

USE OF MAPS FOR SOCIO-ECONOMIC STUDIES WITH REFERENCE TO MALAYSIA

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ABSTRACT

Maps are intellectual devices that are essential for reference and research. They are indispensable for showing spatial data and non-verbal information. This paper discusses the role of maps in socio-economic studies and research with reference to selected Malaysian examples. These examples include research on settlements based on topographic maps, the use of cadastral maps for studies relating to land parcels, and maps as illustrative devices. The prospects and possibilities of maps for research arising from advancement towards the digital format are also examined.

INTRODUCTION

Maps include all cartographic documents drawn to scale to represent specific areas on the earth's surface. The word "map" is commonly used in a generic and specific sense. In the former, it refers to maps, charts, plans or sections and, in the latter, to maps only (Visvalingam, 1989). A "chart" generally refers to a graphic document to aid air or sea navigation or to describe weather patterns, whereas a "plan" is a large-scale drawing of towns, transport or street patterns and may also be a portrayal of the interior layout of houses (Vasiliev *et al.*, 1990).

These documents are different modes of graphic communication based on fundamental principles of cartography, and are intellectual devices by which complex physical and human phenomena on the earth's surface are reduced and portrayed in meaningful patterns and

interpretable images. It is thus possible to derive spatial information from the patterns, distributions, and characteristics of an infinite variety of features and their relationships with the human occupants in the mapped surfaces.

While human beings are able to communicate through words and are generally able to recall what is communicated, they have a limited capacity for unprocessed information as embodied in numbers, directions, locations or distributions. When the information is represented in the form of a graph or map, the human brain is able to process the information more easily than the verbal form (Philips, 1989).

As the ideal graphic tool that offers an overall spatial perspective of particular places or localities, the relevance of maps as an aid in socio-economic studies, economic planning and development is acknowledged (Taylor, 1985). Conventional as well as environmental cartography, for example, is used increasingly in planning and in monitoring change. The fundamental importance of maps in area studies is also obvious. As maps are representations of the real world and may thus be employed as conceptual models in order to better understand this world, their importance in research on topics with a spatial bias is undoubted (Board, 1967). This paper discusses the map both as a source of information and an analytical device in socio-economic studies and research with examples based on Malaysian topics. Investigations of the physical environment for which maps are even more crucial fall outside the scope of this paper.

MAPS AND SOCIO-ECONOMIC STUDIES: SOME EXAMPLES

Among the major types of maps that are useful sources of reference in socio-economic studies in Malaysia include topographic and thematic maps that show economic, social, cultural, political and related phenomena, the general tourist and town maps, town and electoral plans as well as cadastral sheet lithographs.

Topographic and other general-purpose maps are produced by the Malaysian Survey Office. This agency is the custodian of the national geographical database and vested with the task of publishing and disseminating spatial data in suitable cartographic forms (see Voon and Munisah, 1992). Various other government departments also produce agricultural, forestry and medical maps as an essential component of their normal activities.

Topographic maps are large-scale representations of selected areas showing an array of physical and man-made features as faithfully as possible within the limitations imposed by the scale. In Peninsular Malaysia, the one inch to the mile topographic maps comprising 136 sheets and the current series of 177 sheets on a scale of 1:50,000 contain an immense amount of topographic and cartographic information. These maps are officially classified as confidential documents with access granted only to authorized users. Similarly restricted are complementary series on 1:25,000 and larger scale maps of towns and other selected areas. Cadastral plans, on the other hand, are kept in State and District Land Offices as official documents of land parcels that have been granted by the government for private or public uses.

This section will outline the study of selected socio-economic issues to emphasize spatial relationships based on evidence from maps and other primary sources of reference. Two broad types of research are illustrated, one with reference to small-scale maps for studies and planning of a general nature at the regional level,

and the other by employing large-scale plans for detailed investigations at the local level. In either case, the map may also be used as an analytical and illustrative device.

Studies on settlements

Settlements constitute an integral element of the cultural landscape and are an expression of the functional organization and utilization of space. Their economic and social characteristics reflect the nature of occupation and general quality of life of the inhabitants. Maps of towns and villages showing their locations and distribution, population size, ethno-linguistic composition, land use, infrastructure and general social and economic attributes have practical applications for planning and research.

For planning purposes, the location and density of settlements and their topographic attributes indicate the accessibility of different settlements and may thus influence decisions in the provision and spacing of services and amenities such as roads, foot bridges, schools, clinics, wells, water and electricity supplies. The density of roads in an area indicating the ease of accessibility and circulation of goods and services is often a reliable index of development. In planning medical services and the control of tropical diseases such as malaria, knowledge of the location and distribution of remote settlements will contribute towards efficient health management in rural areas. Also, in planning and implementing the population census, settlements and individual houses have to be accurately mapped to assist in the demarcation of enumeration blocks and hence have a direct bearing on the reliability of the outcome of the exercise.

As topics for research, the patterns of rural settlements in different periods of time may reveal radical alterations in political, social or economic circumstances. Figure 1 illustrates the effects of official policies during the immediate post-Japanese Occupation period on the

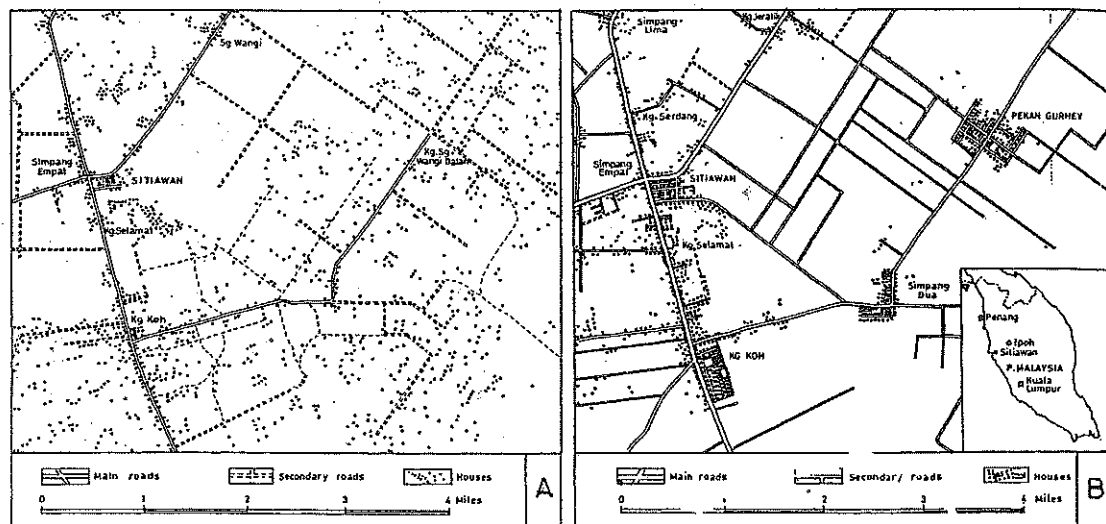


Figure 1. Settlement Patterns in Sitiawan, Perak, in (A) 1937 and (B) 1966.

settlement pattern in the former Dindings district in Perak state. Figure 1A shows the settlement pattern in the late 1940s comprising houses widely dispersed among rubber smallholdings and reflecting the result of spontaneous agricultural pioneering during the colonial period. Figure 1B is the spatial summary of a process of radical social change arising from the enforced relocation of largely Chinese rural squatters who were exposed to influence by an anti-colonial insurgency after the end of the Japanese Occupation.

The result was the creation of several compact settlements called New Villages at strategic sites. This massive forced migration led to the creation of several hundred New Villages and brought about a permanent transformation of the Malaysian cultural landscape (Voon and Khoo, 1986). These changes are more than the visual and physical imprints on the landscape but are the outcome of official policies and suggest a momentous historical event which permeated the whole spectrum of social and economic bases of livelihood in rural as well as urban areas in Malaysia.

Maps may also assist in research on various other socio-economic issues. For example, geographical names on maps constitute a fruitful area for investigation. Many place names reveal distinctive social-cultural attributes of places or connotations associated with the landscape, past political or administrative events, or specific socio-economic organization of a place that may assist in the interpretation of geographical realities. Various studies based on Malaysian place names in topographical maps and other sources show the wealth of information derived from, and interpretation based on, place names (see also Khoo, Chan and Cho 1971; Asmah, 1980; Zaharah and Khoo, 1980).

Similarly, historical maps will help significantly to throw light on the evolution of the settlement hierarchy and human occupation of the landscape (Jackson, 1968; Zaharah, 1966 and 1970). The road system in old maps may suggest clues to the tentative formulation of models on the evolution of the transport network (see Ward 1966 and 1967). The ethnic-composition of the population of settlements would also indicate trends of migration that may

have an impact on territorial loyalties among different ethno-linguistic groups in less developed and ethnically diverse areas.

Studies based on land parcels

Studies based on information of ownership and use of land are inseparable from the core issue of "development" itself, for land is the basis of human occupancy and subsistence. The cadastral plan is the basic document that shows individual parcels of land that have been approved for ownership or use. One of the major impacts of colonial rule in the Malay Peninsula was the introduction of private landownership. Private land becomes a transferable commodity that may be bought and sold or mortgaged in the open market. The system of land administration that was introduced requires that every parcel of private land be surveyed to certify its size, boundaries and location. The Land Office itself is the custodian of three official documents that contain information on the ownership, transfer and mortgaging of land. These are legal documents known as Land Titles, Documents of Transfer (of ownership), and Memorandum of Charge.

The cadastral plan is a base map for georeferencing a variety of spatial data to monitor the changing scenario of landownership and land use of an area. Data contained in Land Titles that can be mapped include the parcel or lot number, its size in acres (now in hectares), the names of original and subsequent owners, the date of alienation and subsequent changes in ownership, land use and special conditions, transactions involving changes in ownership, and mortgages to moneylenders for loans including the year of each charge and the name of the chargee (creditor).

The sale of land is legally registered and filed as a Document of Transfer and contains information on the land parcel and area that is sold, the identity of the vendor(s) and purchaser(s), the date of transaction and the

value of sale. When land is mortgaged to obtain a loan, the "charge" is filed as a Memorandum of Charge and contains details relating to the survey number of the land parcel, the name(s) of the landowner(s) and the chargee(s), the size of the loan, interest rate and the period of repayment.

These records constitute major, sometimes the only practical and reliable, sources of information on the history of agricultural pioneering and the link between landownership and interlocking socio-economic processes. Land under private ownership is a dynamic entity and undergoes an eventful history which embodies elements of land use, ownership patterns and changes, indebtedness, land values and other facets of socio-economic change.

When data derived from land office documents are superimposed on cadastral sheets to serve as base maps, various issues describing the bondage between man and land are amenable to analysis. One may delve into the mechanism of the spatio-temporal expansion of agricultural land use, which in itself symbolizes a decision-making process by which man assesses the prospects of the land in question in terms of distance, accessibility and topography. By superimposing this information on the cadastral map according to the year of alienation of land parcels, it is possible to delineate distinctive spatial patterns of agricultural expansion and settlement (see Figure 2). Information derived from land records may be supplemented by other documents including architectural plans or drawings of rural houses to re-construct past socio-economic landscapes and the manner in which different ethnic groups responded to the tropical environment.

Another issue relates to the nature of spontaneous settlement and colonization in a multi-ethnic society, the identification of the pioneers and their role in the development process. Upon the commencement of this process the evolution of the patterns of ownership and

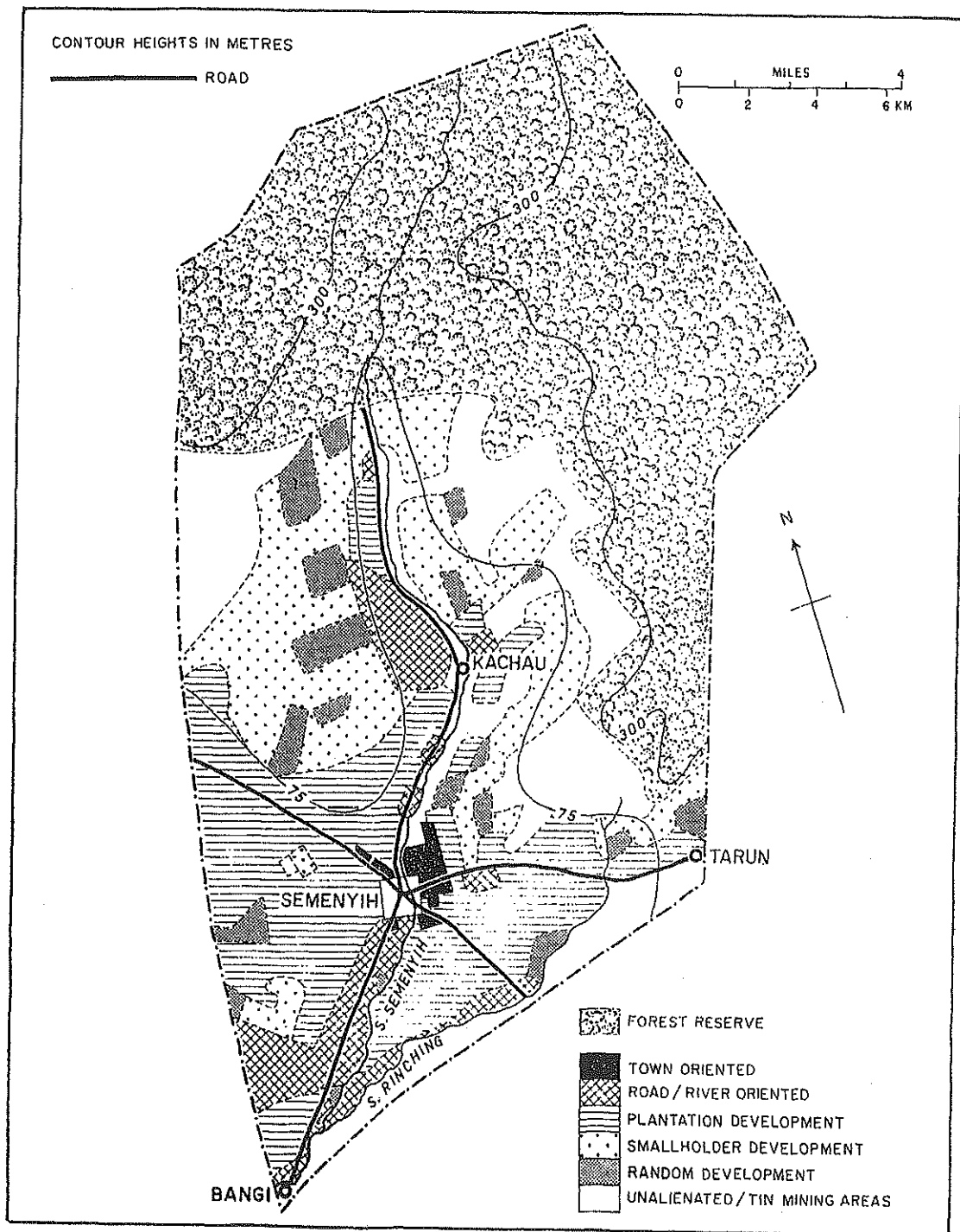


Figure 2. Schematic Representation of Agricultural Expansion in the Semenyih Area, 1894-1968 (from Voon, 1976b).

land use will begin to change (see R. Ho, 1968; W.S. Ho, 1980 and 1981; Voon, 1978). The economic and even social history of an area may be re-constructed with considerable accuracy through the stories of pioneers as documented in archival and land records. Attention may also be centred on different agricultural systems that have evolved, the nature and typology of human settlements as well as the political ecology of colonial development (Voon, 1999).

In the context of the multi-ethnic society in Malaysia, aspects of landownership studies include the growth, diffusion, and evolution of ownership with reference to the ethnic origins of landowners. In the ceaseless process of land transactions, one ethnic group may gain possession of land at the expense of another. By representing land transactions cartographically, it is possible to delineate the extent of ownership changes among different ethnic groups in a selected area of study.

Figures 3 and 4 illustrate ownership changes in Mukim Semenyih and Mukim Ulu Semenyih in Ulu Langat district, Selangor, between 1925 and 1968. In the process of change, the decline in the ownership of land by Europeans and planting companies and, to a lesser extent, the Indians too, on the one hand, and the emergence of Chinese owners on the other, are clearly evident. Another facet of study relates to areas reserved for the exclusive ownership and use of indigenous groups. In Malaysia, the Malay Reservations were created by the colonial government to safeguard the land rights of the Malays and these reservations would form an excellent subject for the study of the implications of colonial policies on indigenous societies (Voon 1976b and 1977).

A major area of study that has hitherto been overlooked is that of moneylending and rural indebtedness. Data extracted from the Memorandum of Charge are amenable to spatial and statistical analysis to examine the time and areal extent of land that has been pledged for

loans according to the ethnic origins of both the borrowers and moneylenders, notably Indian moneylenders known as *Chettians*, the subsequent ownership history of mortgaged land including ownership by the moneylenders themselves, the quantum of loans advanced based on land-use types and ethnic groups, the rate of interest charged during different periods of time and various other issues.

Examined in conjunction with data on mortgages, the cadastral sheets and land titles will reveal, among other things, the nature and extent of moneylending and indebtedness and their impact on the economic well-being of various ethnic groups of landowners. It is also an excellent field of investigation on certain policies of colonial rule (see Voon, 1987).

Admittedly, there are limitations in a study based on land records. A deficiency arises from unregistered changes in the ownership of land. Changes may not be recorded if they involve members of the same family or because the owners have passed away or even because of the practice of "name-borrowing" (Wilson, 1958). Additionally, unregistered changes may also be due to administrative causes. In Malay Reservations, a landowner who has mortgaged his land to a non-Malay moneylender may, in case of default, allow the creditor to assume control of the land though this change cannot be registered legally. In the case of land transfers, the purchase price as recorded may be deliberately under-reported for the purpose of reducing stamp duties. Some of these deficiencies, however, may be minimized by field investigations.

Maps as illustrative devices

Besides providing information, maps are excellent illustrative devices that are indispensable for showing locations, distributions, patterns, movements and a variety of spatial relationships. These spatial features and characteristics are invariably too complex

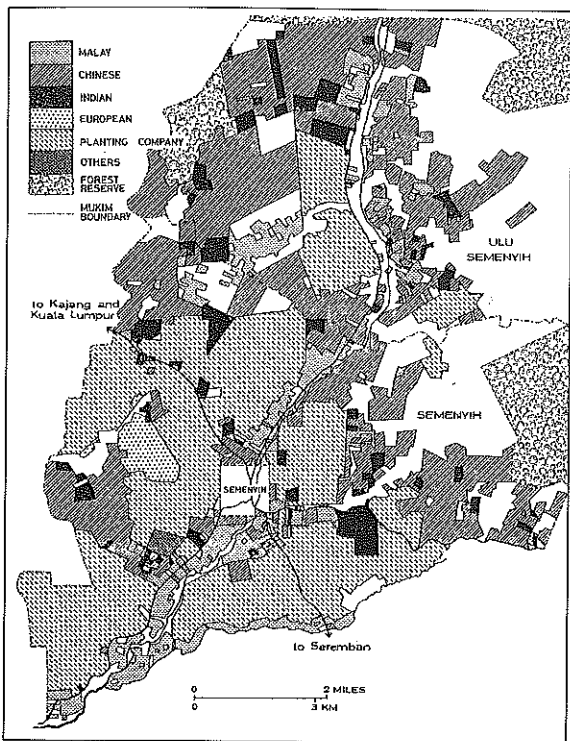


Figure 3. Landownership according to Ethnic Groups and Planting Companies in Mukim Semenyih and Mukim Ulu Semenyih, 1925 (from Voon, 1978).

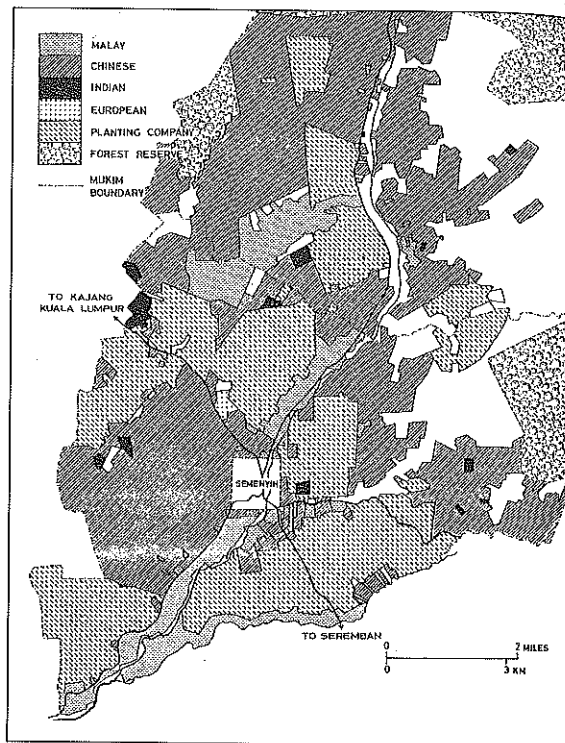


Figure 4. Landownership according to Ethnic Groups and Planting Companies in Mukim Semenyih and Mukim Ulu Semenyih, 1968 (from Voon, 1978).

to be accurately portrayed in the verbal form or by statistical tables.

In the study of human movements, the relevance of the map as an analytical tool and illustrative device is obvious. Movements across surfaces are a fundamental feature of human life and behaviour. The variety, volume, direction and velocity of movements involving humans, goods, services, information and ideas are infinite. Yet the map may adequately capture these features within certain limits of accuracy.

Human migration takes place in an endless process of shifting across geographical space within a country or between different countries. The volumes and directions of movements are the outcome of social, economic or political forces prevailing in the source or destination areas. These migratory movements alter the

distribution of populations and influence future patterns of development and the demand for basic services. The mapping of migration patterns provides a proper perspective on changes in population distribution and may indicate the emergence of large concentrations in certain localities or depopulation in others.

Using Sabah as an example and based on the 1970 population census, it is possible to map out the volume and direction of internal migration at the district level. Figure 5 illustrates the patterns of inter-district movements of population for the districts of Kinabatangan (map A), Labuk and Sugut (map B) and Lahat Datu (map C) during the 1960s. These districts were rich in resources and attracted both investments and labour into the forestry and plantation industries. Figure 6 summarizes the outcome of

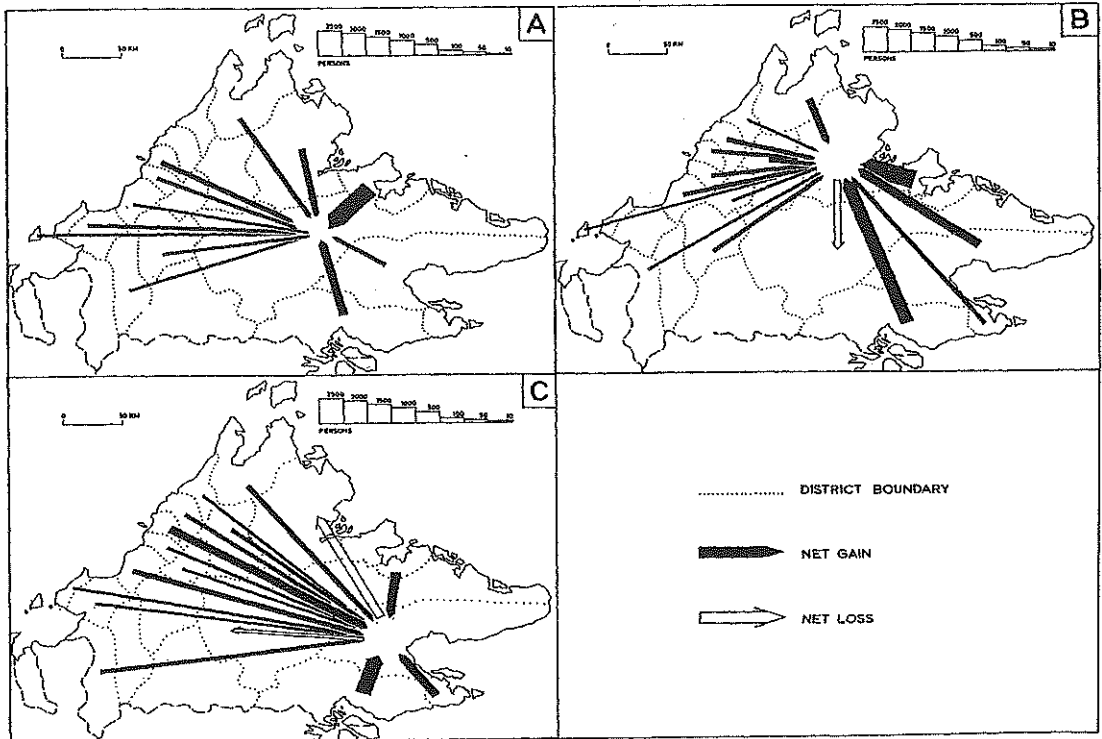


Figure 5. Inter-district Migration in Sabah in the 1960s (from Voon, 1983).

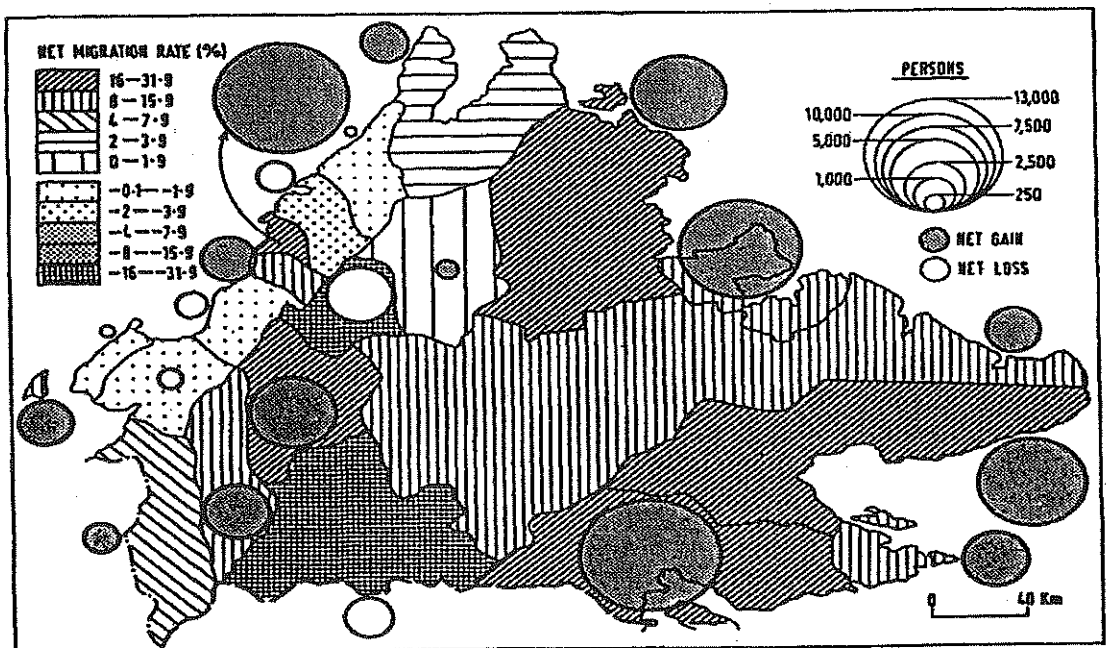


Figure 6. Net Migration Rate and Net Gain/Loss in Migration, Sabah, in the 1960s (from Voon, 1983).

migration involving all the districts in Sabah showing in net gains in some districts and net losses in others (Voon, 1983).

PROSPECTS AND POSSIBILITIES

The processing and distribution of information are becoming increasingly sophisticated. Whether for socio-economic studies or for decision-making in management, planning and development, the map is becoming more crucial than before as spatial data are beginning to be represented not only in visual but also "digital" forms and as "spatial databases" to serve as an increasingly important supplement of conventional spatial records (see Visvalingam, 1990).

Map making is rapidly becoming "an information transfer process that is centred about a spatial database" (Guptill and Starr, 1984). This database has become the ultimate source of reference and the digital map is fast emerging as a commercial product in itself. In many countries, the trend towards the digital map is definite. The Ordnance Survey of Northern Ireland has been supplying topologically structured background data since 1987. In Britain and the United States, topographical and other maps are held in digital form and available for sale to users. In Malaysia, the Department of Survey and Mapping is already producing digital topographic maps and establishing topographic and cartographic databases.

Efforts to integrate cartography, remote sensing and geographical information systems are being intensified. An integrated spatial information system may provide a means to link cartographic, cadastral or landownership data and environmental and socio-economic records to facilitate storage and updating, manipulation through analysis and modeling, and for the display of the output in the forms of maps, statistics or models (Dahlberg and Jensen, 1985). When integrated with other spatial information, census data open up vast possibilities such as

for planning schools, health and social amenities as well as in market research.

As maps are the best medium by which spatial data are represented, they therefore play an essential role in meeting the growing needs of a "knowledge society". Maps with a high spatial resolution offering reliable data on a wide range of topics are indispensable not just for research but, more importantly, for planning purposes to serve the increasingly complex needs of modern societies.

CONCLUSION

Maps fill a critical need in socio-economic studies and research. The variety of cartographic records and coverage in time and space make them particularly useful as sources of information of the human landscape. They also provide the medium by which data derived from documentary sources are geo-referenced to reveal the complex and shifting mosaics of social and economic processes of the evolving landscape.

With the advent of the information age, maps and cartographic data will play an enhanced role in research and in modeling or unraveling complex spatial patterns, organization and relationships obtaining in specific regions. With these advancements the value of maps from the historical to the latest documents may be more optimally exploited to meet the needs of research as well as in numerous practical applications. The potentialities are limited only to the extent to which manipulation of the data contained in such documents is constrained by both artificially imposed as well as technological barriers.

In this context, the value of maps is no less important than that of written documents kept in national archives, libraries or museums. As it may be argued that spatial phenomena and events are more difficult to capture than non-spatial ones, maps are not merely to be conserved as historical but to be regarded as "living" documents to be studied and re-interpreted to

bring about a better understanding and a more balanced perspective of socio-economic processes and developmental progress of the country.

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