

## Book Summary

### GALLE - A geomedical approach to a coastal town in Sri Lanka (Ceylon)

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**Note by editors of Ceylon Journal of Medical Science:** Dr Hella Wellmer of the University of Heidelberg, Germany carried out research on the medical geography of the City of Galle in 1981 and 1982.

Her work resulted in two publications:

- (i) Galle: Geomedizeinsche Analyse einer Kustentstadt auf Sri Lanka (Ceylon). Stuttgart: Steiner Verlag Weisbaden GmbH, 1989. In German, 570 pages.
- (ii) The Underground Drainage System in the Fort of Galle, (Sri Lanka). In : Schweinfurth U. (Ed.). *Forschungen auf Ceylon III*.

This paper is a summary of the first publication made by her in her book. Thirteen maps (from a total of 87 maps and figures) appearing in her book are also reproduced. The book is available for reference at the library of the Royal Asiatic Society (Sri Lanka Branch), Ananda Coomaraswamy Mawatha, Colombo 7.

This book was originally written as a thesis which had been initiated by Professor U. Schweinfurth. Field work was carried out in Sri Lanka from September 1981 to September 1982, and again in March 1983.

The essence of the book is an approach to the spatial distribution of health and disease. This geomedical approach consists in the description of areas within the town of Galle, homogeneous with respect to the ecological factors, which determine the quality of life and the health of their inhabitants. The author names these areas "hygiochores" - in accordance with nosochores, areas of uniform prevalence of diseases. The hygiochores do not correspond with the administrative areas in Galle. One of the basic problems in geomedical analysis is the fact that statistical data are available only for administrative areas, which are not necessarily identical with ecological units.

Rivers, hills, or streets are often depicted as administrative boundaries, whereas from an ecological point of view they are the central structures. It was nevertheless possible to use the original census of 1981, since census blocks are very small. Most of the other data the author collected herself by way of household-interviews, inspection of all rooms and facilities in 300 households (1958 inhabitants), stool samples of children 3 - 12 years old, interviews with hospital in-patients, and mapping of such relevant factors as vegetation (Figure 1), run-off, soil, private water supply (Figure 2), public water supply quality of streets, public and private buildings (Figure 3), toilets (public and private and open land, sea-shore), (Figure 4), ethnic groups (Figure 5).

Part One gives an introduction to the physical geography of the town of Galle (Figure 6).

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Two parallel hill ranges, running NE-SE and ending on the peninsula, where the Fort was built in colonial times, are the most prominent features. They form the western rim of a geological depression, which has a sandy coastal plain - the northern shore of a natural harbour - at its centre. This densely inhabited coastal plain with high water table is one of Galle's problem areas. But most of the health hazards prevail in the low-lying stretches of the little rivers running parallel to the hills, especially of the Moragoda Ela at the centre of the depression.

The geographical introduction is followed by an account of Galle's history and by cultural regionalisation of the town. The densely inhabited areas and the Central Business District (CBD) are oriented towards the harbour, whereas the outer parts of the town are determined by the arterial roads, which follow orography (Figure 7). The upper class prefers the hill ranges as residential areas, the lowest class is displaced to the low-lying areas. It can be demonstrated that type of housing indicates the socio-economic status of the inhabitants.

Part One ends with a description of the main factors of urban landscape as far as they are relevant to the following geomedical analysis. Water supply and water disposal are outstanding problems in a tropical environment. While a dense network of pipes guarantees that water supply is sufficient, no sewage system exists except for a drainage system for storm water in the Fort. The water runs in open canals. The toilets are connected to pits or septic tanks. All sewage water whatever the means of its disposal, bears health risks as breeding place of mosquitoes or distributor of worm-diseases.

The drainage system in the Fort (p. 224 ff) is of special historical interest. Due to lack of maintenance it has today turned into a health hazard. Maintenance was prevented by a commonly held belief that the drainage system was washed by the tide. The author was able to defeat this disastrous assumption and to show that the canals are partly blocked, and inhabited by rats and insects.

Part Two relates the findings of the survey to regionalisation. Housing, education, age structure, income, and diseases are analysed in context with the environment. Filariasis and geohelminthic diseases are the two main topics of this chapter. Galle is situated within the "filarial belt" of Southern Sri Lanka (A. S. Dissanayake, 1965, 1984; U. Schweinfurth, 1983). By mapping all microfilaria-positive cases as reported by the Anti-Filariasis Control Unit of Galle, 1971 - 1979 (Figure 8), the coastal plain was identified as the most heavily infested area. Two characteristics are prominent: high population density and low number of registered breeding places. Three factors are likely to be responsible for the high number of microfilaria positives:

1. proximity of the Moragoda Ela: centre of the depression; high water table.
2. high population density: discarded receptacles as breeding places for mosquito vector; high number of microfilaria positives as reservoir.
3. insufficient control measures, as discarded receptacles cannot be sprayed.

In Sri Lanka geohelminths are very common parasites in humans. Stools of 428 children (3 - 12 years) were investigated for *Trichuris trichiura*, *Ascaris lumbricoides*, and Hookworm. 206 (= 48%) contained more than one species. Again the low-lying areas are the most affected (Figure 9). Due to habitat conditions characterized by humid but well aerated soils, prevalence of hookworm is highest in the low-lying areas (Figure 10), especially when there are defaecation grounds in the open as a result of a lack of toilet facilities. Due to the high water table, pits cannot be built in these areas, and septic tanks are too expensive for the mostly poor families. *Ascaris lumbricoides* is connected to high housing density, especially when more than 6 households share one toilet (Figure 11). *Trichuris trichiura* is found all over the town (73% of the children investigated). Only children of rich families with high education and high living standard are free of it, irrespective of the environment they live in.

Figure 12 gives a synopsis of prevalence zones for worms:

- I. The Fort is free of hookworm (tarred streets, sufficient toilets); *Ascaris* and *Trichuris* are rare.
- II. Densely built areas without trees (i.e. shadow): prevalence of the three worms is about average.
- III. Coastal plain and low-lying areas: highest prevalence.
- IV. Sparely populated areas and hills: prevalence below average.

The hygiechores appear as a synopsis of the factors analysed. For purely practical reasons it is not possible to consider all ecological factors relevant to health. The author therefore has to be content to describe the hygiechores according to the factors which she analysed during the survey: natural regions, vegetation, utilization in history, population density, public buildings and industries, house-types and socio-economic status, sanitary facilities, ethnicity, infrastructure, supply with goods of daily demand, access to medical facilities, selection of diseases.

Six types of hygiechores (A-F) have been identified (Figure 13): 'A' indicates areas where quality of life is best and the incidence of diseases lowest. 'F' indicates areas most unfavourable to health and quality of life. In the cultural regionalisation, zones are arranged in half-circles with the harbour in their centre. When the ecological setting and the values defining living and health conditions are taken into account, the half-circles become penetrated by a more sectoral or striped pattern, shaped in accordance with the parallel configuration of hill ranges and valleys (hygiechores A and F), i.e. with topography.

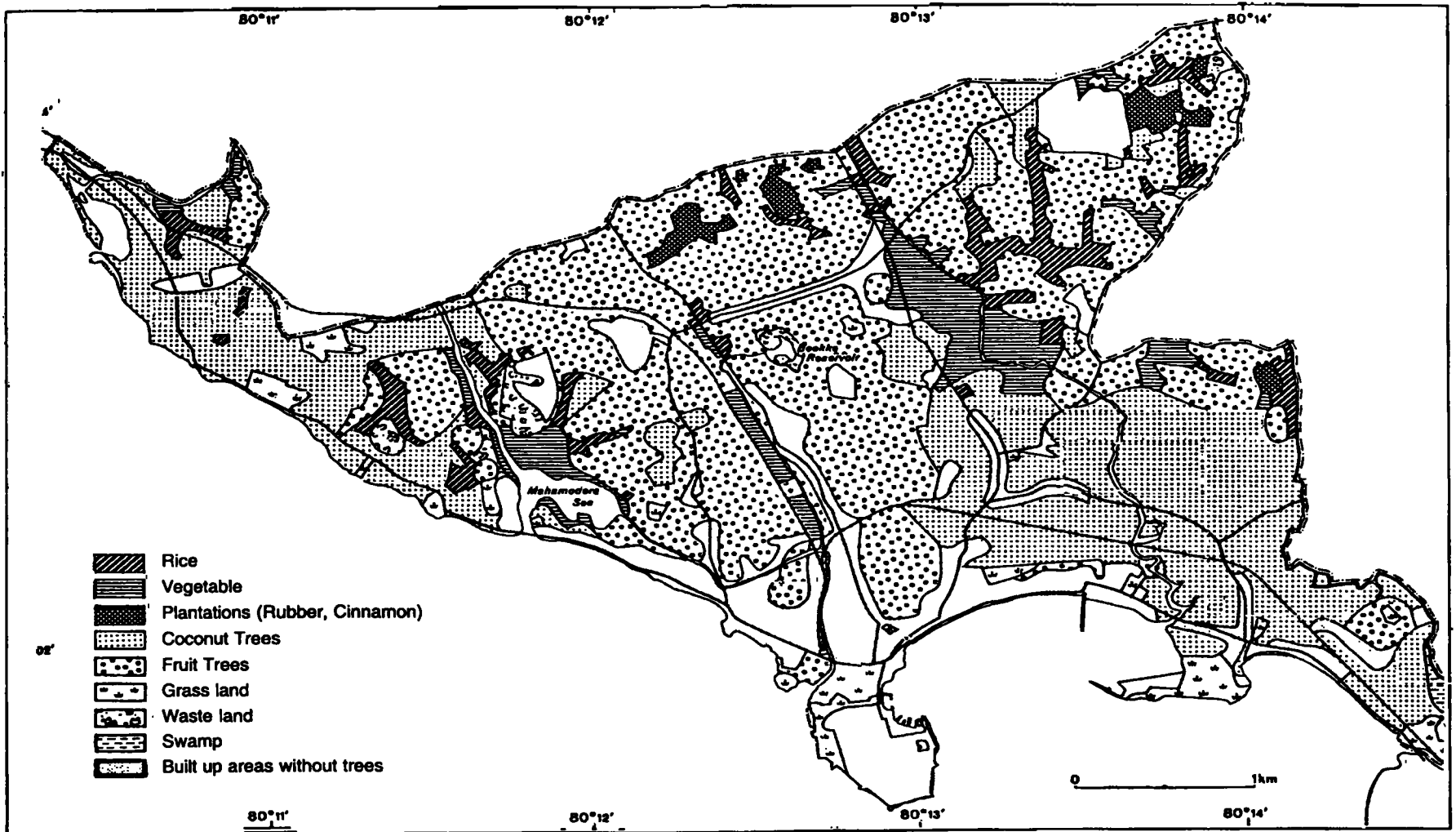
There are two problem areas in town: on the one hand the low-lying areas, where helminthic diseases are prevalent and where lack of infrastructure and temporary flooding cause inconvenience; on the other hand the slum areas in the inner urban core, with high density of housing, with a high rate of poverty and unclean conditions. In both cases, the inhabitants have a low educational

standard and live in an unhealthy environment. On the upper end of the social ladder - and in glaring contrast to the above-mentioned - the upper class and upper middle class live in the areas of best quality of life in Galle, designated with the hygiechore 'A'. They dwell in spacious villas with servants and sanitary facilities and enjoy the conveniences of a good infrastructure. Infectious diseases and undernutrition are rare.

Despite such differences regarding education, standard of living, hygiene, and nutrition, differences in health status are distinct but not dramatic. The described hygiechores differ in this respect less than one should expect. To account for this, three characteristics of the town of Galle must be considered:

1. Favourable geographical conditions: high rainfall, i.e. sufficient water supply, proximity to the Indian Ocean, lateritic soil and hilly landscape in most parts of the town, remoteness from the flood endangered catchment area of the Gin Ganga river, and a climate enabling the inhabitants to stay in the open all-day.
2. Traditions: daily body-wash, boiling of all meat, fish and vegetable, the idea of preventive measures in Ayurvedic medicine.
3. Since Galle is a place of out-migration, it is unaffected by the consequences of invasion by impoverished crowds from the rural areas. The few slum-areas in the town-centre are infinitely better than the slums in Colombo, which are situated in the low-lying areas, i.e. the most difficult environment. The low-lying areas of Galle are also inhabited by urban poor, but the term 'slum' would be inappropriate for the widely scattered huts located on grassy land beneath coconut-trees and built of traditional material, where they live.

The urban development plan of Galle considers economy, traffic, and development of so called neighbourhoods. Health is not mentioned at all. The identification of hygiechores can be a helpful tool for planners.



Quellen: Eigene Geländearbeit und Luftbilder ca. 1:25333, 1975, Survey Dept., Colombo.

Figure 1. Existing vegetation within the town boundaries of Galle 1982

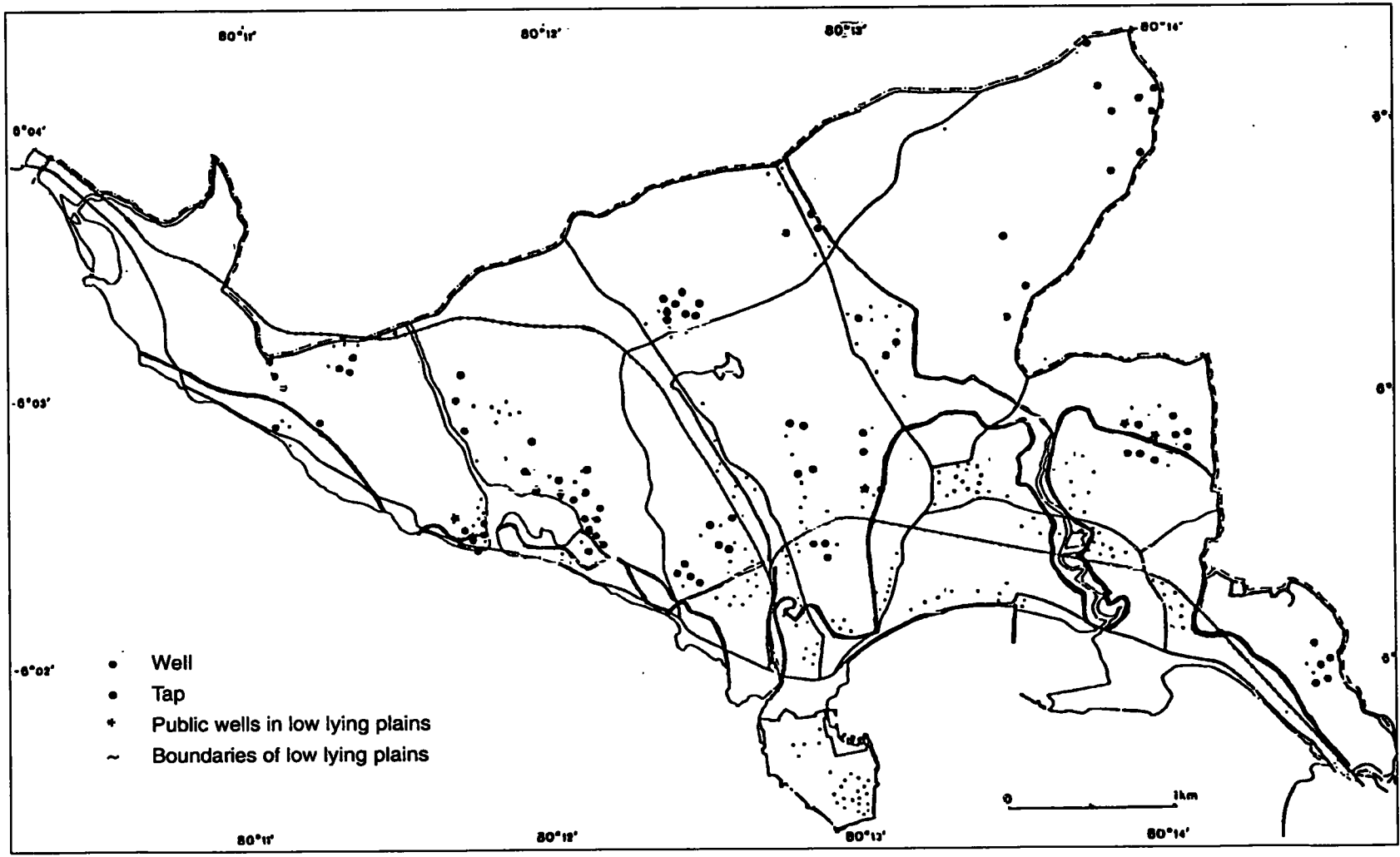


Figure 2. Drinking water in sample of 300 houses

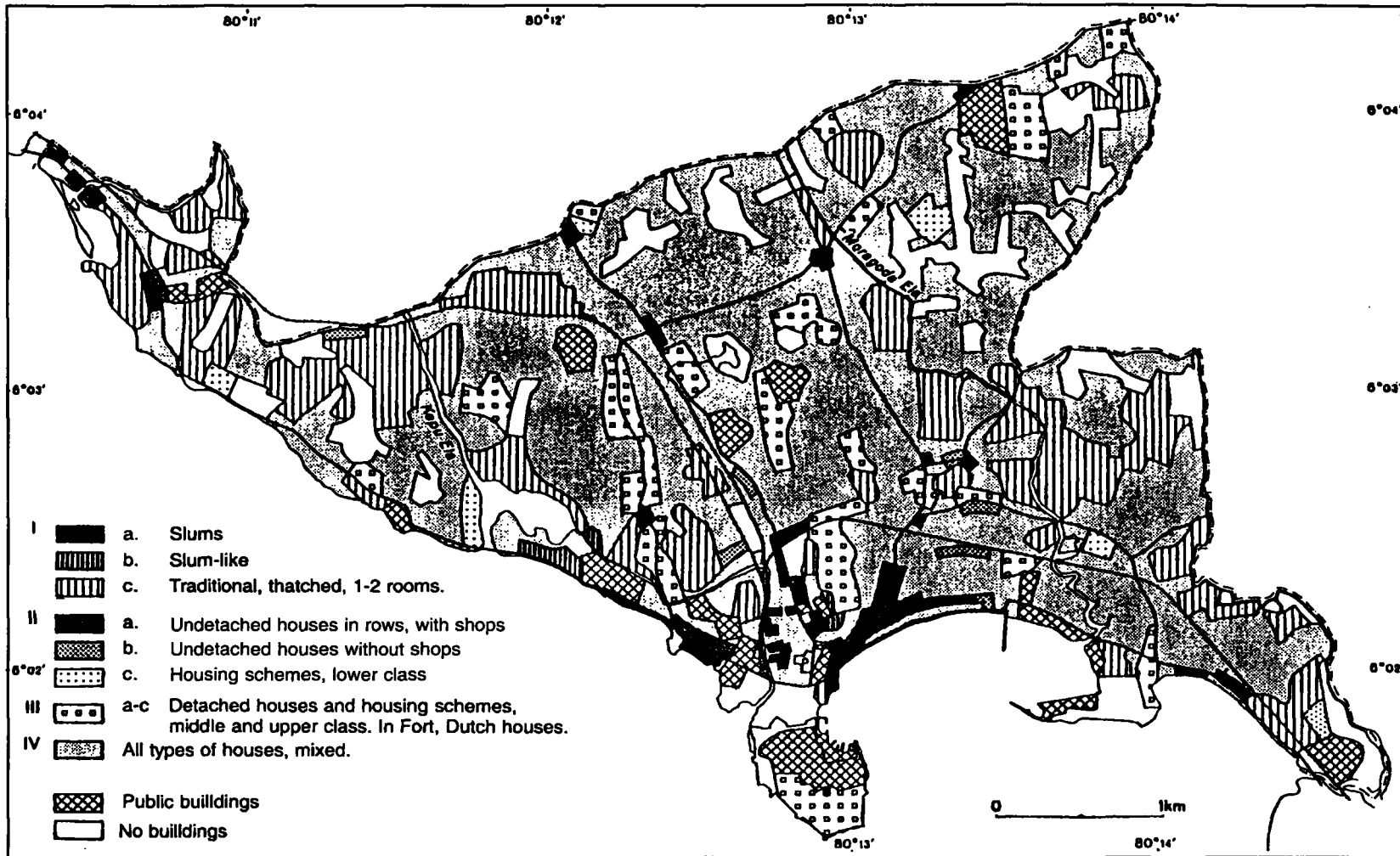


Figure 3. City regionalisation for types of building

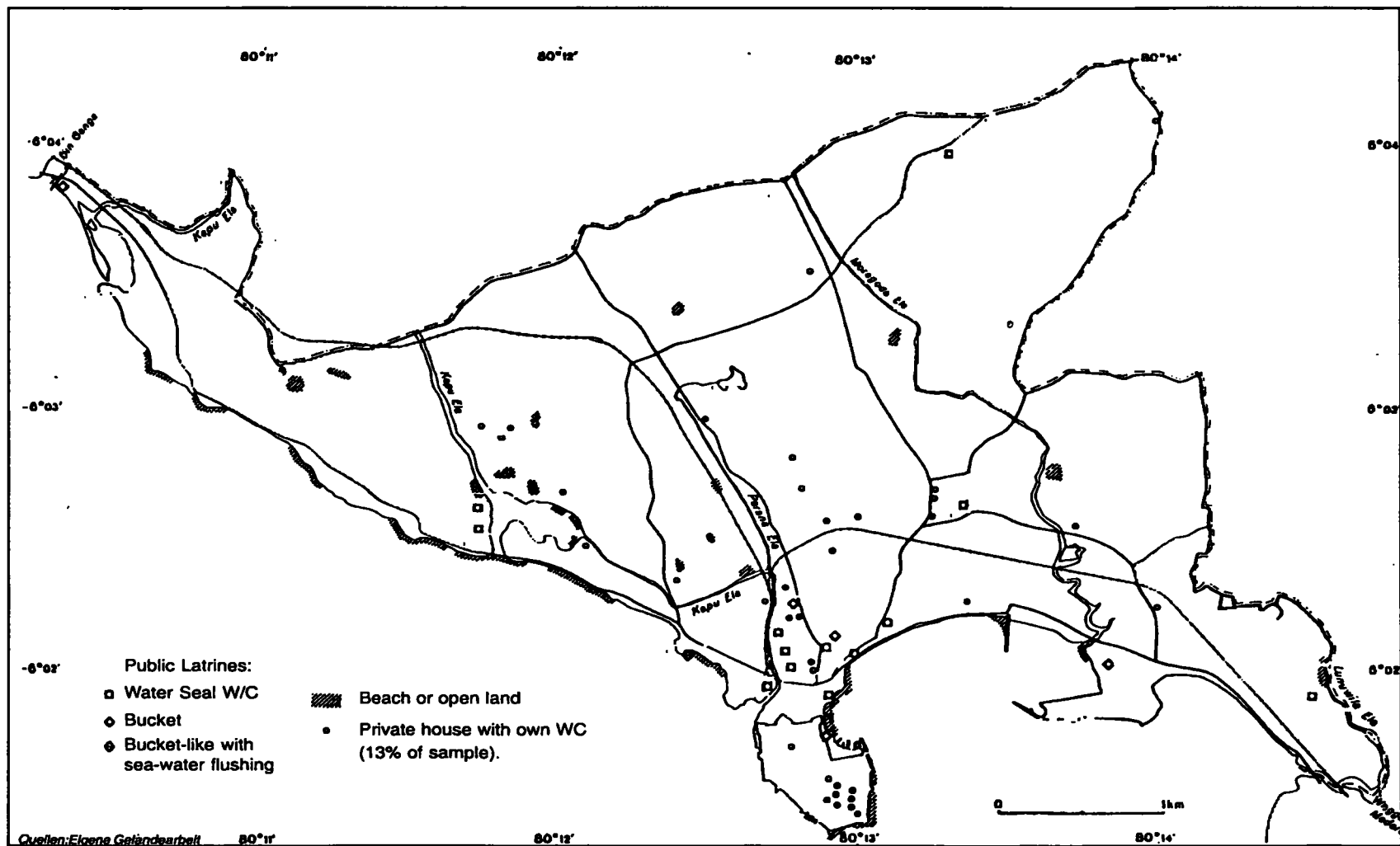


Figure 4. Places of defaecation

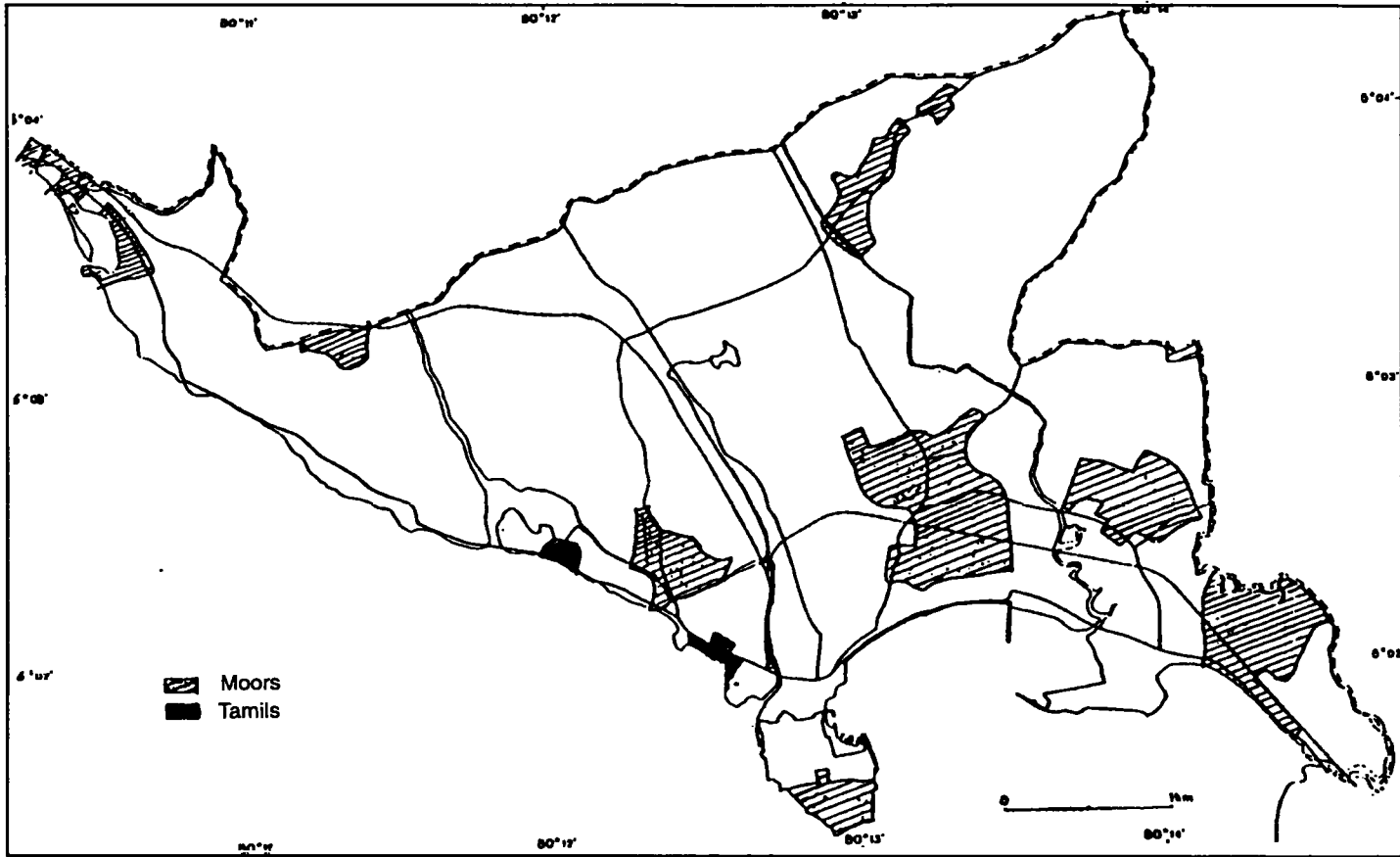
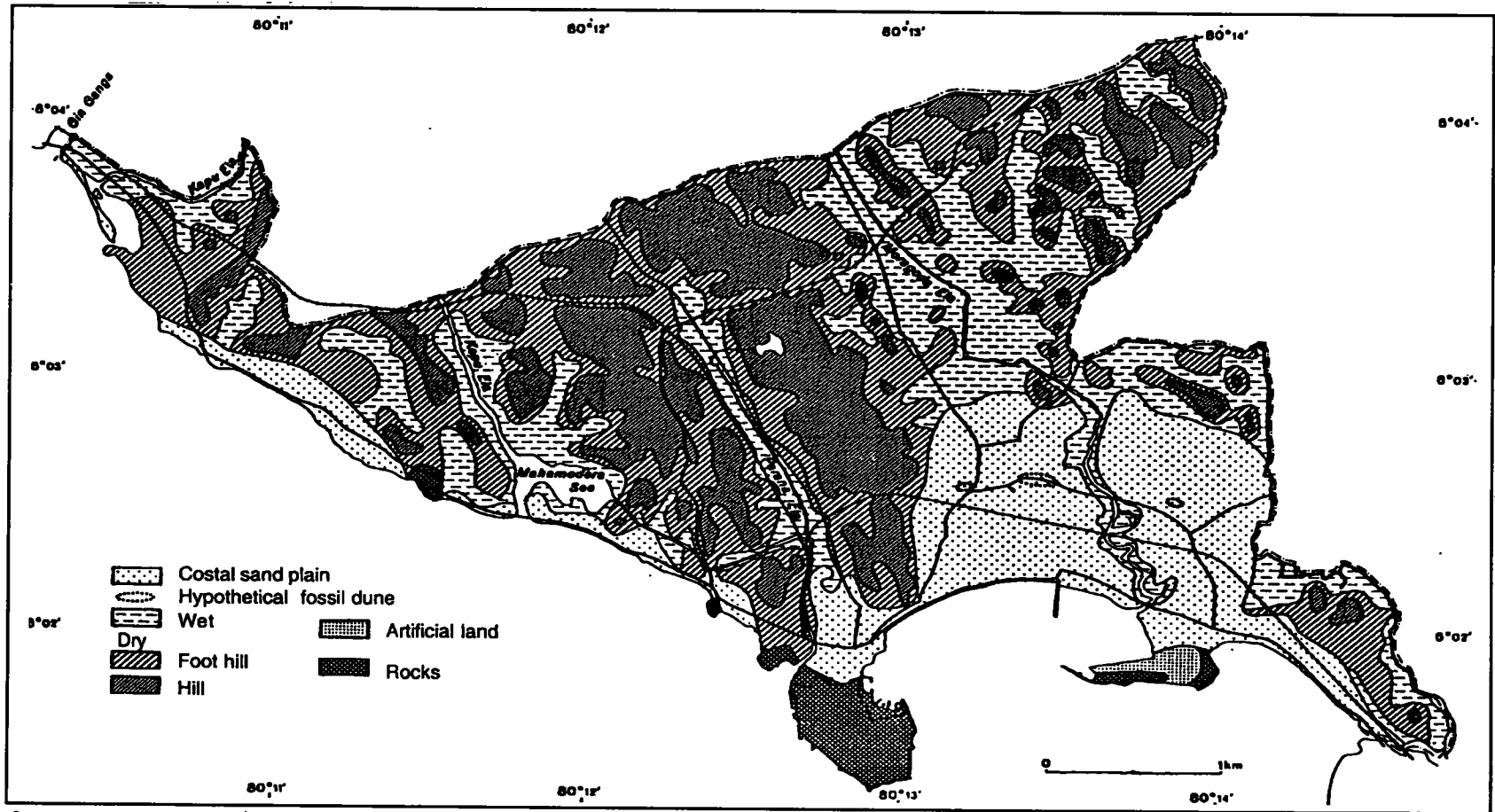


Figure 5. Living areas of ethnic minority groups in Galle, 1982; Areas where moors and tamils live are shown



Quellen: Eigene Geländearbeit und Höhenlinienkarte 264 feet to 1 inch, 1970, Survey Dept., Colombo.

Figure 6. Natural geographical areas in the city of Galle

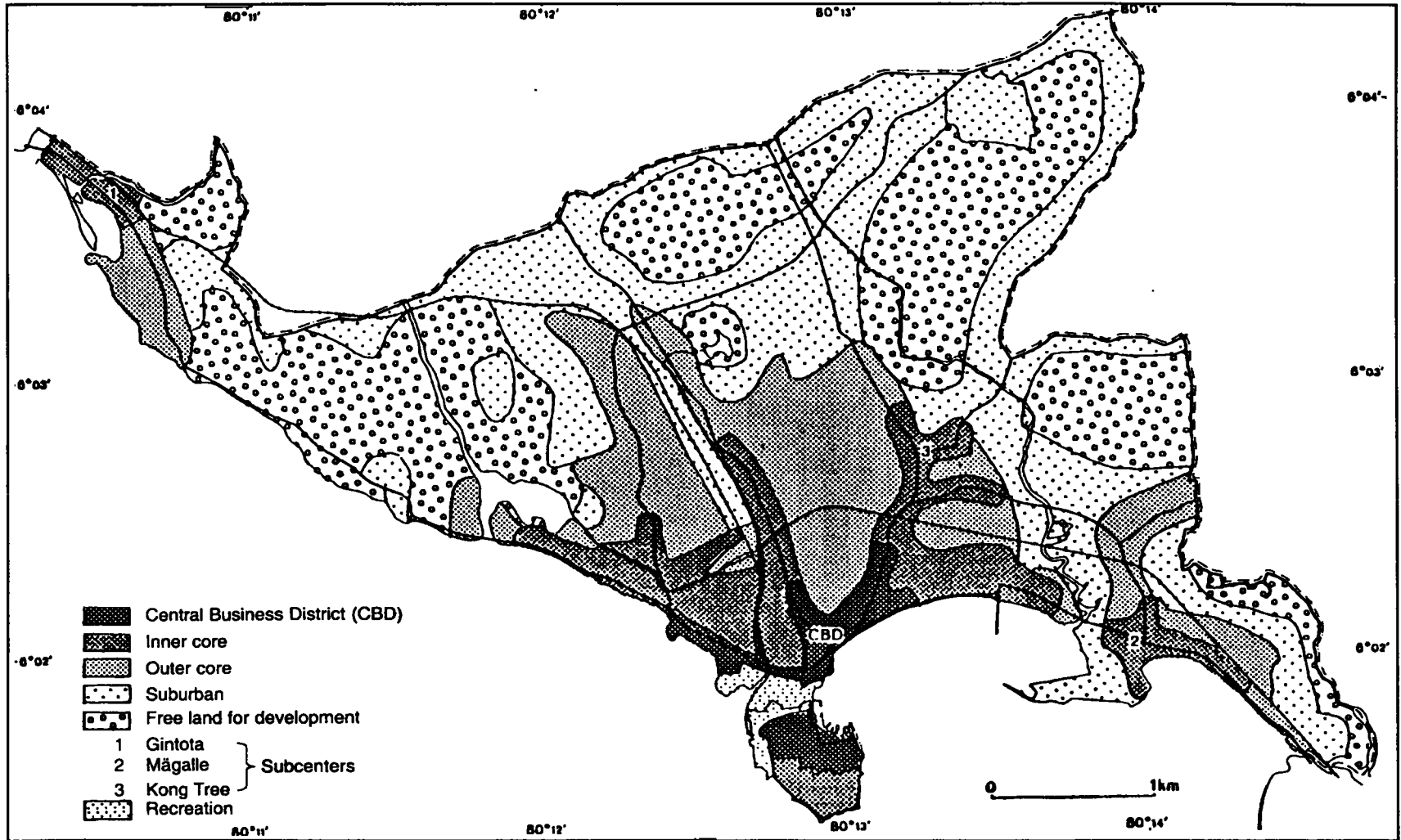


Figure 7. Regionalization of the City: Central Business District, Inner Core, Outer Core, Suburban, Free land for Development, Subcentres, Recreation

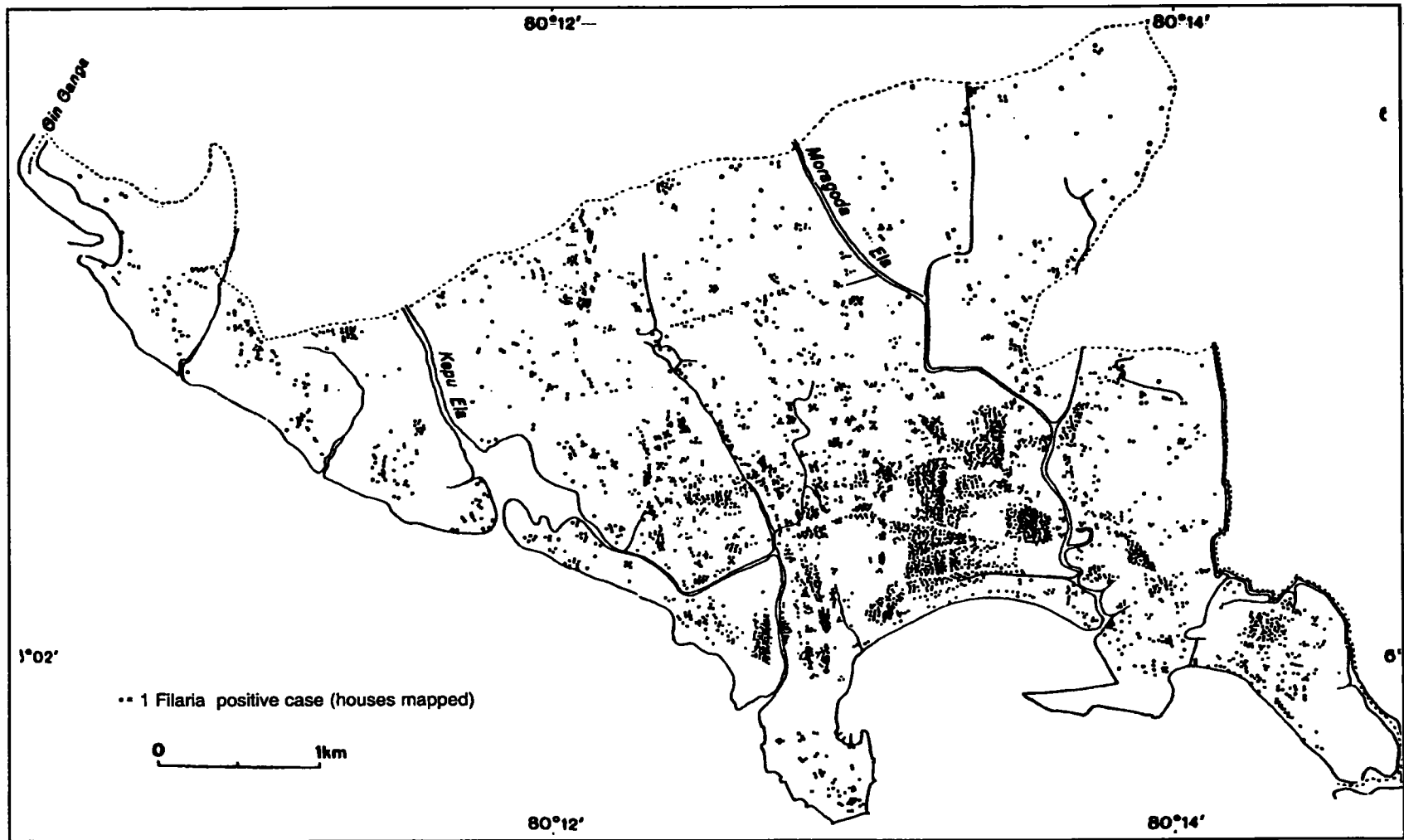


Figure 8. Filariasis in Galle. 4,132 Positives 1971-1979

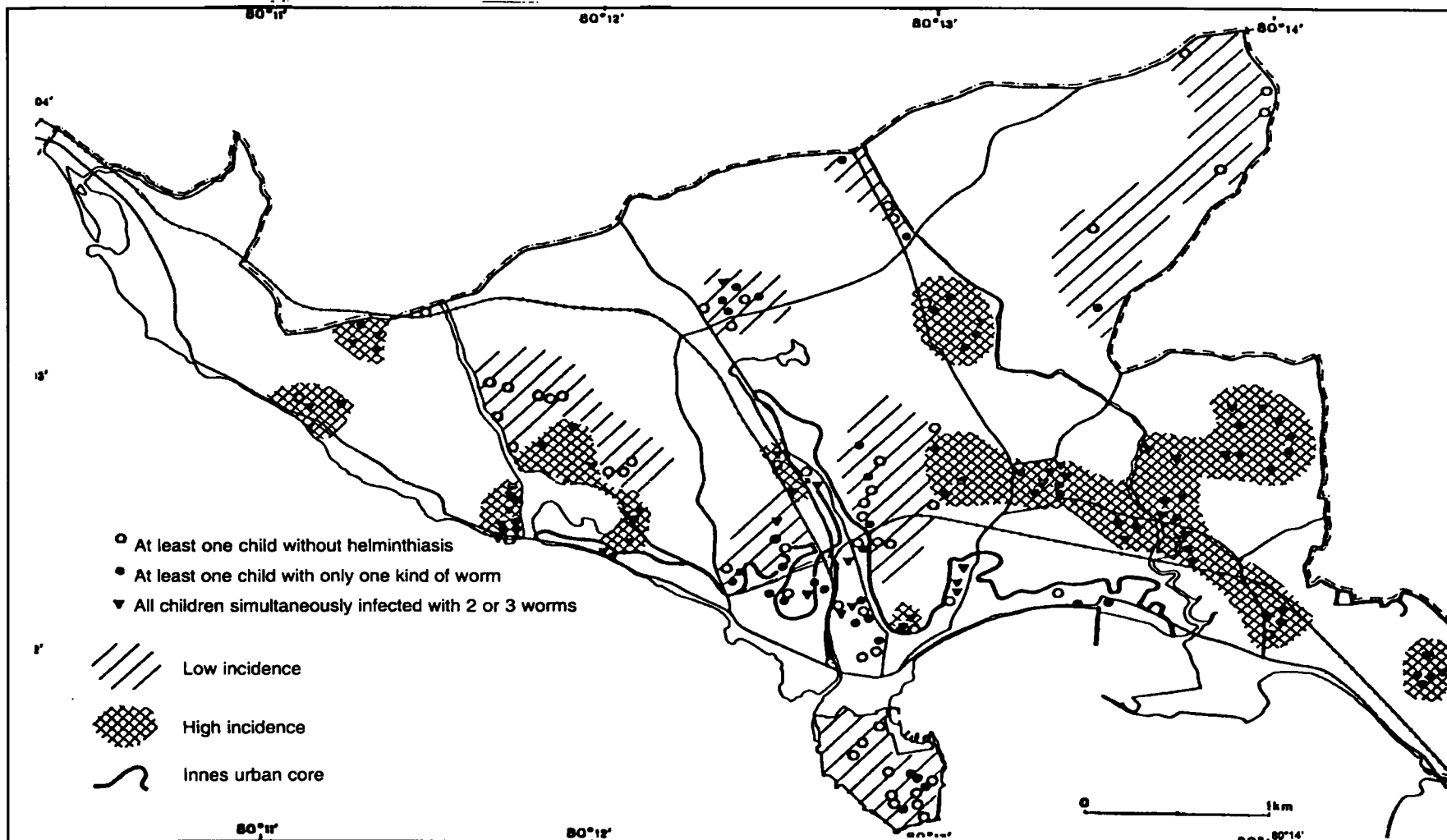


Figure 9. Multiple worm infections in Galle

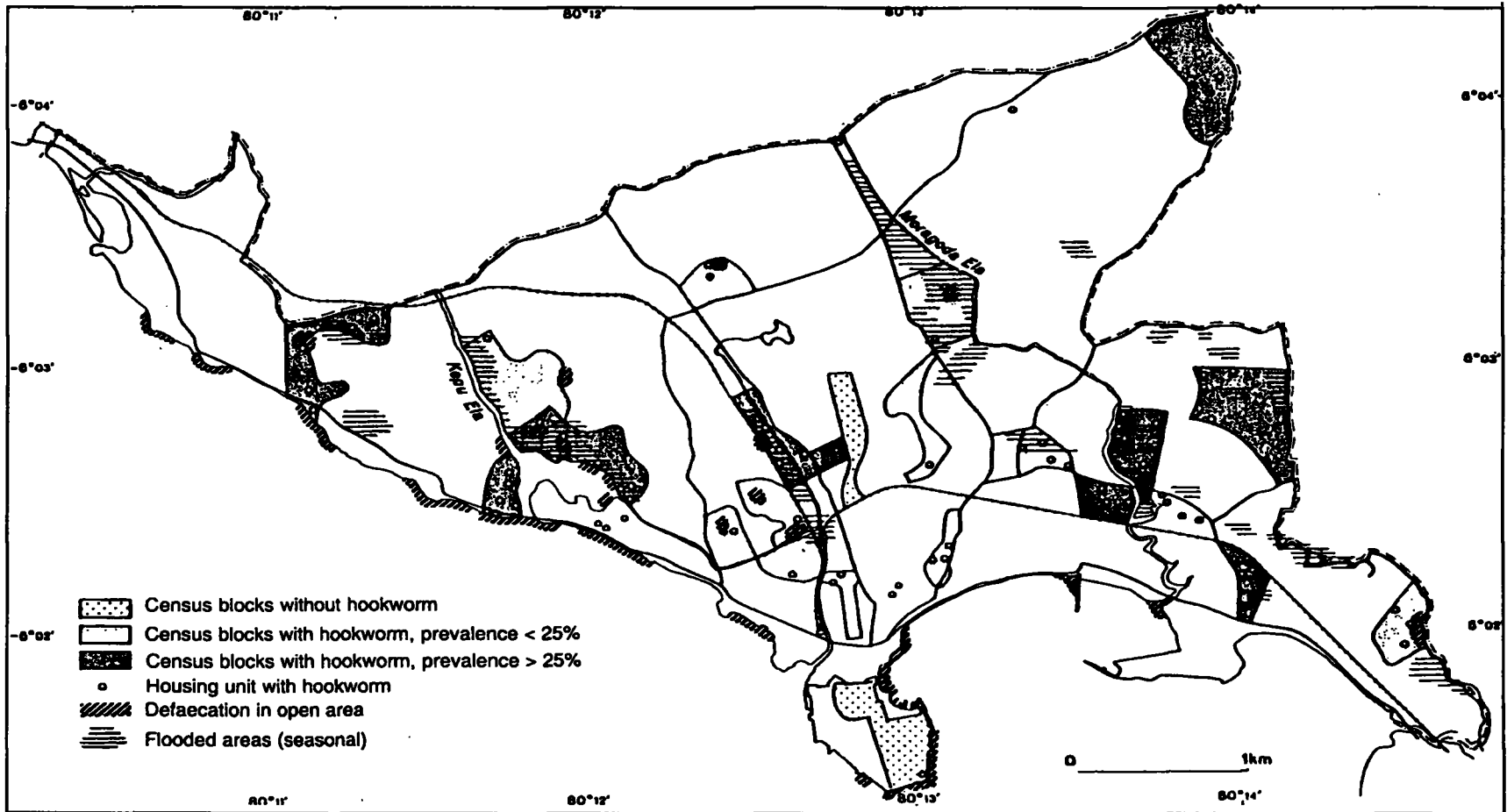
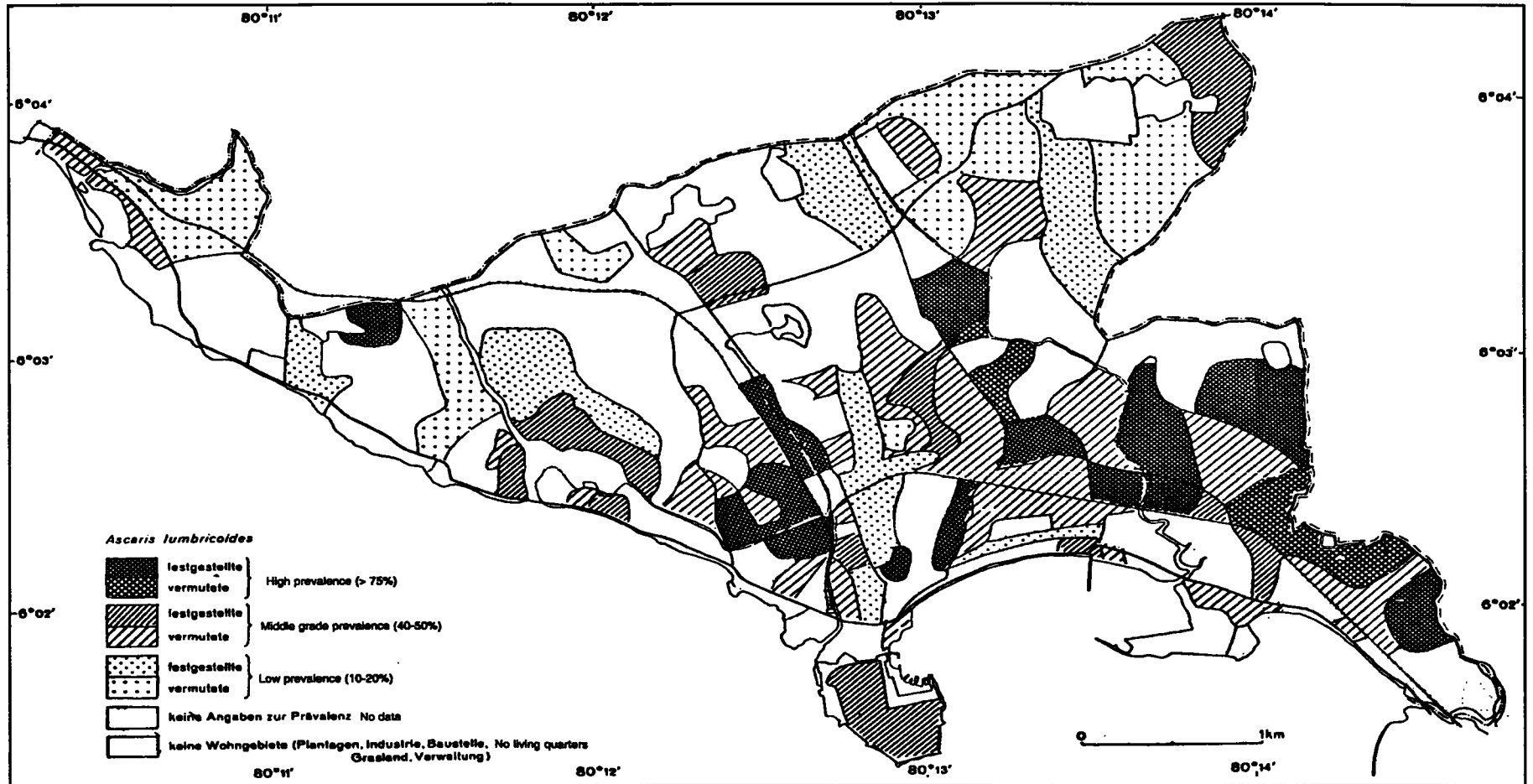


Figure 10. Hook worm infections in Galle, 1982



Festgestellte = analysed in household sample  
 Vermutete = hypothetical, because of conditions

Figure 11. *Ascaris lumbricoides* in Galle in 1982

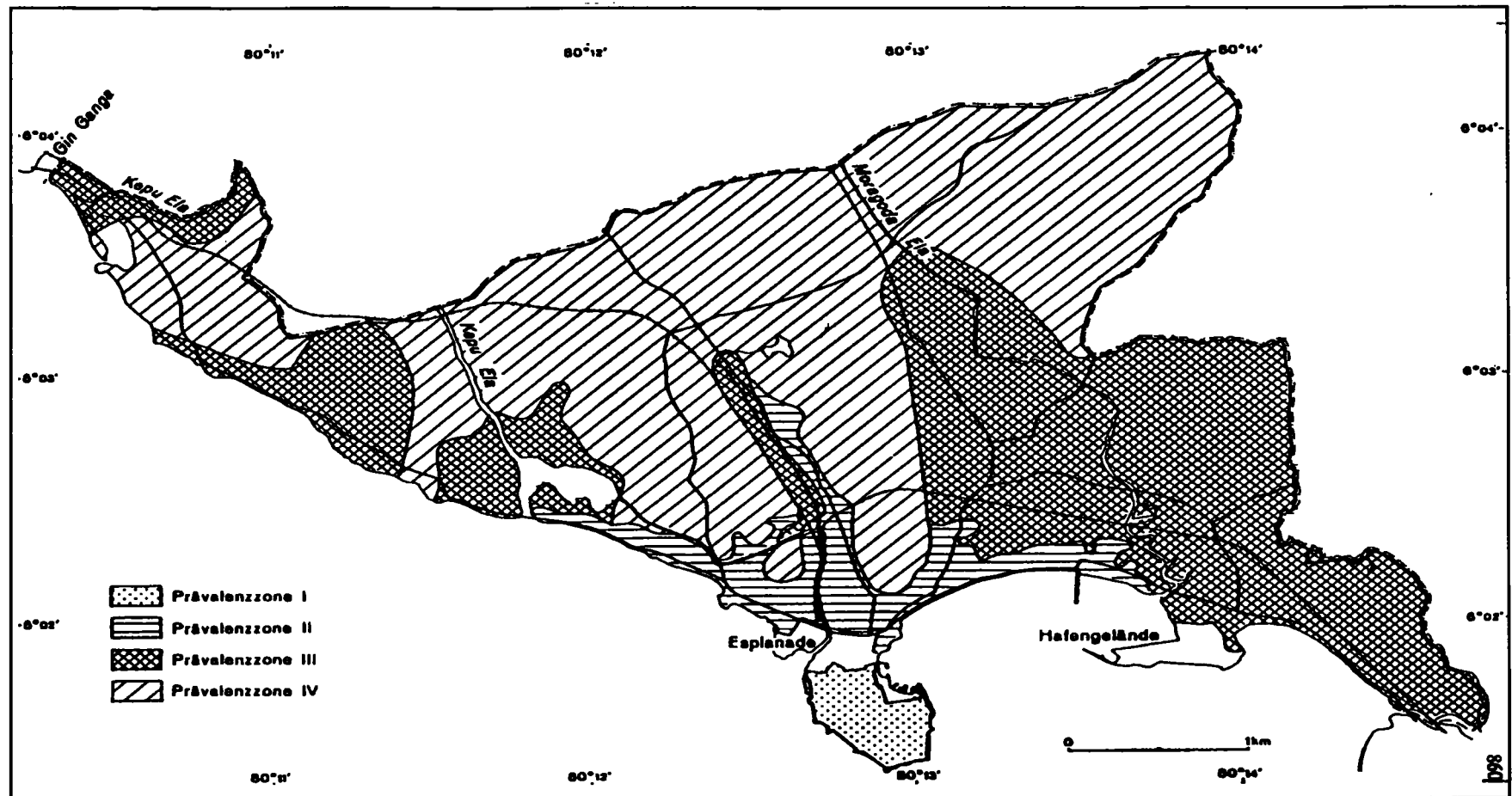


Figure 12. Prevalence zones of helminth infections  
(Prävalenzzone = prevalence zone)

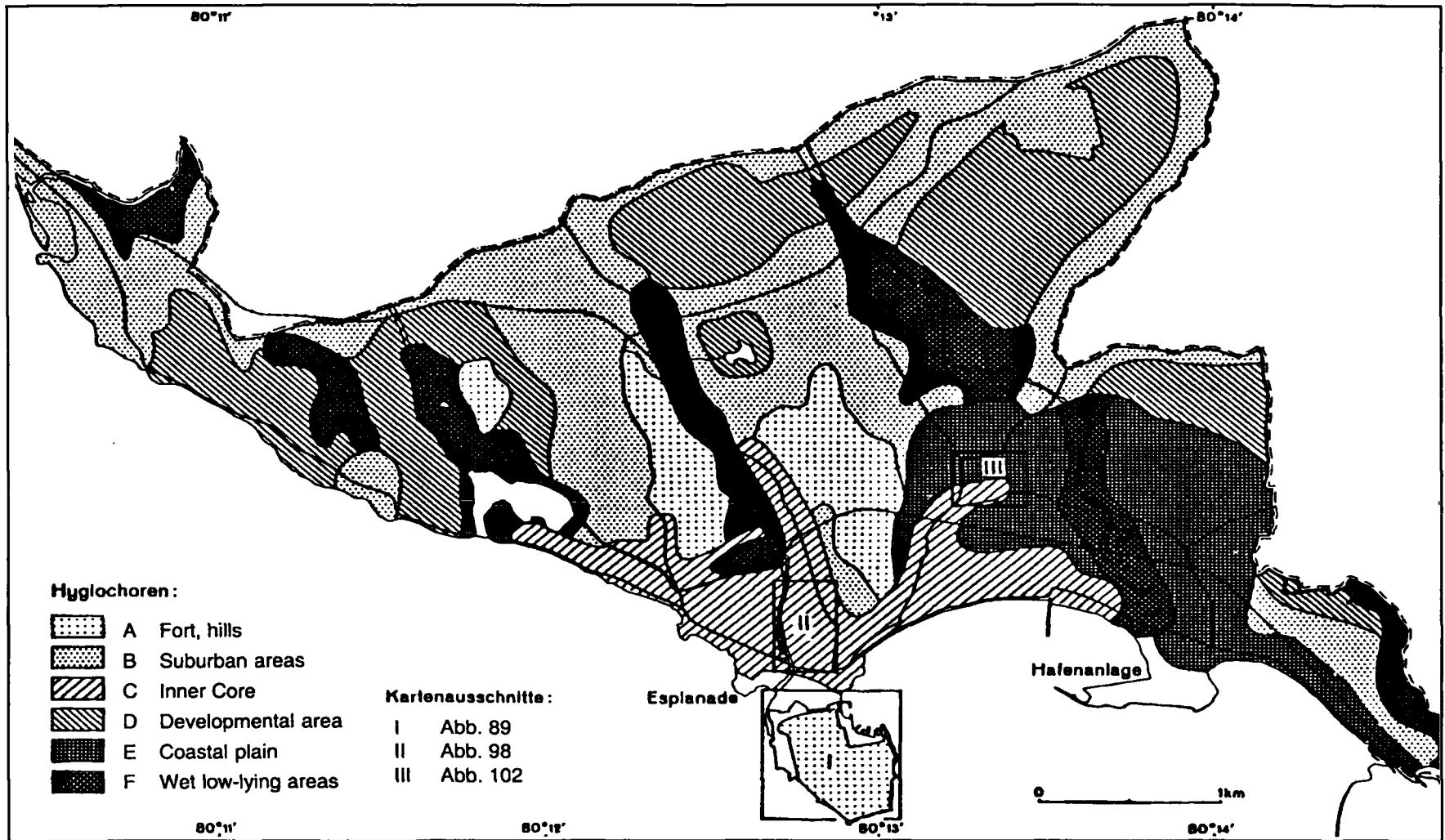


Figure 13. Hygiochores for the City of Galle, 1982

On the basis of hygiene as a "science of maintaining health", areas of identical importance for health are termed "hygiochores".

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