HISTORICAL LAND USE CHANGES OF
JEMPOL, NEGERI SEMBILAN IN THE TWENTIETH CENTURY

Mohd. Shahrudin Abd. Manan*, Nor Rasidah Hashim

M.Sc (GS18042)
4th Semester

---

1. Introduction

Land use is anthropogenic activities as a way for humans to manipulate, modify and adapt with their environment (Singh et al., 2001; Milanova et al., 2005). The activities give significant impacts on the Earth's surface thus become reliable interface in understanding spatial interaction between human and environment (Mandal, 1982; Lawson, 2001; Legg, 2007). Analyzing past land uses is useful to understand patterns of land use changing over time besides also worthy for heritage conservation projects since it requires and dependant on the availability of complex historical information ranging from the geo-morphological characteristics to demographic patterns of the area interest.

Historically, the most important land use change in peninsular Malaysia was the clearing of forest land for agricultural purposes and mining activities as well as for the establishment of settlements along the coastal and riverine area (Cleary & Goh, 2000; Andaya & Andaya, 2001). Subsequent technical development in the late 19th and 20th century e.g. railway network constructions and automotive industry, together with the colonial British intervention and growing human population, have dispersed the land use activities into hinterland of the peninsula (IBRD, 1955; Dartford, 1958; Wafa, 1972; Saw, 2007). After independence, land use pattern in Malaysia was dictated by the government policies e.g. Fringe Area Alienation Scheme, Federal Land Development Authority (FELDA) Scheme, Federal Land Consolidation and Rehabilitation Authority (FELCRA) Scheme and New Economic Policy (NEP) which led to the extensive growth of human concentration in urban areas (Wafa, 1972; Stephen & Khoo, 1975; Ooi, 1975 & 1976; Lim, 1976; Salleh, 2000).

The studies of past human land use in peninsular Malaysia were conducted using indirect approach phenomenology (Titchen and Hobson, 2005) by critically analyzing historical documentations e.g. statistics and censuses (Wong, 1971; Wafa, 1972; Wan, 1976; Lim, 1976; Cleary & Goh, 2000; Hill, 1997; Rigg, 1997; Gullick, 2003; Hack, 2001). Nevertheless, these studies mostly concentrated on the 'textual' and 'numerical' analysis often leaves out the 'sense of space and location' within the historical documentations. These studies did not use map analysis despite the fact maps are an informative tool to 'story' about past phenomenon (Campbell, 1993; Gregory and Southall, 2000; Knowles, 2002). The advancement of Geographic Information Systems (GIS) technology over the past few decades has boosted an interest in spatial researches and as of late GIS has begun to enrich humanities and history research (Goodchild, 1991; Gregory, 2005; Okabe, 2006).

2. Research Objective

1.   To analyze historical land use changes in Jempol, Negeri Sembilan in the twentieth century using Geographic Information System (GIS).

3. Research Methodology

In this study, the Jempol district in Negeri Sembilan, Peninsular Malaysia was used as a case study.

3.1 Study area

Jempol is located between latitudes of 2°35'-3°10' North and longitudes of 102°10'-102°45' East. It is the biggest district in Negeri Sembilan. Currently, there are seven districts in Negeri Sembilan namely Seremban, Port Dickson, Jelebu, Kuala Pilah, Rembau, Tampin and Jempol. The total land areas of Jempol district are estimated to be 1484 km^2 which covers approximately 22 % of the total land area of Negeri Sembilan (total land area of Negeri Sembilan is 6674.5 km^2). Prior to 1980, Jempol was under Kuala Pilah district. Jempol was officially declared as a registration district in Negeri Sembilan on 1st January 1980. Five mukims were gazetted in the district, namely Kuala Jempol, Jelei, Serting Ilir, Serting Ulu and Rompin. Among them, Rompin is the biggest mukim whereas Kuala Jempol is the smallest. Bahau town which located within the Jelei mukim is the capital town for the district. Jempol was dubbed as the 'Daerah Laluan Bersejarah' (District of Historic Route) on 24th March 1998 as a token of appreciation to the historic site of Penarikan land portage which is located within the district (Ibrahim and Jamaludin, 1999; Wheatley, 1961). In terms of Adat districts in Negeri Sembilan, Jempol is also known as Luak Jempol. It is clustered with other four Luaks i.e. Ulu Muar, Terachi, Gunung Pasir and Inas to constitute the 'Luak Tanah Mengandung' (motherland of royalty) (Gullick, 2003; Idris et al., 1994).

3.2. Data analyses

Four steps were conducted in this research as follows:

1.   Exploring data availability.

In this study, the study period of twentieth century was classified into two different eras i.e. colonial and post-colonial. The colonial era refers to the years of Malaysia during British colonization prior to its independence from 1900 to 1957 whereas the post-colonial era refers to the years of after the independence i.e. from 1957 onwards. For that, data availability within two government agencies of the National Archives of Malaysia (NAM) for the period of colonial era and Department of Agriculture (DoA) for the period of post-colonial era were investigated in this study to obtain reliable information about past land use activities in the study area.

2.   Establishing a basemap.

Establishing a basemap were conducted based on several procedures including georeferencing the historical maps of NAM using WGS 84 and overlapping the georeferenced maps with topographic digital map from Department of Survey and Mapping Malaysia (JUPEM) for validation, digitizing maps to produce vector of land uses and standardizing data differences between the historical maps and modern maps (land use maps from DoA).

3.   Conducting GIS analysis.

In this study, four landscape indicators were used to analyze land use patterns in the area as follows:
1.   Total Landscape Area (TLA)
2.   Number of Patches (NumP)
3.   Patch density (PD)
4.   Shannon's Wiener Diversity Index (SDI)

Integrating the four landscape indicators, five criteria of GIS analysis were conducted as follows:
1.   Analyzing landscape patterns.
2.   Analyzing landscape patterns along land transportation during colonial era.
3.   Analyzing landscape patterns within the riparian area.
4.   Analyzing landscape patterns against the topographic elevations.
5.   Analyzing managed human landscape.

4.   Understanding human land use pattern in the colonial and post-colonial era.

4. Results & Discussions

Combining the spatial analyses of human land use patterns in Jempol between colonial and post-colonial era in this study would give general understanding about land use patterns of inland Negeri Sembilan throughout the twentieth century. Although the map scale between the eras is different i.e. the map scale of colonial era is 1: 125 000 and the map scale of post-colonial era is 1: 150 000, nevertheless the differences is not crucial in giving general description about landscape patterns of Jempol within the century.

The twentieth century was considered as the most crucial era in Malaysian development history. Starting from the British colonial intervention followed by the institutionalized land development programme of the post-independent government to the industrialization of 'Look East' policy and Vision 2020, the successful development in Malaysia has been discussed to be associated with strategic government policies (Stephen and Khoo, 1975; Jackson and Rudner, 1979; Sidhu, 1980; Drabble, 2000; Rigg, 2003). By reconstructing historical trajectory of land use patterns throughout the century, this study aims to enrich the discussions.

The entry of Negeri Sembilan into Federated Malay States (F.M.S) in 1896 allowed British intervention in the state's economic affairs. In the early twentieth century, mining industry was a major focus of British affair in Negeri Sembilan (Gullick, 2003). The mining activities were concentrated in Seremban, Linggi and Jelebu. For that reason, most of inland area in Negeri Sembilan was 'untouched' by British at the time. Malay villages were distributed along river banks and paddy cultivations became their major agricultural activities (Mahmud, 1970; Hill, 1977). A small number of gold mining activities were formed in Kuala Pilah (Sheppard, 1965). As found in this study, Jempol was predominantly covered by forests in 1907. Only 1 % of the area was discovered to be used for agricultural lands and other reserves including built up and mining areas. The agricultural activities were mostly concentrated along Sg. Serting and Sg. Jempol which could be considered as wet paddy cultivations (Hill, 1977).

The success of rubber plantation in Linsum Estate at Seremban in 1902 has shifted British concentration to encourage massive rubber plantations in Negeri Sembilan. Besides giving financial supports to running rubber estates, they also developed land transportation for the sake of rubber industry (Kato, 1991). As found in this study, the growth of land transportation networks was positively correlated with the substantial deterioration of forest coverage of Jempol in the colonial era. Based on the GIS buffer analysis, about 97 % of the networks were connected with forests in the early twentieth century. The pattern was later changing when the analysis discovered forest fragmentation along the networks in 1938. At that time, rubber changed to be the biggest coverage along the networks whereby forest coverage declined 67 %. This finding visualized the deforestation patterns of inland Malaya in conjunction with the development of land transportation networks for the sake of British economic agenda (Lim, 1967; Ooi, 1976).

Owing to the sudden world demand for rubber as a result of the development of automobile industry, the British government subordinated all other agricultural activities in order to accelerate rubber plantation in Negeri Sembilan. After the gazettement of Negri Sembilan Land Enactment 1903, more forest and agricultural lands were cleared and converted into rubber plantations (Haron, 1997; Gullick, 2003). Based on this phenomenon, it was unsurprising to notice that there was no indication of any rubber lands on the 1907 historical map whereby there were 333 km^2 of alienated land for rubber plantation 31 years later as indicated on the 1938 map. The finding therefore further supported the historical discussion that the British colonial period has resulted high proportions of the land in Malaya (before independence, peninsular Malaysia was known as Malaya) being composed of commercial plantations especially rubber for the sake of the colonial economy (IBRD, 1955; Wafa, 1972; Lim, 1976; Wan, 1976; Rigg, 1997; Hack, 2001; Gullick, 2003).

In the post-colonial era, rural modernization becomes a main agenda for the independent government of Federation Malaya (later known as Malaysia). FELDA played an important role in this economically and socially agenda (Wafa, 1972; MacAndrews, 1977; Riggs, 2003). In Jempol, three major land schemes were identified to be

implemented i.e. FELDA, FELCRA and Rubber Industry Smallholders Development Association (RISDA). Most of these schemes were found to be scattered in the north-eastern part of the district. The major impact of these schemes development is the migration of human distribution from river valley into inland area of Jempol. However, the human migration was followed by an environmental phenomenon i.e. deforestation.

Since the main aim of these schemes is to convert forests into commercial arable lands especially rubber plantations, the finding in this study which showing positive relationship between deforestation and the increment of rubber patches was unsurprising. As discussed by Kumar (1986), forestation is always being subordinated when it comes to the issue of economic demands in Malaysia. His discussion has a reason when the GIS analysis discovered a massive forest conversion into arable lands especially on the lowland areas of Jempol in the post-colonial era. From 1938 to 1984, forest coverage in the lowland area of Jempol jumped down from 67 % to only 9 % coverage of the total area. Meanwhile, for the period of 13 years i.e. from 1984 to 1997, 39 % of forest base in the area was destructed for other land use activities with out of its 18 % were forest to rubber conversion. By the year 2004, only 5 % of the lowland area of Jempol remained to be covered by forest while rubber constituted the biggest patches concentration. On the other hand, this finding leads to disclose the deforestation trend of Jempol to climbing up to the higher altitude areas. Based on the GIS overlay analysis, patch density of higher altitude areas i.e. above 100 m.a.s.l. has increased from 0.1 to 1.1 patches for the past 97 years. Besides, about 3 % of forest coverage in the higher altitude area of Jempol was found to be lost by the year 2004. It is a significant decrement since the area maintained to be 'untouched' for over the past 59 years i.e. from 1938 to 1997. The observation on the site in 2008 revealed this deforestation pattern when it shows a massive clearing of a hill forest in Jempol that could be seen clearly from Bahau town.

The development of land schemes has also encouraged human participation in Jempol's landscape. As found in this study, the Jempol's landscape tends to be totally managed by human by the late twentieth century. In 2004, 86 % of the area was covered by managed human land use (MHL) compared to only 1 % in 1907. Besides, patch density of MHL has increased steadily throughout the period from 0.05 patches in 1907 to 0.5 patches in 2004. In one perspective, it could be said that the degradation of forest and biodiversity in Jempol was systematically managed by human during the post-colonial era. Further analysis disclosed the positive relationship between the patch density of MHL and SDI values. Based on this finding, SDI becomes a suitable index in understanding human land use complexity in Jempol throughout the century.

As Jempol heading towards an agro-industry hub in Negeri Sembilan (Ab Khalid M., Deputy land administrator of Jempol District and Land Office, personal communication, July 9, 2008; Information Malaysia 2005), two different stories between household paddy and built up area in the post-colonial era were discovered. In the last three decades, paddy extent decreased from 8 km^2 to 4 km^2. In the early period of 1984 to 1997, most of the paddy fields were converted into arable lands of rubber and other crops cultivations including cocoa, coconut, horticulture and market gardening. However, by the year 2004, most of the fields were found to be abandoned with the finding of considerable growth of

secondary vegetations in the paddy areas. In contrast, built up area was found to be consistently increased for over the three decades. In 1984, there was 20 km^2 of built up area in Jempol before it increased into 31 km^2 in 2004. These two contradictory spatial patterns augmented the issue of massive abandonment of paddy fields as discussed by Kato (1994), Rigg (2003) and Hashim (2006) due to the deagrarianization in Negeri Sembilan by the late twentieth century.

5. Significance of the Findings

The research contributed to filling the gap in history knowledge by bringing the 'sense of spaces and locations' in the history studies. Besides enhancing the historical discourses, the study also contributes to enrich historical databases by providing documentation of land use changes of Jempol that will benefit many researchers including historians, social scientists and geographers. Due to the historic data restriction, the quality and quantity of data become an issue. Data availability, scaling issues between historical and modern maps, geographic projection of the historical maps, unstandardized land use types and the condition of historical documents are some issues raising throughout this study. Much to our dismay, there were some historical documents that had been destroyed, ruined and misplaced including historical maps, censuses and survey reports. Nevertheless this research provided many lessons including resolving the following challenges of standardizing data differences from various government agencies, reconciling different base map scales and groundtruthing the historical data.

6. Selected references

Hack, K., 2001. *Defence and decolonisation in Southeast Asia: Britain, Malaya and Singapore, 1941 – 1968*. London: Curzon.

Hashim N.R. & Yaacob N.M., 2007. Understanding land use changes: Study looks at the impact of human activities on an historically important site. *ArcUser*. Retrieved April 15, 2008, from http://www.esri.com/news/arcuser/1207/malaysia_land-use.html

Knowles, A.K. (Ed.), 2002. *Past Time, Past Place*. CA: ESRI.

Okabe, A. (Ed.), 2006. *GIS-based studies in the humanities and social sciences*. FL: CRC/ Taylor and Francis.

Wheatley, P. 1961. The Golden Khersonese: Studies in the Historical Geography of the Malay Before A.D. 1500, Kuala Lumpur, University of Malaya Press.