse production". Secondly, until they have gained adequate seniority new settlements may continue to use ancestral burial grounds (cf. examples in Bulbeck 1992:Chapter 9). Thirdly, as the landscape becomes more crowded settlements will swell rather than multiply. The last point is borne out by the strong positive correlation between population density and number of people per cemetery, calculable from the data in Table 1 (Pearson's r = 0.8). For the same reason, a similarly strong correlation operates between density of cemeteries (per square kilometre) and number of people per cemetery (r = 0.72). Furthermore, assuming a linear relationship between these two variables (i.e. the mathematical form $y = ax + b$) we can estimate the number of people per cemetery (y) by multiplying the cemetery density (x) by 429.3 and adding 239.3.

Table 1. Estimated 19th and 20th century populations and cemeteries, intensively surveyed *kecamatan*

	Somba Opu, Kabupaten Gowa	Bonto Marannu, Kabupaten Gowa	Galesong Utara, Kabupaten Takalar
Late 20th century			
Population	41,369	35,792	27,784
Cemeteries	39	41	27
Early 20th century			
Population	21,770	18,840	16,340
Cemeteries	37	36	24
19th century			
Population	10,850	9420	8170
Cemeteries	30	33	18
Late 20th century			
Population/Cemetery	1060	870	1030
Population density	1473	260	1277
Cemetery density	1.39	0.30	1.24
Early 20th century			
Population/Cemetery	590	520	680
Population density	775	137	751
Cemetery density	1.31	0.26	1.10
19th century			
Population/Cemetery	360	285	450
Population density	388	69	376
Cemetery density	1.08	0.24	0.84

Notes. Number of late 20th century cemeteries revised slightly downwards from my PhD thesis (Bulbeck 1992:459). Population and cemetery densities are per square kilometre. Early 20th century populations estimated based on the 1.9 times increase in population density recorded for Gowa county between 1930 and 1985, and the 1.7 times increase for Takalar county. These populations are assumed to represent twice the respective mid-19th century populations.

This last result is quite important as cemetery density can be taken directly from the archaeological survey data. As will be discussed below, the surveyed sites congregated mathematically into clusters which extended 3.6 kilometres inland from the coast, between 3.6 and 8 km, and eight km and over. So the lines drawn on Figure 1 separate the continuously surveyed area into a coastal area (39 km^2), immediate hinterland area (30 km^2), and inland area (98 km^2). To estimate changes in population I have reviewed my site reports for evidence of the spatially discrete burial grounds in use by at least the 14th century, the 15th century, the 16th century and the 17th century, within the three geographic divisions of the continuously surveyed area. (This approach differs from the countrpart exercise in my PhD thesis where I concentrated on "toponymic sites".) As the areas involved are known, recorded cemetery frequencies can be converted into the population estimates given in Table 2.

Table 2. Cemeteries and population estimates per geographical area

Number of cemeteries	14th century	15th century	16th century	17th century
Coast	11	19	37	51
Immediate hinterland	17	17	33	43
Inland	15	29	57	75
Estimated people per cemetery	**14th century**	**15th century**	**16th century**	**17th century**
Coast	360.4	448.4	646.6	800.7
Immediate hinterland	482.6	482.6	711.5	854.6
Inland	305.0	366.3	489.0	567.8
Estimated populations	**14th century**	**15th century**	**16th century**	**17th century**
Coast	3964	8520	23924	40836
Immediate hinterland	8204	8204	23480	36748
Inland	4575	10623	27873	42585
Total	16743	27347	75277	120169
As a proportion of the 17th century population	**14th century**	**15th century**	**16th century**	**17th century**
Coast	10%	21%	59%	100%
Immediate hinterland	22%	22%	64%	100%
Inland	11%	25%	61%	100%
Total	14%	23%	63%	100%
Population densities (people per square km)	**14th century**	**15th century**	**16th century**	**17th century**
Coast	102	219	613	1047
Immediate hinterland	273	273	783	1225
Inland	47	108	284	434
Total	100	164	450	720

The reliability of these estimates can be checked for the 17th century against the estimates of the local population available from European texts. Consider the approximately six square kilometres corresponding to the southern half of the city of Macassar - "Macassar proper" as described by Speelman in 1669. It contains only 17 recorded 17th century burial sites (Bulbeck 1992:Chapter 11), yet at around AD 1650 would have contained ten houses per acre (Reid 1987) or, at four to five people per household, 40-50,000 inhabitants. The exhorbitant ratio of around 2500 people per cemetery reflects the difficulties confronting site survey within a currently active delta, to the extent that the textually derived estimates alone are reliable (Bulbeck 1992). However, site recovery problems were far less notable within my Aeng, Anak Gowa and Kale Gowa clusters, which correspond to Macassar's contiguous villages. My estimate of approximately 90,000 inhabitants for Macassar's contiguous villages during the 17th century (Table 3) agrees with the indications (Reid 1987) of approximately 100,000 inhabitants within old Macassar's immediate surrounds over and above the 80-100,000 people within the city itself. These indications are the 1615 report from Macassar that 36,000 fighting men (presumably 20% or less of the total population) were mustered within 24 hours, and the 1636 report that 60,000 people died in a plague. Hence the historical records confirm the archaeologically derived estimates of the study area's 17th century rural population.

Table 3. Estimated 17th century population of Macassar and districts

District	Estimated Population
Macassar (10 houses/acre X 12 km^2)	80,000-100,000
Aeng, Anak Gowa & Benteng Tua clusters (9 cemeteries @ 800 people/cemetery plus 43 cemeteries @ 855 people/cemetery)	44,000
Tallok heartland (9 cemeteries + 21 historical toponyms)	44,000
7-20 km radius from Somba Opu southwards (100 cemeteries @ 568 people/cemetery - assume half surveyed)	114,000

Note. Population of Tallok heartland assumed approximately equal to that of the Aeng, Anak Gowa and Benteng Tua clusters, as approximately the same area is represented, and were it surveyable the same order of site density could have been expected.

We can therefore estimate the population of Macassar and its districts at their mid-17th century peak (Figure 2). The "city of Macassar" is here identified with the area shown as densely populated at c. 1638 (Reid 1983b:144). Macassar's "contiguous villages" comprise the ring of land between Aeng and Kale Gowa included in my intensive archaeological survey, and an equivalent stretch of land corresponding to Tallok's political heartland (unsurveyed, except for Fort Tallok). The estimated 90,000 inhabitants, at a density in excess of 1000 people/km^2 (cf. Table 2), would properly speaking indicate a suburban rather than rural setting. While high such an estimate does not seem excessive given that

the zone includes the two main Makasar palaces, whose brick walls respectively enclosed 84 hectares and 40 hectares (Bulbeck 1992). Macassar's "outlying districts" are represented by the ring of land due east to due south of Somba Opu. As approximately half this area was surveyed intensively, the populated calculated from the number of recorded cemeteries (57,000) can be doubled. Thus the total population in the area indicated in Figure 2 was about 300,000, comprising equal numbers within the city, its contiguous villages and its outlying districts, despite the contemporary Dutch sketches (Reid 1983a) which misleadingly depict the land around the city as vacant fields.

Looking at populations prior to the 17th century we have only the archaeological data available for comparison (Table 2). As already noted these data are inadequate for the currently active delta where Somba Opu is located. However, it is hard to see a reliable, formal correction for that inadequacy, and my analysis will essentially follow the indications supplied by Table 2. The coastal populations consisted of fishing and maritime trading communities with access to a strip of annually flooded agricultural land behind the coastal dunes. The immediate hinterland comprises the Kale Gowa (Gowa's political heartland) and Anak Gowa clusters, or in land-use terms the major concentration of wet-rice land. The inland populations consisted of villages ringing the comparatively restricted lowland swamps, and with access to raised land suitable for dryland farming (where indeed a small porportion of the sites are located).

The population clearly grew strongly and consistently between the 14th and the 17th centuries, apparently registering a five to tenfold increase during the period (Table 2). The major increase may have been between the 15th and 16th centuries, involving a threefold increase. Thus the study area stands out as another clear example of a strong (and undoubtedly recursive) relationship between population growth and political centralisation (e.g. Macknight 1983). In this context, note that the "immediate hinterland" held what was easily the area's densest population (270 people per km^2) during the 14th century, reflecting Gowa's establishment as an agrarian kingdom (presumably based on wet rice) by around AD 1300 (Bulbeck 1992).

Despite the pronounced population increase, the distribution of the population cannot be shown to have changed between the 15th and 17th centuries. (Technically this is because the relative distribution of cemeteries remained constant, and my mathematical steps deriving population from cemeteries involve unilinear manipulations.) On the other hand, a case could be made that the population along the coast may have grown to a larger degree than the hinterland populations. There seems little reason to doubt that Tallok's establishment as a major kingdom at around AD 1500 involved the exodus of a significant proportion of Gowa's population to the mouth of the Tallok river, which area is not included in Table 2 (Bulbeck 1992:Chapter 12). Similarly, both the ceramics and the historical evidence indicate that the population grew especially pronouncedly within the area of "Macassar proper" during the 16th and early 17th centuries (Bulbeck 1992:Chapter 11). Therefore, the value of the present analysis may lie in showing that, despite any such heightened emphasis on maritime activities during the 16th and 17th centuries, the hinterland populations continued to proliferate.

Several important conclusions follow. The basic organisation of the economy suggested by the 17th century sources appears to have been

established by the 15th century, i.e. it was a **precondition** rather than a **consequence** of the trends towards political centralisation which followed. This centralisation involved the **intensification** of economic activities within **each** ecological sector. Such **balanced dynanism**, with rapid population growth sustained quite equally throughout the study area, provides the basis for understanding why political relations remained fluid, and the centres of power peripatetic, within a general trend towards the aggregation of polities.

Site-Clustering Patterns and Political Spheres

Attempts to link settlement patterns recorded archaeologically to sociopolitical and economic organisation have to date enjoyed only limited success. One classical approach, Central Place Theory, involves several assumptions concerning geographical homogeneity and a market exchange which are either inapplicable or at least contentious with respect to archaeological situations. At best the site pattern "conforms fairly well" to the theory's expectations (Bray 1983:183; see also Johnson 1972). More realistic attempts to apply the principle of "central places" include Thiessian polygons and XTENT modelling (e.g the papers in Grant 1986). While the above approaches reconstruct spheres of influence based on identified political centres, an alternative methodology identifies political territories from the clusters which the individual sites themselves form (e.g. Alden 1979).

My own settlement-pattern analysis (Bulbeck 1992) combines the above approaches by using average-linkage clustering rather than the nearest-neighbour clustering algorithm employed by Alden. At any stage of joining sites, we have both a cluster centre, and a territory defined by the boundary of the sites within the cluster. Clustering continues until all the sites have been assigned to a particular cluster. The clusters can then be compared with the sociopolitical groupings recorded in Gowa's 16th and 17th century records (Mukhlis 1975), and the locations of the mathematically defined cluster centres and the major sites (as identified archaeologically) can be compared.

It might seem that this approach produces a static political landscape, whereas the texts document numerous changes such as relocation of the palace centres and changing composition of Gowa's *Bate selapang* or nine community heads. However, ambiguities arise within the site-clustering exercise depending on how geographical barriers such as rivers are treated, whether brick wall is treated as "site", how sites abutting the intensively surveyed area are handled, and whether joins which are only "probable" are accepted. (Alternative methods of introducing ambiguity, with which I have not yet experimented, would be the use of Ward's clustering method as well as average linkage, and carrying out the exercise separately for 16th century sites and 17th century sites.) Arguably, whereas a pattern which reasserts itself represents a geopolitical fixture of the landscape, patterns which arise only under certain methodological procedures should correspond to more fleeting circumstances. These variable clusters will be fitted to their most appropriate geopolitical organisation, based on conjoint analysis of the historical and archaeological data, in the reconstructions which follow. Primary centres (primary palaces), secondary centres (secondary palaces and independent political centres), and tertiary centres (Gowa's nine community heads, and "dukedoms" which seated noble *karaeng*) will be plotted at various intervals. Note that the central places which are not distinguished by fortifications nonetheless stand out archaeologically as extensive burial ground complexes, e.g. Saumata, Pattallassang, Moncongloe, Paccellekang (Pattiro Tua), Kanjilo, Mandallek and Galesong.

Figure 3 depicts the early 16th century, more precisely the period when Tallok (Karaengloe ri Sero) had established its independence of Gowa (Batara Gowa). At this stage the landscape was still shared among numerous independent kingdoms, for instance the five shown along the coast. Trends towards centralisation can be seen in the alliance of six inland communities with Gowa, and the confederation involving Jamarang, Mandallek and Bajeng (a confederation which included a further four kingdoms south of the picture).

This centralising trend continued when Gowa absorbed Garassik whilst relocating its palace to Somba Opu in the mid-16th century, and Galesong (briefly) and Jamarang disappeared from the historical records (Figure 4). Gowa's early 16th century allies generally became Gowa's mid-16th century constituent communities or *Bate selapang*, although Paccellekang has dropped out, and Borongloe appears to have been absorbed by Bontomanaik. The expansion of the territory directly controlled by Gowa, at Tallok's expense, is clear. (During the late 16th century Tallok became a dependency of Gowa, first between 1577 and 1590 when its ruler was the wife of the Gowa king, and then between 1590 and 1593 when it was directly ruled by the Gowa king.)

Figure 5, referring to the early 17th century, depicts the geopolitical organisation between 1620 and 1634, when Tallok's Abdullah (Karaeng Matoaya) exercised the regency from Bonto Alak whilst keeping his son Mudhaffar on the Tallok throne (presumably at Tallok itself). Abdullah's relocation from Tallok should be understood in terms of Bonto Alak's superior placement for administering Macassar, whose management was clearly now under the auspices of Tallok's royalty and high nobility. Gowa, which had relocated inland to its original palace of Kale Gowa, did not have direct control over even the Kanjilo area to the immediate south, let alone the Macassar harbour. Nonetheless with the late 16th century demise of Bajeng to the south and Maros to the north, the area covered by Gowa's nine community heads had expanded dramatically compared to the middle 16th century situation. We see at this stage a clear separation of powers between Tallok, whose jurisdiction covered the coastal stretch embracing Macassar, and Gowa which was responsible for the greater hinterland. Galesong's re-establishment as a coastal kingdom south of Macassar is consistent with these developments.

The middle 17th century, between 1635 and the Dutch occupation of Macassar in 1667, shows some new developments (Figure 6). Whereas mutually exclusive geopolitical spheres for Gowa and Tallok can be delineated for any previous stage, now Gowa's and Tallok's territorial jurisdictions overlapped. Thus Gowa's community heads and dukedoms, and Tallok's dukedoms, display an interdigitated distribution. Hence although the royal court, re-established at Somba Opu, was officially headed by Gowa, it was a plural institution which included several Gowa and Tallok factions, as well as a faction descended from the Maros nobility. Complementary with Macassar's plural constitution, we can observe a complete lack of even nominally independent polities within Somba Opu's vicinity. By 1667 the coastal plain from Maros to the far south coast was directly ruled from Somba Opu, except for the insignificant kingdom of Jipang left over as an isolated remnant of the early 16th century Bajeng confederation.

As an initial generalisation (Figure 3 to 6) we can note a usually close correspondence between the site cluster centres and major places. "Natural" central places include Kale Gowa, Saumata, and less impressively Pattallassang and Mandallek. Garassik/Somba Opu is another "natural central place", even though it sat on a major estuary to

supervise the trading activities centred there, as would be expected of a major coastal place. Despite the "pull of the sea" Garassik/Somba Opu sat in a bay and was ringed by seashore and near-coastal settlements, and so was a suitable central location for supervising the dependent settlements. Tallok on the other hand was far less suitable as an administrative centre as, even today, the land immediately north of the Tallok estuary is thinly populated.

To some degree there is a positive relationship between the stability of a site cluster and the continued prominence of the corresponding community in the historical records. Kale Gowa (Gowa), Saumata and Pattallassang are clear examples, and contrast with more fragile site clusters such as Moncongloe, Borongloe and Paccellekang. Note that local community solidarity tends to persist even in the latter cases, for instance Paccellekang reappeared as an administrative centre in the mid-17th century after a century of obscurity, and Borongloe arose again as the elite ruling the local administrative centre of Bonto Ramba (with Bontomanaik now a dependency) in the early 20th century (cf. Chabot 1950). In other cases the settlement cluster produced the continuity in the face of sociopolitical change. For instance the Macassar harbour consistenty contained an administrative centre, although it vacillated between Garassik and Somba Opu, and a cluster centred near Mandallek persisted even though at one stage, the early 17th century, it was the seat of Galesong kingdom.

Bonto Alak stands out as an under-utilised "natural" central place for the area between the Tallok estuary and the northern reaches of precolonial Macassar. (The centre of the Tallok site cluster constantly falls close to Bonto Alak, including Figure 4 where Pampang and Tallok would join, with a centre near Bonto Alak, except that the Pampang cluster is shown distinctly as it was dependent on Gowa). Hence the decision by the successful Bone war leader Arung Palakka, to base himself in Bonto Alak after Makassar's occupation by the Dutch, should be understood in terms of Bonto Alak's natural advantages for local administration.

The most dramatic changes to the geopolitical landscape occurred at the macro level, for instance the absorption of the polities to the south within Gowa, Tallok's rising and falling status, and Gowa's vacillation between domination over Macassar and being a hinterland kingdom based at Kale Gowa. (The latter occurred again after the 1669 destruction of Somba Opu, when Gowa relocated to Kale Gowa and later to Sungguminasa.) Such dramatic changes followed shifts in political alliances and expediencies, and it is extremely doubtful that any of the large-scale networks shown in Figures 3 to 6 could have been retrodicted from archaeological data alone. Indeed Gowa's exceedingly rich geopolitical record (when seen through the magnifying glass of archaeological survey) is so valuable precisely for its exemplary demonstration of political lability and organisational restructuring. (Complex societies neither are static, as site-clustering analysis alone might suggest, nor follow simple one-way trajectories as disconnected snatches of historical records might indicate. Even those scholars interested in major patterns rather than details should be aware that the less complete a record, the less representative it is.)

On the other hand there have been powerful continuities in local geopolitical organisation, as the settlement-pattern analysis clearly demonstrates. These continuities were not vested in mystical lines of ancestors or mental structures detached from the local ecology. They were vested in the propinquity of communities clustered together,

adapted to similar ecological conditions and utilising corporate as well as private resources. These community groupings, whether specialised in maritime trade and exploiting the coastal resources, or managing the monsoonal rice fields of the coastal plain behind Macassar, constituted the deep structure of local sociopolitical organisation which supported the veil of political alliance and intrigue.

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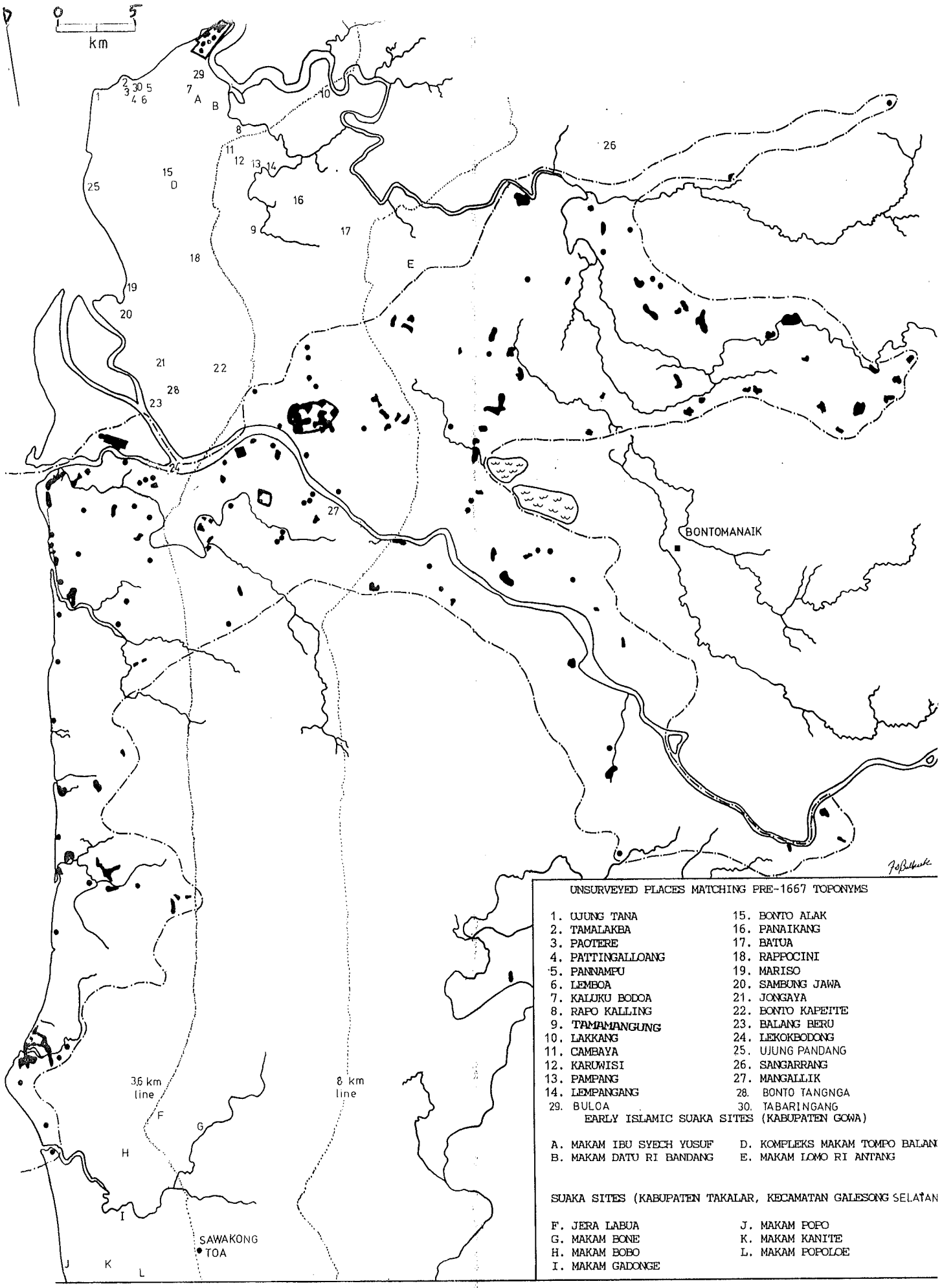


FIGURE 1.

IMMEDIATELY PRE-ISLAMIC & EARLY ISLAMIC SITES - AREAS & POINTS - USED IN RECONSTRUCTING GOWA'S SETTLEMENT HIERARCHIES

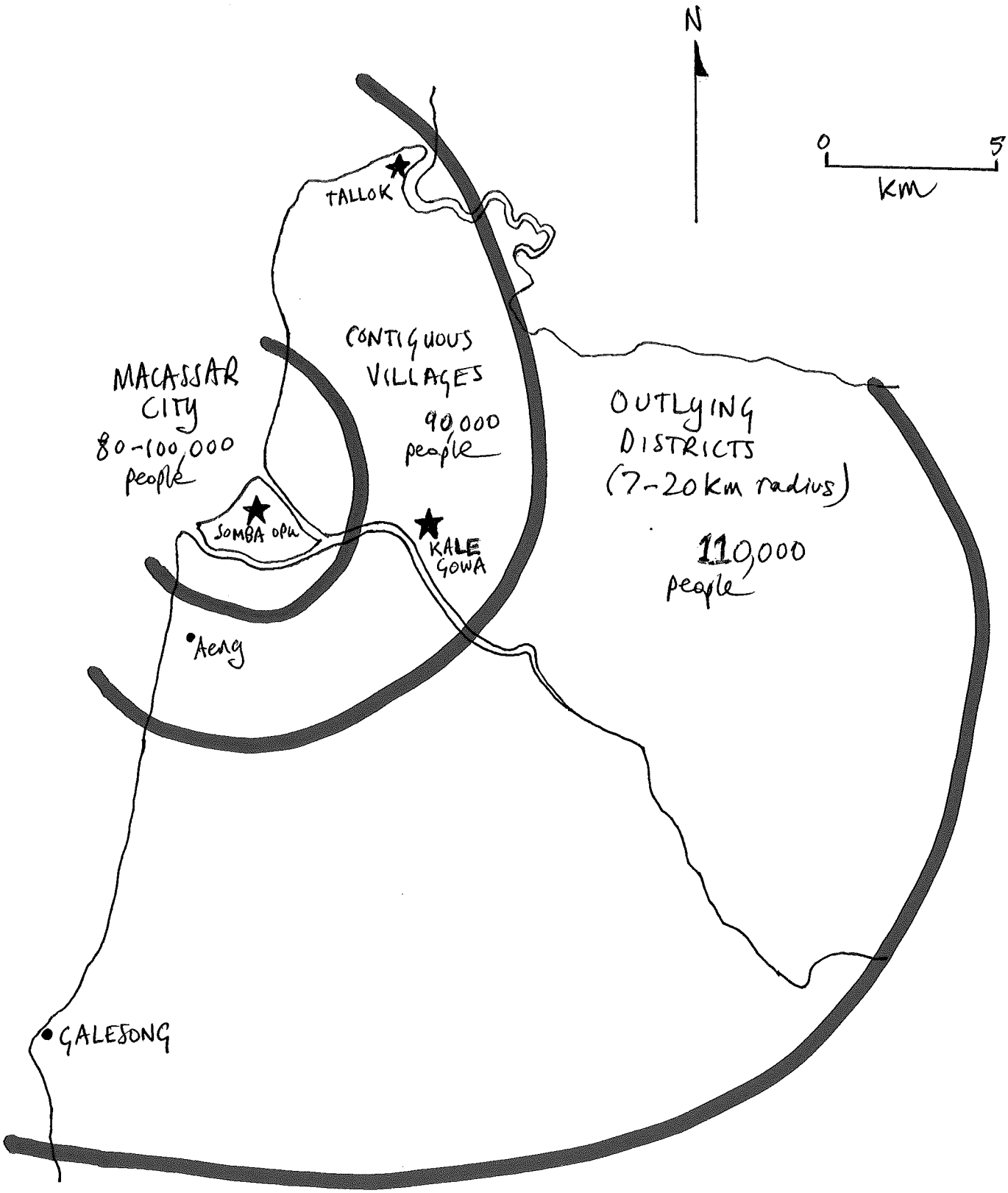


FIGURE 2. DISTRIBUTION OF MID-17TH CENTURY POPULATION OF MACASSAR AND DISTRICTS

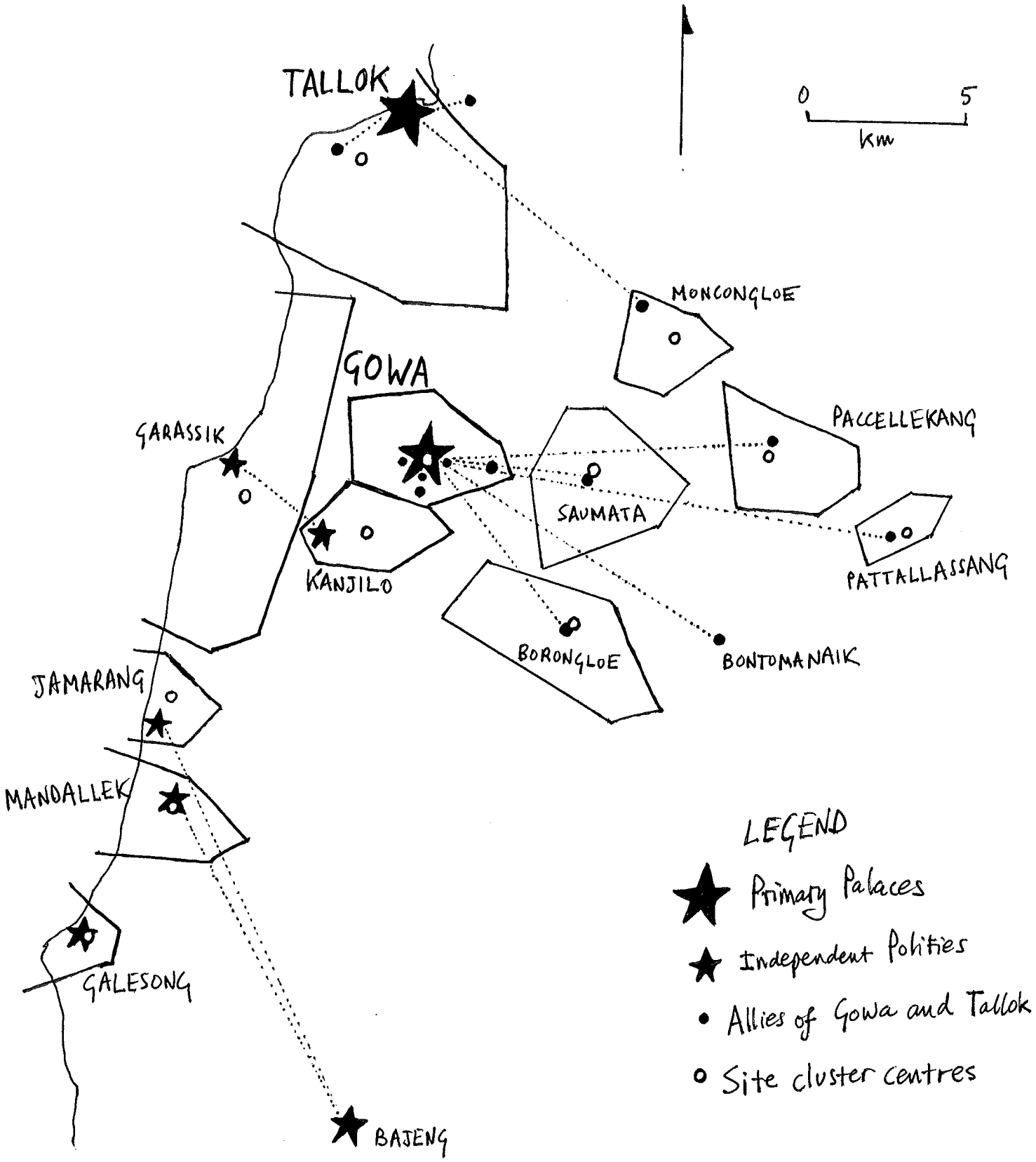


FIGURE 3. EARLY 16TH CENTURY GEOPOLITICAL LANDSCAPE

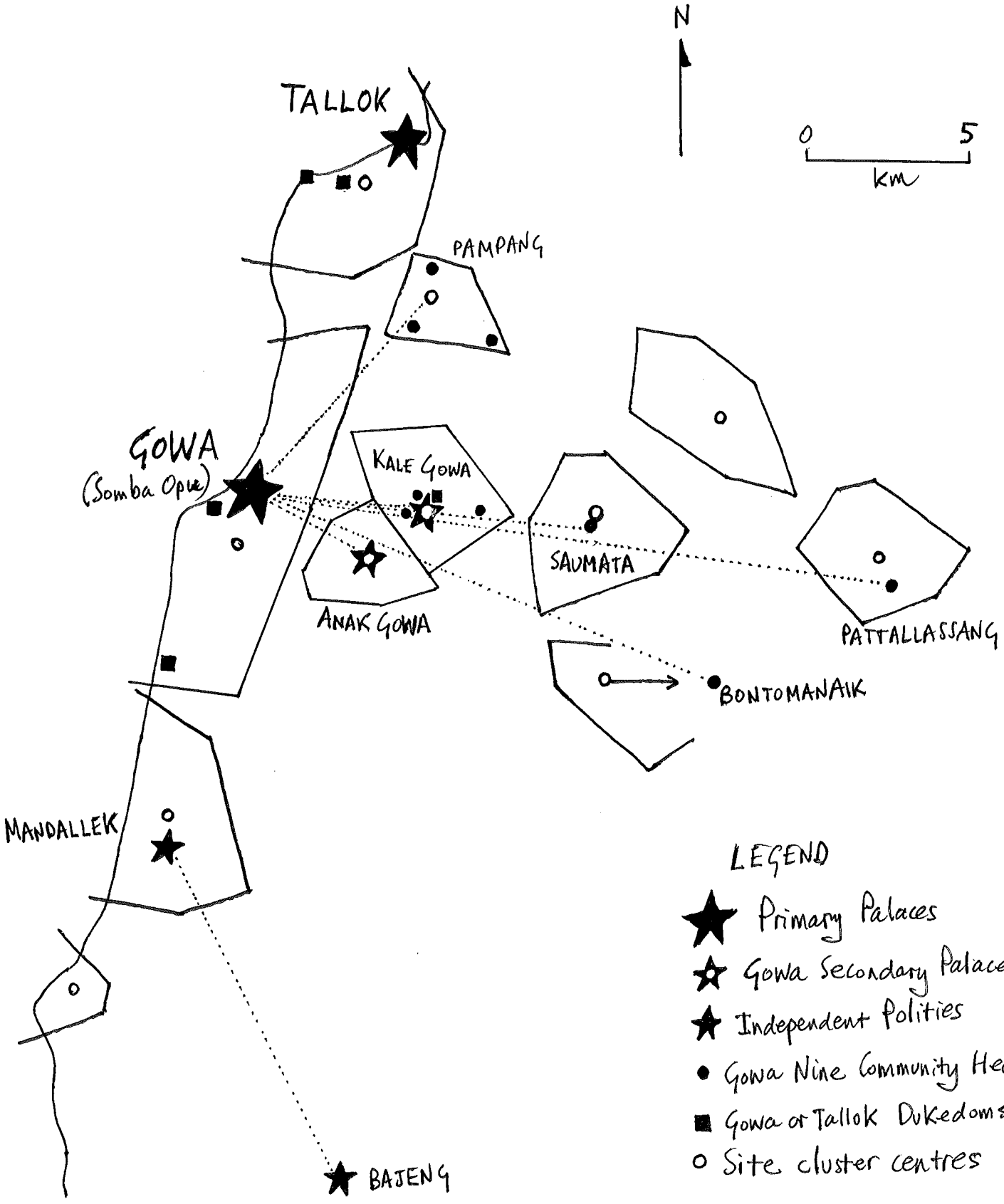


FIGURE 4. MIDDLE 16TH CENTURY GEOPOLITICAL LANDSCAPE

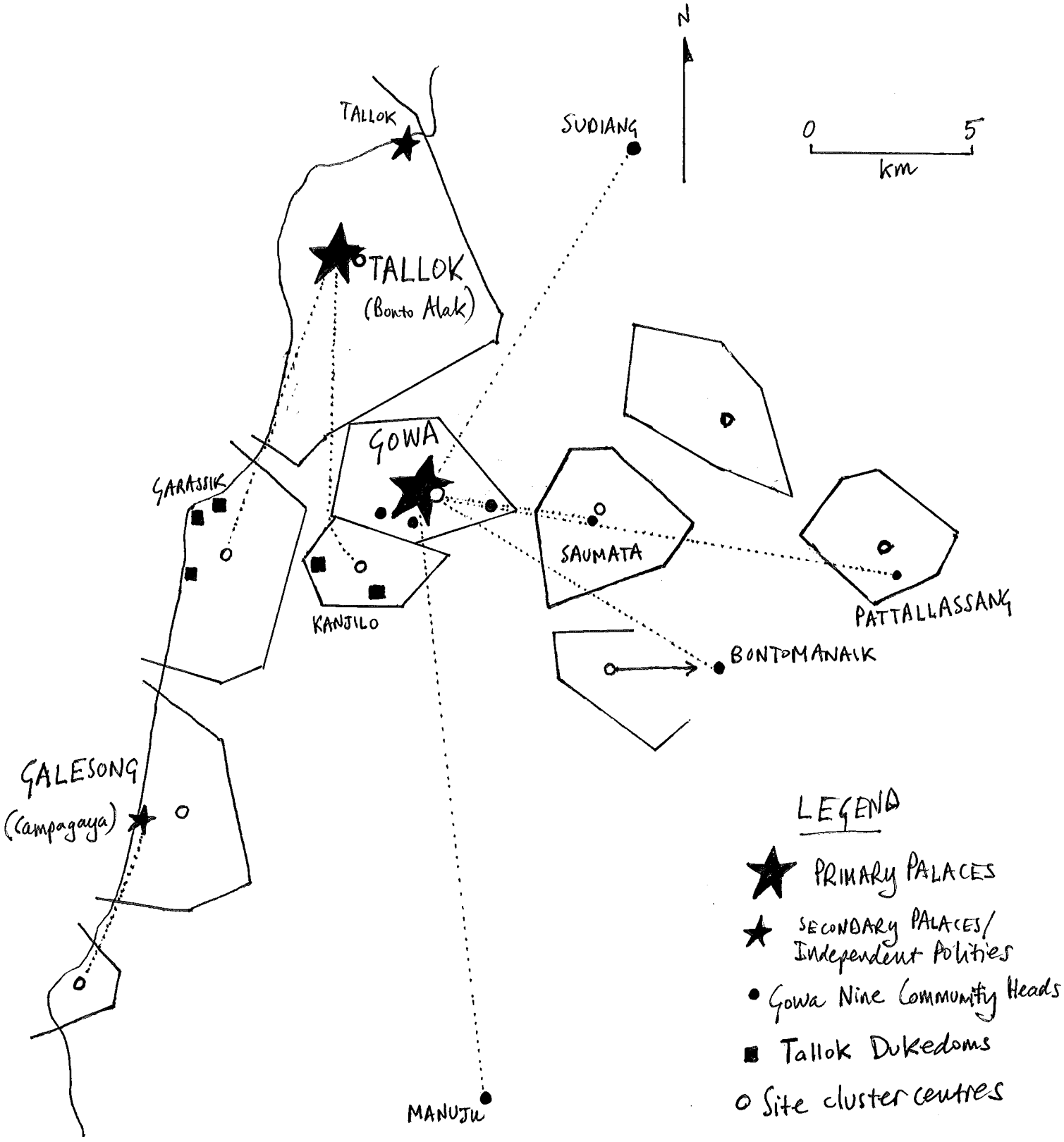


FIGURE 5. EARLY 17TH CENTURY GEOPOLITICAL LANDSCAPE

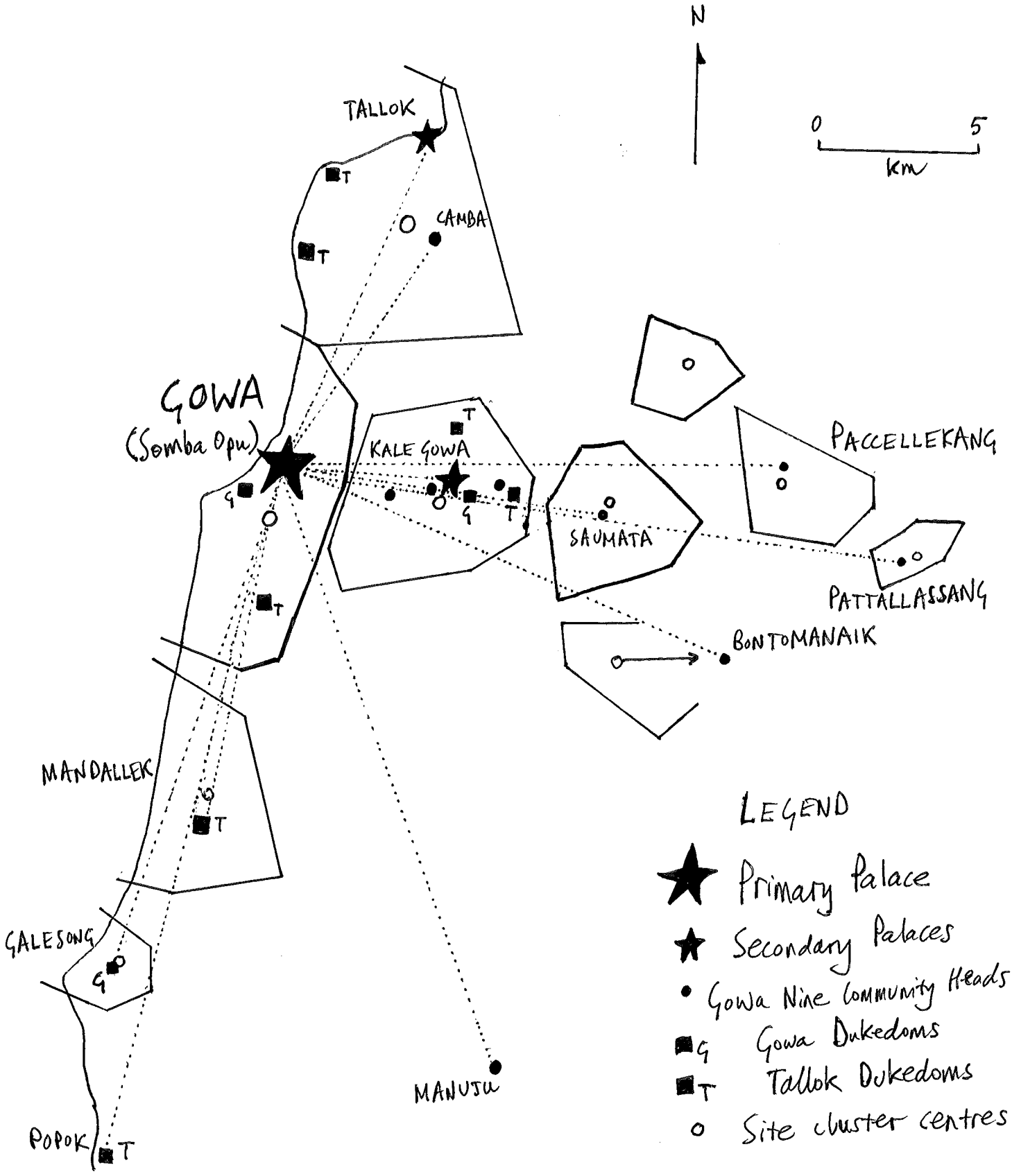
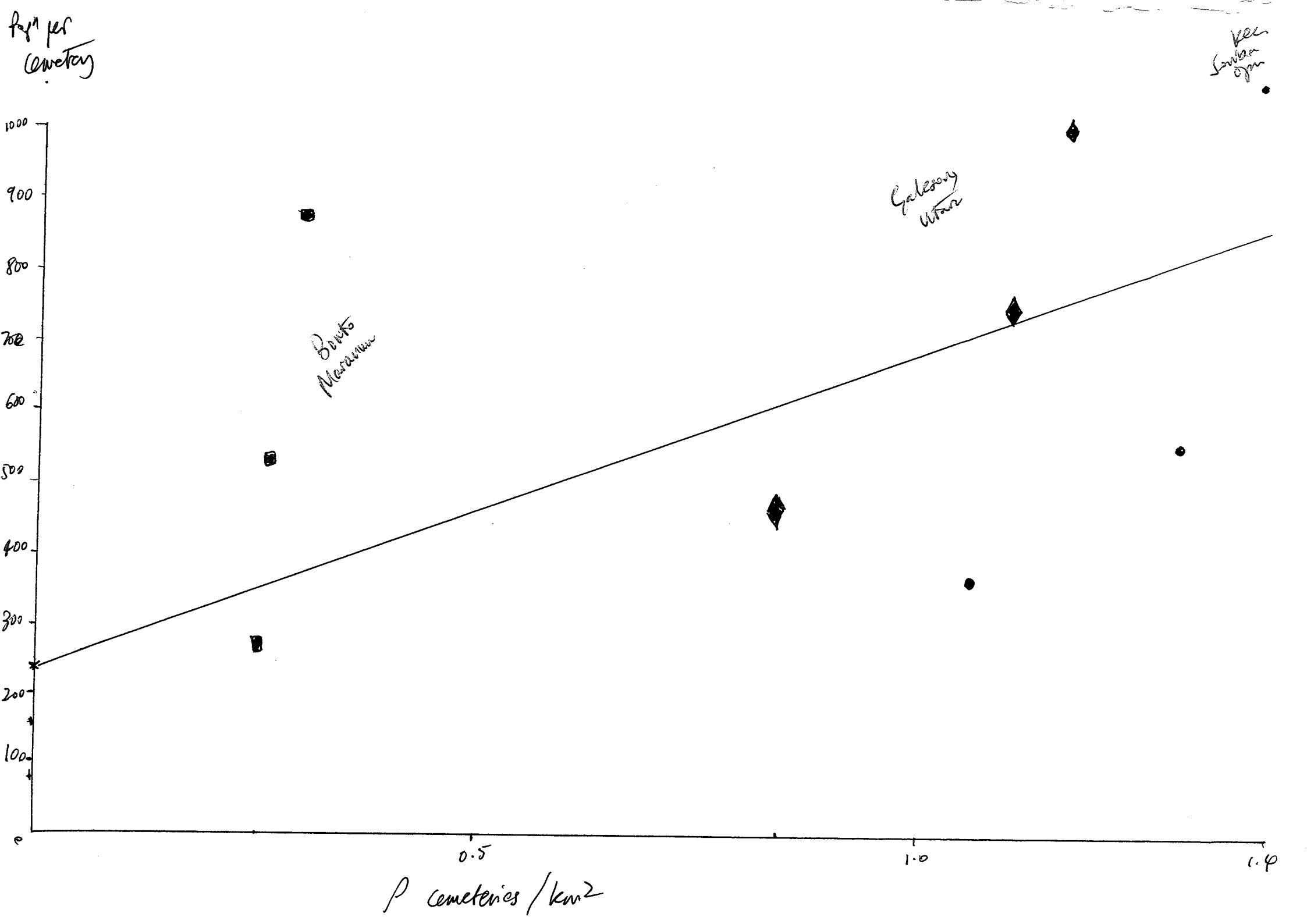


FIGURE 6. MIDDLE 17TH CENTURY GEOPOLITICAL LANDSCAPE


Pop per cemetery
1000
900
800
700
600
500
400
300
200
100
0
0.5
1.0
1.5
ρ cemeteries / km²
Galesong Utara
Bonto Marannu