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Spatial Variation of Socio-economic Activities and Settlement Relocation in Pandaw Model Village, Kyauktan Township

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Abstract

Socio-economic study is not a new topic in the discipline of social sciences including geography. However, most studies focus on the variation of socio-economic conditions at regional and district levels. This is because census data are readily available at this level. In this paper, intra-village level variation of social economic conditions is analysed with the aim to assess the benefit and cost of settlement relocation with reference to Pandaw Model Village. Pandaw Model Village includes two settlement areas: clustered and dispersed. Socio-economic data of the study area were derived from official statistics and two intensive field surveys and structured interviews. The results found that there show great socio-economic variations between two settlement areas. From the point of socio-economic variation and physical environment, if dispersed settlements are relocated in clustered areas, the village will benefit from the scale of economic and social welfare. On the other hand, fuel and water supply problems will be encountered.

1. Introduction

Socio-economic study is not a new topic in the discipline of social sciences including geography. However, the most studies focus on the variation of socio-economic conditions at regional and district levels. This is because census data are readily available at this level. Murayama (2003) identified the common elements of socio-economic conditions such as social class, economic status, cultural (ethnic) and occupational structure of the Peninsula of Malaysia at district level, and explained these spatial variations by using factor analysis. Berentsen (1999) used socio-economic indicators like population, gross domestic product per capita, purchasing power, vehicle registrations, etc. to analyse the results of the reunification of Germany.

Very recently, some young scholars studied socio-economic conditions of a settlement area in relation to its structure. Than Than Khine (2004) and Zin Mar Win (2004) show that socio-economic conditions are varied according to the sequential developments of a settlement unit. They divided the settlement into three areas based on their development stage. The initially developed area was occupied by people of stable and high occupation status and reveals the best socio-economic conditions in the whole settlement area. The recently developed area was occupied by wage earners and temporary job workers. Although the recently developed area has a relatively higher income than the intermediately developed area, the nature of their jobs is not as stable.

Pandaw Model Village located in the Southern part of Kyauktan Township can be tentatively divided into clustered and dispersed settlement areas. Both clustered and dispersed settlements have been occupied for more than 80 years . With the development of technology and the improvement of transportation, the government is trying to promote the living standard and living conditions of rural areas. Accordingly, Pandaw was designated as Model Village in 2000. With the designation as model village, it has tried to relocate the dispersed settlement in the clustered area. Although this relocation project was started in 2000, it has not been fully realised yet. Relocation of dispersed settlement in a clustered area could benefit from points of scale of economic and social welfare generated by co-location. However, there could arise some socio-economic problems generated from income differentiation, water and fuel supplies, etc. This paper tries to analyse cost and benefit of settlement relocation based on the socio-economic conditions of the clustered and dispersed settlement areas.

Problem

Based on the above backgrounds of the study area, the problems of this study could be stated as follows:

- How do socio-economic conditions differ between clustered and dispersed areas?
- What are the factors generating such socio-economic variations?
- What will benefit and cost be if settlement relocation occurs?

Data and method

General information on Pandaw Model Village was derived from the Pandaw Model Village Peace and Development Council. Detailed socio-economic data were collected through two intensive field surveys and structured interviews conducted in September 2003 and May 2004, respectively. To understand the socio-economic conditions, every odd- number house (50%) of the clustered area and about 25% of the randomly selected samples of the dispersed settlement area from Pandaw Model Village were interviewed. Although the sample sizes of two areas are different, they can be assumed as representative data for the present analysis.

Spatial variations of socio-economic conditions between clustered and dispersed areas are examined based on interview results. Furthermore, functional relationships between Pandaw Model Village and its adjacent town and villages are analysed to be able to fully understand these spatial variations. Through the above sample analysis, the socio-economic situation of the study area could be clearly understood. Then, based on socio-economic variation results and functional relationships, suggestions for the benefit and cost of the relocation project are discussed.

The second part of the paper states the general background of the study area based on data derived from official statistics. The third part deals with the analysis of variations of socio-economic conditions between clustered and dispersed settlement areas. Then, the functional relationship of Pandaw Model Village and its adjacent villages and towns is analysed. Finally, this paper discusses the causes that generate the variations and

existence of two settlement areas, and finds out the possibilities that would occur by relocating the clustered settlement.

2. Background of the Study Area

Socio-economic conditions of an area are greatly modified by its physical and cultural backgrounds. This is especially true in developing countries. Thus, it is necessary to understand those backgrounds before discussing the real socio-economic conditions.

Physical bases

The study area is located longitudinally between 96° 32' and 96° 37' East and latitudinally between 16° 58' and 16° 63' North. In terms of relative position, it is located in the Southern part of Kyauktan Township. Since it is located on the banks of Hmaw-wun Creek (opposite of Kyauktan Town), the fishing industry is developed. The famous Kyaik Hmaw-wun Yele Pagoda is located on a small island in the Hmaw-wun Creek between Kyauktan Town and Pandaw Model Village. As a result, transportation (ferry) services between Kyauktan and Kyauktan Yele Pagoda are dominated by Pandaw Model villagers. Being located on the alluvial soils deposited from Yangon River and Hmaw-wun Creek and receiving Tropical Monsoon Climate, the study area has favourable conditions for rice cultivation. Pandaw Model Village is bounded by Hmaw-wun Creek in the North, Dhamainseik Creek in the West, Sandi Creek in the South, and Kalama Creek in the East. This water bounded location has created different transportation and socio-economic aspects for the inhabitants.

In terms of administration, Pandaw Model Village is included in the Pandaw Village Tract which is composed of Pandaw Model Village and Kyungalay Village (Fig. 1).

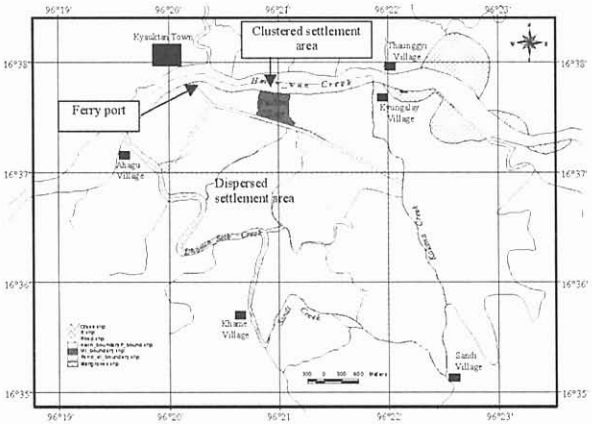


Fig. 1: Location of Pandaw Model Village (Source: Land Record Department, Kyauktan Township)

Development process of Pandaw Model Village

The present Pandaw Model Village was formed by relocation of people from the former Kyaukmaye Village located near the ferry port. In the last 50 years, there were about 70 households in the village and it was located between Yuzana Street in the South and the Western side of the monastery in the East. Before the river bank was eroded, the village was extended about 300 feet to the river side from the present river bank. In 1974, the village area was extended to the Southern part. To solve the water supply problem large ponds were dug in the Southern part of the village. In 1986, the Eastern parts of the village were extended to accommodate the increasing population. In 1990, the Pandaw Kamakaloke Motor Road

construction project was started. To take the advantage of motor road accessibility, Pandaw Village extended to the Southern part of the village and filled the former paddy fields between village and newly constructed road with houses. Recent village expansion was done in the south-eastern part in 1998 (Fig. 2).

Since agriculture lands are distributed in large fields, many farmers permanently live not only in the village but also in the paddy field. From the evidence of the topographic map (one Inch- 94D/6) it becomes clear that there have been some houses in the paddy field since 1933. However, interview results show that some people who are more than 80 years old, have been living in the dispersed area since they were born.

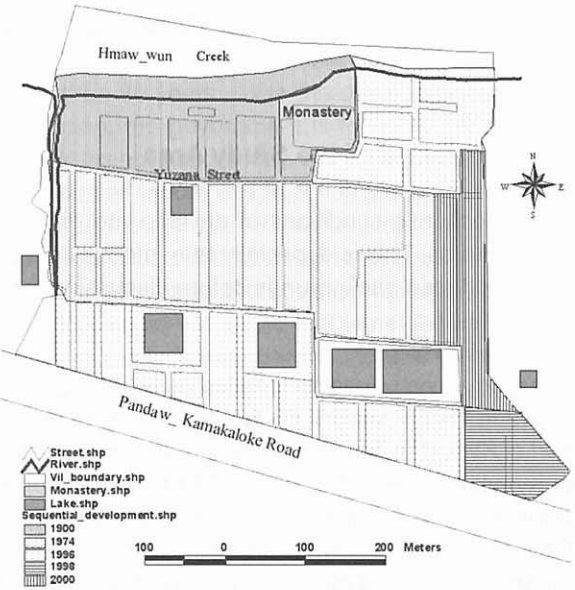


Fig. 2: Sequential development of Pandaw Model Village (Clustered Area) (Source: Based on personal interviews conducted with the village-heads (2003-04)

Economic bases

Since the study area is located on the alluvial deposit plain, agriculture has become one of the major economies. The general land-use pattern of the village is shown in Fig. 3. More than 95% of the area is occupied by agriculture. Two percent is left for the pasturing of cattle. In 2003, there were 348 farmers and 924 workers engaged in agriculture. Although many farmers use traditional cattle-plowing-and-threshing methods, mechanisation is spreading in the agriculture sector. There are 2 tractors and 29 power tillers in the village. These machines are not only used in agriculture but also in transportation. Traditional farmers use bullock-cart for transportation of farm produce. There are 222 bullock-carts in the study area.

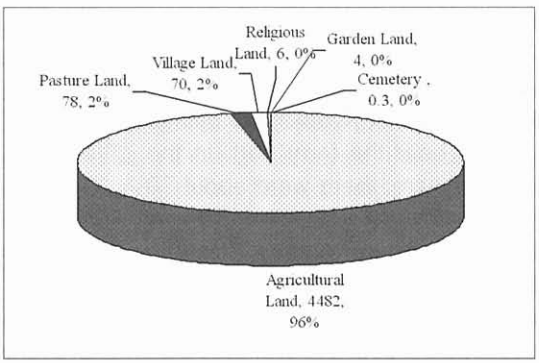


Fig. 3: General land use pattern of Pandaw Model Village (2003) (Source: Village Peace and Development Council, Pandaw Model Village)

Based on the large area of paddy fields in the village itself and its adjacent villages, many rice mills are established along the Hmaw-wun Creek. Two small

scale rice mills are located at the edge of the clustered settlement area while another two large rice mills and six small rice mills are located near the ferry port, opposite of Kyauktan Town.

Owing to its location near the Kyaik-Hmaw-wun Yele Pagoda, passenger transport service has developed in the Village. There are 60 small passenger boats and 4 large passenger boats in the village. They transport the passengers between Kyauktan and Pandaw, and Kyuaktan and Kyaik-Hmaw-wun Yele Pagoda. Ten passenger boats are reserved in the service. In addition, there are 5 large freight boats and 4 small freight boats, and 10 small reserved freight boats in Pandaw Model Village.

Due to its location on the southern bank of Hmaw-wun Creek (which flows into Yangon River) the fishing industry has also developed in the study area. There are 4 large fishing boats and 17 small fishing boats in the village. As services activities, there are 4 Video houses, 2 Karaoke houses, and 1 liquor shop in the clustered area.

Social bases

In 2003, there were 553 households living in 539 houses in Pandaw Model Village. The total population was 2497 (1237 males and 1260 females) in 2003. Of them, 94.7% are Buddhists while the rest of 5.3% adhere to Hindu. The settlement pattern of Pandaw Model Village could be generally divided into the dispersed settlement area and the clustered settlement area.

In 2003, 218 households lived in the dispersed area while 235 households resided in the Pandaw Model Village's clustered area. One monastery is located on the banks of Hmaw-wun Creek in the clustered settlement area. Since the majority of the Hindus are busy in farming and dwell in the paddy field, they have constructed their religious symbols near their houses.

The use of fly proof toilets is one of the prerequisites for the designation as model village. Therefore, all houses in the clustered area use fly-proof toilets. There is one rural health care centre in the village. A Maternal and Child Welfare Association is organised by 15 members. Red Cross Society (10 members), Fire Fighting Association (10 members), Union Solidarity and Development Association (5 members), and Women's Affair Association (15 members) are also organised to conduct social matters.

Based on the data derived from the Pandaw Model Village Peace and Development Council, there is one Basic Education Middle School in Pandaw Model Village. Since Pandaw Model Village is at the centre of the village tract, students passing through Tharzi Basic Education Primary School and U Shwe Phyo Basic Education Primary School located in the Pandaw Village Tract, and Basic Education Primary Schools located in the adjacent village tracts have to attend Pandaw Middle School. In 2002-03, there were 299 State Primary School students and 193 State Middle School students taught by 12 teachers in Pandaw State Middle School.

3. Spatial Variation of Socio-economic Conditions in the Two Areas

The United Nation's Human Development Index (HDI) uses economic indicators to include gross domestic product (GDP) per capita, economic structure, worker's productivity, access to raw materials, and availability of consumer goods (Rubenstein 2003, 288p). These indicators are used in terms of time series data. However, in this study we will use some of these economic indicators with modifications, in terms of spatial data. Per capita income of each household is used instead of GDP per capita. Economic structure is represented by type of occupation. Although UN's HDI is divided into primary, secondary and tertiary occupation, our study has divided the primary occupation type into more details. The remaining two indices (worker productivity, access to raw materials) are not considered in this study. In addition, availability of consumer goods is analysed in terms of functional relationship in the next section. To clarify the spatial variation of economic conditions, other indicators of economic status are also analysed.

Spatial variation of economic conditions between clustered and dispersed areas
House type, family size, occupation, and per capita income are used to analyse the spatial variation of economic conditions between clustered and dispersed settlement areas. In addition, possession of transportation facilities and luxury goods are considered to back up the reliability of income.

Fig. 4 shows the variation of housing type and average family size living in the two areas of Pandaw Model Village. Both of these areas have many medium size houses. However, the average number of people living in those varied house sizes are different between clustered and dispersed areas. The average number of people living in large houses in the clustered area is 4.8 while in the dispersed area it is 6.3. In the clustered area 4.5 people live in medium size houses, while in the dispersed area 5.1 persons live in these house types. Small size households also show variations between the clustered and the dispersed area. Therefore, from this table we can derive two points: 1. the majority of residents in the dispersed area live in medium size houses, 2. the household sizes in the dispersed area are larger than in the clustered area concerning all house types. This means that they live in large families and the average space for each person is narrow.

To be able to explain the household size variations, it is necessary to examine the occupational structure. In this study 5 occupation types are described. Of them, three major types are created by given natural environment factors (farmer, fisher man, transport service) while "sell and buy" has been developed to supply the local residents. The remaining

	No. of house				Avg. Family Size			
	Clustered	%	Dispersed	%	Clustered	Std	Dispersed	Std
Large	20	16	7	11	4.8	1.9	6.3	2.9
Medium	73	58	42	67	4.5	1.8	5.1	2.1
Small	32	26	14	22	4.5	1.7	5.0	1.7

Fig. 4: Variation of house types between clustered and dispersed areas (Source: Based on personal interview (2003-2004)).

occupations, mostly factory workers and government employees are added as others. The occupational structures of the clustered and dispersed areas is shown in Fig. 5. A balanced job structure is found in the clustered area. On the other hand, the dispersed area is dominated by farmers. From this table we can understand that the two areas are quite different in terms of occupation, and farmers with large families are living in the dispersed area.

Settlement Area	Services (transport)	Farmers	Fisher man	Sell & buy	Others	Total	Sample Size (n)
Clustered Area (No.)	44 (25.4)	43 (24.9)	34 (19.7)	25 (14.5)	27 (15.6)	173 (100)	119
Dispersed Area (No.)	0 (0.0)	55 (90.2)	2 (3.3)	0 (0.0)	4 (6.6)	61 (100)	60

Fig. 5: Job variation between two settlement areas in Pandaw Model Village
Source: Based on personal interview (2003-2004)
Note: Values within the bracket show percentage

As an economic indicator, it is necessary to check the monthly per capita income of the two areas. Fig. 6 shows these variations. Although the standard deviation is large, we can clearly see that residents living in the dispersed area earn twice as much as those of the clustered area. However, the reliability of this income variation must be further verified by their belongings.

Settlement Area	PCI (Kyat)	Standard Deviation	Sample Size (n)
Clustered Area	6050.61	3969.77	119
Dispersed Area	13643.6	9568.85	60

Fig. 6: Monthly per capita income variation between two settlement areas
Source: Based on personal interview (2003-2004)

Fig. 7 shows the possession of transportation facilities. Some of these are not only used as a means of transport but also as an income generator. Two different areas own and use different types of transportation media. Bicycle, boat and bullock cart are major transportation facilities for the clustered area. However, dispersed farmers own and use bullock cart and boat as their major transport facilities. In addition, nearly all residents from the dispersed settlement area own one bullock cart and some households own more than

Settlement Area	Bicycle (No.)	Motor Bike (No.)	Motorboat (No.)	Tractor/ Tiller (No.)	Bullock cart (No.)
Clustered Area	14	0	28	9	16
Dispersed Area	0	2	9	0	106

Fig. 7: Possession of transportation facilities (Source: Based on personal interview (2003-2004)). Note: Values are calculated for 100 households. Number of sample size for clustered and dispersed are 126 and 54 respectively.

one. Thus, although it is impossible to compare one bullock cart with one boat, the relative wealth of the dispersed residents is clear.

Variation of social conditions

As a social condition, communication, lighting and water supply systems are analysed. Fig. 8 shows the possession and use of communication facilities in both clustered and dispersed areas of Pandaw Model Village. From this table, it can be said that the dispersed area has better communication facilities than the clustered area. This point also supports the conclusion that residents of the dispersed area are richer than those of the clustered area (drawn in the economic conditions) since high income could encourage the use of luxury goods like TV, Video and VCD.

Settlement Area	TV	Video	VCD	Cassette	Radio
Clustered Area	27	6	6	29	13
Dispersed Area	54	24	24	50	30

Fig. 8: Possession of communication facilities (Source: Based on personal interview (2003-2004)). Note: Values are calculated for 100 households. Number of sample size for clustered and dispersed are 126 and 54 respectively.

The lighting system of two residential areas is shown in Fig. 9. Collective electricity supply is only available in the clustered area. Most of the residents living in the dispersed area use their own generators, gas lamps, oil lamps, and candles. This table also reveals two points related to the variation of socio-economic conditions. First, dispersed people could not get the benefit of a collective electricity supply system. Second, many dispersed residents are wealthy enough to possess their own generators.

Settlement Area	Generator	Electricity	Battery	Gas Lamp	Oil Lamp	Candle
Clustered Area	13	22	15	6	41	31
Dispersed Area	20	0	30	11	94	67

Fig. 9: Spatial variation of lighting system in Pandaw Model Village (Source: Based on personal interview (2003-2004)).
Note: 1. Answers are based on multiple choices.
2. Values are calculated for 100 households.
3. Number of sample sizes for clustered and dispersed are 126 and 54 respectively.

The sources for drinking water and water for domestic use of the study areas are shown in Fig. 10. Both clustered and dispersed areas have relied for their fresh water supply solely on man made ponds and natural rain water. Although other water sources like using tube wells were asked no one answered the question. According to an interview with the village head, it may be very difficult to dig a tube well due to intrusion of salt water. Although they tried to dig a tube well two or three times before, all efforts failed. Therefore, they tried

to repair and improve the existing ponds by means of fencing and construction of water tanks near the ponds. People and animals are not allowed to enter the ponds directly but tap water from the tanks. Accordingly, the fresh water supply from ponds becomes available throughout the year. This is the reason why only 45 out of 100 residents from the clustered area responded that they use rain water for drinking and domestic use.

Settlement Area	Pond Water	Rain Water
Clustered Area (No.)	100	45
Dispersed Area (No.)	100	76

Fig. 10: Water sources of Pandaw Model Village (Source: Based on personal interview (2003-2004)).

Note: 1. Values are calculated for 100 households.

2. Number of sample size for clustered and dispersed are 126 and 54 respectively.

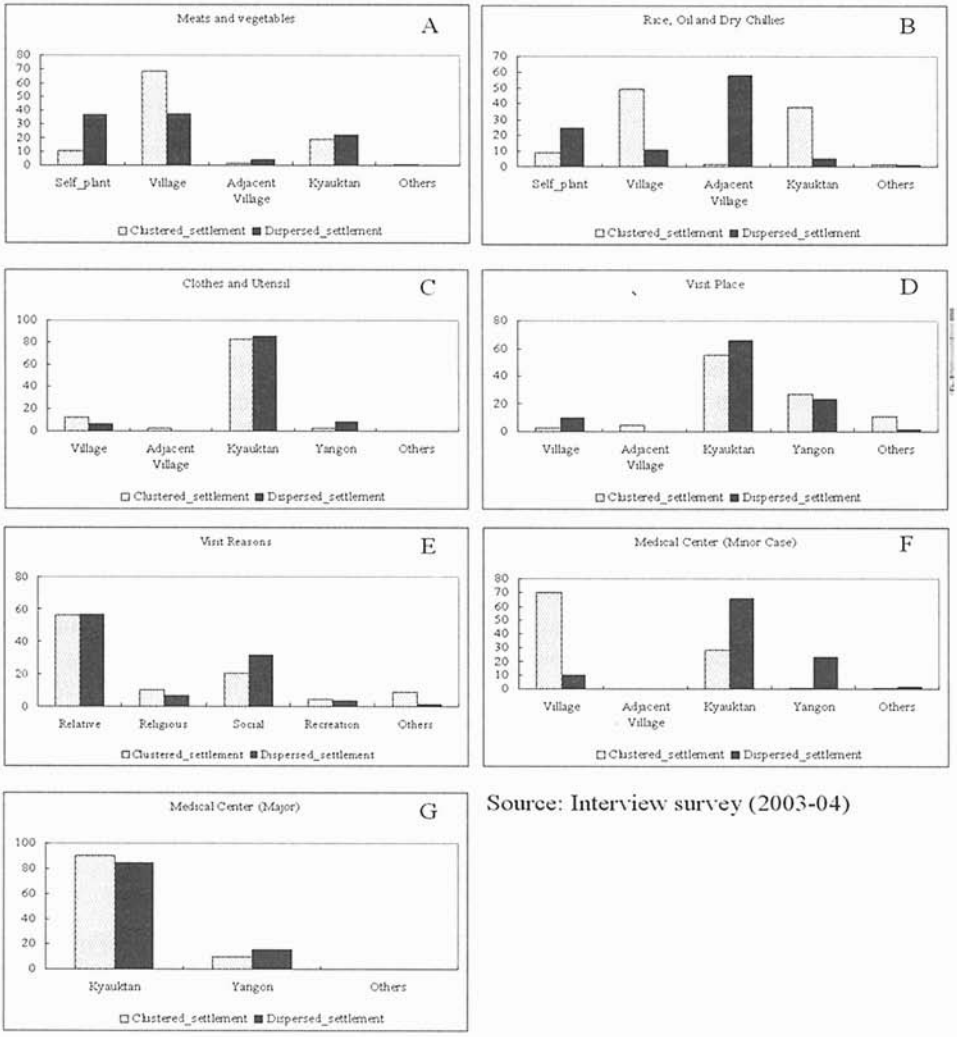
4. Relationship between Pandaw Model Village and Other Areas

To understand the socio-economic variations between clustered and dispersed areas more deeply, socio-economic relationships of each area and their adjacent villages and towns are examined based on personal interview data. Fig. 11A to Fig. 11C depicts the functional relationship between the two settlement areas of Pandaw Model Village and other cities, towns and villages. For vegetable and meat supplies, the clustered area relies on Pandaw Model Village itself and Kyauktan Town while the dispersed area gives priority to self plantation and Pandaw Model Village and Kyauktan Town evenly. Dispersed settlements are located relatively far away from the clustered settlement area where shops and temporary markets are available. Thus, they have to plant vegetables and breed chicken and duck for their consumption. In addition, when they go to the clustered area and Kyauktan Town they buy vegetables and meat. In case of rice, dry chilies and oil, the clustered area mainly depends on their own village and Kyauktan Town while the dispersed area is based on its adjacent villages and self plantation. However, in the case of clothing and utensils both settlement areas buy mainly (more than 80%) from Kyauktan Town. Therefore, it can be said that the clustered area cannot properly serve the dispersed area. For most of the dispersed residents, it is not necessary to pass through the clustered area to reach Kyauktan (township, administrative centre and also the nearest town). They can just follow the Pandaw Kamakaloke Motor Road and take the ferry at the ferry port. Otherwise, they can use their own boat through the nearest creeks.

Social relationships of the two settlement areas are also examined by asking for most frequently visited places and reasons of visit. Fig. 11D shows the variations of the two settlement areas in terms of visiting places. Peoples from both settlement areas visit Kyauktan and Yangon very frequently. In addition, nearly 10% of the visiting trips of dispersed residents lead to the same village, especially the clustered area. The major reasons for visiting are visits to relatives and social purposes (Fig. 11E). In addition, nearly 10% of the

visits of people living in the clustered area are for pilgrimage purposes. People living in the dispersed area do not make many trips for religious purposes.

Finally, the variation of relationships in health care is analysed. In case of minor sickness and accidents, people from the clustered area depend on the same clustered village area where there is one rural health care centre and traditional medicine practitioners (Fig. 11F). Conversely, the dispersed settlement does not depend much on the clustered area for their minor health problems. It is because Kyauktan Town is more reliable for the dispersed farmers than the clustered area in terms of time distance and reliability of the



Source: Interview survey (2003-04)

Fig. 11: Difference in socio-economic relationship between clustered and dispersed area (%)

presence of practitioners. As for hospitals people living in the dispersed area rely on Kyauktan Town and Yangon (Fig. 4G). They do not depend on the clustered area since it is far away and the presence of a physician (nurse) is not sure. Therefore, they depend on Kyauktan Town which has nearly the same time distance as the clustered area. In case of major sickness and necessary surgical operations, both settlement areas depend on Kyauktan and Yangon. However, the dispersed residents rely more on Yangon. It may be the result of being wealthy.

5. Causes of Socio-economic Variation

Before discussing the problem of socio-economic variation and relocation of dispersed settlements to the clustered area, it is necessary to discuss the current situation of Pandaw Model Village. Historically and geographically, the Pandaw Village's settlement area has separated into clustered and dispersed areas. Household size and individual living space between the two settlement areas are different. In the dispersed area, an integrated living system where more than one generation is living in a house is prominent. Such a living system is largely connected to the type of their occupation. Farmers generally possess about 30 acres of land and breeding cattle to use in farming and chickens, ducks, etc. for self-support. Their farm lands are located at more than one hour walking distance from the clustered area. In addition, since they are living in the paddy field they have to find their way of fuel supply. Since there is no large tree to use as firewood, dispersed farmers usually use dried cattle manure in cooking. They grow vegetables for their kitchen use. Although their main job is farming, there are many other related works to support their living. While males are working in the farms, female family members are doing others jobs.

Fig. 12 shows the sketch diagram of one dispersed farmer. One of the distinguishing features is that he has two ponds, one for drinking water and another for human and livestock usage. These two ponds occupy a large area. Fish is generally bred in the ponds for household consumption. The second feature is the presence of a garden (although not in consolidated form) to support the farmer's household. Two or three kinds of seasonal vegetables are grown there. The third

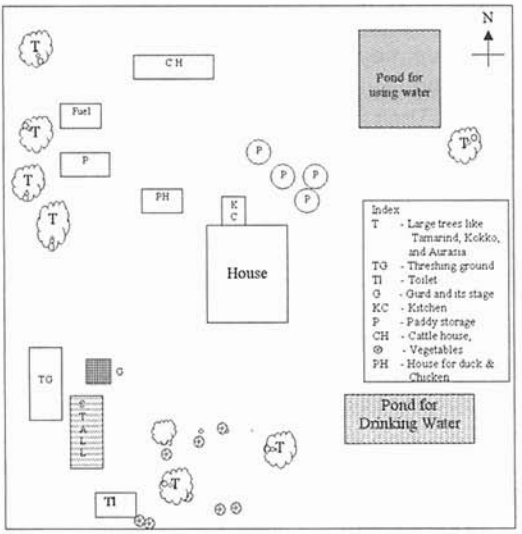


Fig. 12: Sketch diagram of dispersed farmer's house (Source: Field observation 2004)

feature is that he has cattle and poultry houses. Cattle are used in farming while ducks and chickens are bred for meat. Another difference is the storage of paddy and fuel. This particular farmer stores paddy in the bowl and waits until two or three weeks before the onset of monsoon. When the monsoon has come, he sends the paddy to the rice-mill and has it processed into rice to be sold to the market. Thus, he can get an earning and profit generated from any price variation of rice. In addition to rice, he also makes and stores the fuel for the whole Monsoon period. He uses cattle manure (and sometime paddy peels) to make fuel plates. In order to make the plates cattle manure and paddy peel is mixed, then dried in daylight before being put in the store. Then, dry them in the daylight before putting them in the store. Therefore, it can be said one dispersed farmer has developed his own ecosystem on the farm as is shown in the interview results analysed before. This farmer does not much rely on the clustered area for vegetable and food supply.

The development of self-support system alone cannot not sustain the dispersed settlement. It will be difficult for dispersed farmers in case of security and health. Therefore, it is necessary to examine their social relationships. Fig. 13 depicts the sample social relationship of farmers living in the dispersed area. Farmers living in the dispersed area have blood relationships one way or the other. For example, Farmer A is a relative of B and C while farmer D is aunt of farmer B and sister of farmer E. In case of Hindu, this relationship is stronger than Bhamar since they practice a close-blood-relative- marriage system.

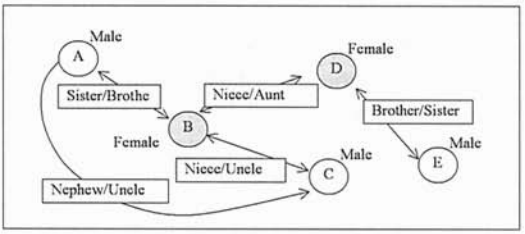


Fig. 13: Sketch diagram of dispersed farmer's house (Source: Field observation 2004)

Therefore, nearly all residents living in the dispersed area have relationships with each other and work in similar jobs. They earn large amounts of money from rice cultivation (Fig. 6). Their expenditure, however, is largely covered by their self-support system. Thus, they can save money and can use it in communication and lighting facilities (Fig. 8 and Fig. 9) as compared to the clustered area.

6. Discussion and Conclusion

Based on the above variations of social and economic conditions, the cost and benefits of the relocation project will be discussed. Both cost and benefits can be considered in terms of short and long term situations.

Firstly, if dispersed settlements are relocated in the clustered area what will be the benefits for economic and social conditions of the village?

(1) Each farmer uses more than one acre of land for their residents and self-support system. If they are relocated in the clustered area, about one acre per farmer of

land could be converted from present day residential land to paddy land. Since there are about 218 households living in the dispersed area, more than 200 acres of additional land could be cultivated with paddy. As a result, the contribution to the village economy in short terms would be high.

(2) If all dispersed settlement could relocate in the clustered area, they could enjoy the benefits of collective using of both economic and social welfare. For example, if full relocation occurs, consumption of the clustered area will be doubled. As a consequence, some economic activities that dispersed settlements depend on in Kyauktan Town directly for the time being will be relocated to the clustered area. Then, subsequently economic multiplier effects will take place in the clustered area. When the demand (e.g. population) increases in the health care sector, the supply (e.g. doctors) will occur (opening of a clinic) automatically and could be of benefit not only to relocated people but also to existing families. Other economic and social welfare activities underlie similar principles.

(3) Hindu families living in the dispersed area do not have a good future since they practise close-blood-marriage system. They allow marriage between first cousins. Although it is necessary to verify this from medical and genetic point of view, some negative results (birth of a deaf child) of this practice were found during the field survey. With relocation such a problem could be solved to a certain extent.

Alternatively, what will be the cost that villages have to pay for relocation?

(1) From its location and climatic conditions, both clustered and dispersed settlements rely for their water supply on rain water and ponds. Rain water is only available during the rainy season. Since the area is located on the alluvial plain and surrounded by tidal creeks, no underground fresh water supply is available. According to official statistics, there are 8 large ponds in the clustered settlement area and about 80 ponds in the dispersed settlement area. Since each house of the dispersed settlement area generally has two ponds, the actual number could be much higher. The first problem that would arise with relocation is fresh water supply. It is necessary to consider how fresh water can be supplied to the relocated people in the clustered area. The problem is not only for people but also for cattle and livestock breeding by the farmers. Agriculture mechanisation and use of fertiliser is one of the solutions to the fresh water demand of fish. However, other problems mentioned below will still exist.

(2) Most of the people living in the dispersed area use cattle manure and branches of Dhani (nipa) and small annual bushes growing in the dispersed area. To dry and store the cattle manure, large areas of space and cattle are necessary. Therefore, if they relocated to the clustered area fuel problems would occur. If they could not make their fuel themselves, there should be a fuel supply source for them.

(3) The third point is not the short term problem but a long term one. As mentioned in the previous section, dispersed farmers are developing their small ecosystem of living. They make their foods and fuels from the farm, garden, cattle, poultry, fish, trees, etc. If they are relocated such a small ecosystem will be destroyed and all activities involved in the system have to be supported from different sources and different places. For example, in case of a dispersed settlement, they could use

branches of bushes and cattle manure, materials that are annually recovered. If they relocated they would have to use fuel wood or fossil fuel for their cooking. Since all ponds and gardens would be converted to farmland they would have to buy their fishes and vegetables. There should be some places that could supply those necessities. Where is this place? Within Pandaw Village? Within Kyauktan Township? Yangon Division? The problem still in need to be solved is "could newly developed larger ecosystems maintain natural resources to the same extent as old ecosystems?"

Although the present study can only open the debate on costs and benefits of settlement relocations based on socio-economic variations, more detailed and intensive studies are necessary to give convincing and concrete solutions.

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