

International Conference on Built Environment (ICBE)

**SOCIO ECONOMIC IMPACT OF SOIL EROSION ON AFFECTED POPULATION
AT SG. LANGAT**

Siti Noraini Bt Ahmad¹, N.K.F Mustafa¹, Siti Nur Aliaa Roslan¹ and
Hanah Zakariah¹

¹*Infrastructure University Kuala Lumpur, Malaysia*

ABSTRACT

Erosion occurs naturally when, during rainfall, water in the river flows rapidly thereby eroding the river banks. Eventually the river banks collapse, forming silt on the base of the river, gradually makes the river shallower, which increases the possibilities of flooding along the river bank. Studies carried out along the Sg. Langat banks had identified the Hulu Langat area as the most seriously affected by soil erosion. The Hulu Langat area is quite heavily populated, mainly by villagers that had set up roots in the area for generations and owned properties in the area. Majority of the population either live in detached kampong houses or terrace houses. These are the people that will be mostly affected by soil erosion occurrences and due to this, impact of soil erosion towards social, psychological, environmental and economics of the affected population was assessed in this study. The impact assessments were made based on findings from interviews and survey questionnaires distributed to locals living in the affected areas. Responses from the survey carried out were tabulated and analysed to determine the extent of socio economy and psychological impact caused by the soil erosion. It was found that soil erosion occurrences in the Hulu Langat area do not have significant economic impact on the affected community. However, it was observed that there may be potential psychological impact that could include but not limited to increase in anxiety on safety of both lives and properties of the affected community.

Keywords:

Soil Erosion, Social Impact, Psychological Impact, Environmental Impact, Economic Impact, Affected Population.

INTRODUCTION

This paper is a subset of the research on Erosion Risk Potential Categorization in Langat River, a Scientific Collaboration between Infrastructure University Kuala Lumpur (IUKL) and HTC Kuala Lumpur, Department of Irrigation and Drainage Malaysia (DID). The research objectives include determining the degree of soil erodibility along the Langat River; evaluating rainfall erosivity at the Langat River; identifying erosion risk potential along the Langat River and categorizing erosion risk potential in the Langat River.

Soil samplings carried out at sampling points located at affected areas in Hulu Langat namely Pansoon, Kampung Kuala Kerdik, Dusun Tua, Kg. Seri Nanding and Sungai Serai had

shown that the occurrence of soil erosion along the Sungai Langat river bank is most serious at these areas. Impact of soil erosion towards social, psychological, environmental and economics of the affected population were thus assessed in these affected areas. The impact assessments were made based on findings from interviews and survey questionnaires distributed to locals living in affected areas.

LITERATURE REVIEW

Soil erosion is an issue where the adage ‘think globally, act locally’ is clearly apropos. Think globally, because soil erosion is a common problem that has, does, and will continue to impart the global community. Act locally, because effective erosion control requires action at the hillslope, field, stream channel and upland watershed scales Terrence J. Toy et al., (2002).

Soil erosion has been a major issue in the past and will become an even greater issue in the future as population growth continues to expand and land resources are more intensively used, often to a point of destruction. Soil erosion is a natural process, occurring over geological time, and indeed it is a process that is essential for soil formation in the first place. With respect to soil degradation, most concerns about erosion are related to accelerated erosion, where the natural rate has been significantly increased as the results of logging activities, the introduction of rubber plantations, tin mining activities or deforestation associated with land conversion for agricultural, industrial or urbanization purposes Gregersen et al., (2003).

There are two major types of erosion, by wind and by water. However, soil erosion caused by running water is the type that of soil erosion that is mostly seen around the world. This includes rivers that erode the river basin, rainwater that erodes various landforms, and the sea waves that erode the coastal area. Water erodes and transports soil particles from higher altitude and deposits them in low lying areas. Wind erosion is most often witnessed in dry areas wherein strong winds brush against various landforms, cutting through them and loosening the soil particles, which are eroded and transported towards the direction in which the wind flows.

Under the Malaysian conditions, erosion by water is the most significant due to high mean annual rainfall, storm density and frequency. Higher rates of erosion will occur when the vegetation cover is disturbed or removed. Once the vegetation is cleared, interception of rainfall will be greatly reduced which will result in a severe increase in surface runoff velocity and volume. Erosion by running water may take place in the form of rill or gully erosion, particularly in loose sandy granitic soils (University of Malaya Consultancy Unit, 2003).

According to Pimentel (2006), the United States is losing soil 10 times faster than the natural replenishment rate, while China and India are losing soil 30-40 times faster. As a result of erosion over the past 40 years, 30% of the world’s arable land has become unproductive. Around 60% of eroded soil ends up in rivers, streams and lakes, making waterways more prone to flooding and to contamination from fertilizers and pesticides. Erosion also reduces the ability of the soil to store water and support plant growth, thereby reducing its ability to support biodiversity. This further affirms the seriousness of the issue of soil erosion not only in Malaysia but in the world at large.

It is generally understood that increased soil erosion can lead to loss of land, reduced soil fertility, greater rainfall runoff, lower groundwater recharge, more sediment flows in river, higher contaminants in diminishing water supplies, lowered quality of drinking water, increased flooding, and diminished economic benefits and increased hardships to both rural and urban populations. The impact of soil erosion on the affected population therefore, should be studied

so as to come up with suitable and appropriate mitigating measures applicable locally as well as internationally.

METHODOLOGY

Methodology used to capture the qualitative type of information to assess the socio economic impact of soil erosion along the Sungai Langat on the affected community was through interviews and survey questionnaires that were randomly distributed to the community living within the affected area. List of questions asked and responses in the survey questionnaire distributed are listed in Table 1.

Section A of the questionnaire was aimed at acquiring general demographic information of the community and level of property ownerships.

Table 1: List of Survey Question and Possible Responses

A. POPULATION DATA (Kindly tick (√) the relevant answer)		
1	Please state your occupation	a) Student b) House wife c) Government servant d) Private sector e) Professional f) Self employed g) Un-employed
2	Total household income per month	a) Less than RM1,500 b) RM1,500 to RM2,999 c) RM3,000 to RM5,000 d) RM5,001 to RM9,999 e) More than RM9,999
3	Number of household	a) Living alone b) 2 to 3 persons c) 4 to 5 persons d) More than 6 persons
4	Type of dwelling	a) Flat/ Apartment/ Condominium b) Terrace/ Link house c) Semi detached d) Detached house/ Bungalow
5	Length of stay in present dwelling	a) Less than 1 year b) 1 to 3 years c) 4 to 10 years d) More than 10 years

6	Property ownership	a) Own/ Under mortgage b) Rented/ Quarters c) Inheritance		
7	Is your house/ place of work located close to the Langat River? If yes, please state the area you live/ work in.	Yes		No
		Area:		
8	Are you aware of the erosion occurring near/ at your area? If yes, please state the area and proceed to Section B of this questionnaire.	Yes		No
		Area of occurrence:		
B. IMPACT ON SOCIO ECONOMY (Kindly tick (√) the relevant answer)				
1	How do you come to know of the erosion occurring at/ near your area?	a) General public b) Personally visited the area c) From relevant government department d) Mass media (TV/ Radio/ Newspaper) e) Others _____		
2	Distance of the erosion from your house/ place of work.	a) Less than 1 Km b) 1 Km to 2 Km c) More than 2 Km		
3	What mitigation measures have/ will you take to protect your family against the impact of the erosion?	a) Move to another location b) Sell the house/ land located in the affected area c) Monitor the erosion activity and ensure appropriate mitigative measures are being carried out by the relevant department.		
4	Has the soil erosion resulted in:			
	a) Loss of source of income?	Yes	No	Not sure
	b) Reduced income?	Yes	No	Not sure

	c) Reduced rental rate/ value of house and/ or land?	Yes	No	Not sure
	d) Unable to continue with recreational activities like fishing etc. in the Langat River?	Yes	No	Not sure
	e) Migration of local people to other places?	Yes	No	Not sure
	f) Damage to your property?	Yes	No	Not sure
	g) Damage to public property such as roads, bridges etc.?	Yes	No	Not sure
	h) Flooding in affected area especially during heavy rain?	Yes	No	Not sure
	i) Anxiety and feeling of unsafe when at home/ work place located near to the affected area?	Yes	No	Not sure

Questions in Section B were aimed at assessing the level of economy, psychological and environmental impact of soil erosion on the affected community. Responds from the survey carried out were tabulated and analysed using Microsoft Excel to determine the extent of socio economy and psychological impact caused by the soil erosion on the affected community.

SURVEY FINDINGS

A total of 57 responses were collected and findings from these responses were analysed using the MS Excel. Questionnaires were randomly distributed in six areas within Hulu Langat as shown in Table 2 below. Only one respondent was not from the Hulu Langat area and this respondent was not aware of any soil erosion activities within the area.

Table 2: Breakdown of the Survey Responds by Area

No.	Area	Total	Percentage
1	Taman Titiwangsa, Hulu Langat	9	15.8%
2	Batu 14, Hulu Langat	13	22.8%
3	Hulu Langat	3	5.3%
4	Pangsun, Hulu Langat	18	31.6%
5	Dusun Tua, Hulu Langat	12	21.1%
6	Hulu Langat Police St, Bt 14	1	1.8%

7	Not near Sungai Langat	1	1.8%
Total:		57	100%

General Demographics

The respondents were mainly self-employed (30%), work in the government (25%) and private (21%) sector while the other 24% comprise non income earners that include housewives and students. Majority (42%) of the respondents have total household income of RM3, 000.00 to RM5, 000.00 a month while the total number in a household is mainly four (4) to five (5) persons (44%).

Questions on type, length of stay and ownership of the present dwelling were asked to determine the level of economical and psychological impact of the soil erosion occurrences on the affected community. Results showed that majority of the respondents live in detached houses or bungalows (46%) and terrace or link houses (46%). 65% of the respondents have lived in the Hulu Langat area for more than ten (10) years which could indicate original settlers in the area, which is further affirmed by findings on the ownership of the dwellings which showed that 77% of the dwellings are owned by the respondents. Figures 1 to 3 show the findings of the survey on type, length of stay and ownership of dwellings.

Perceived Impact of Soil Erosion

98% of the survey respondents live or work near the Sungai Langat area, out of which 47% are aware of the occurrences of soil erosion along its banks. A total of ten (10) areas of soil erosion occurrences were identified from the survey, that include Batu 14, Hulu Langat, Sg. Semungkar, Sg. Tekali, Jln Hulu Langat/Ampang, Kg. Sg. Semungkis, Sg. Chua, Sg. Serai, Sg. Limau Manis, Batu 11, Hulu Langat and Dusun Tua. Most of the respondents interviewed had either witness the soil erosion occurrences along the Sungai Langat themselves (45%) or had heard about it from people living in the affected area (42%). Responds to questions asked to determine the extent of economical and psychological impact of the soil erosion on the affected community are tabulated and shown in Table 3 and Figure 4 and Table 4 and Figure 5 respectively.

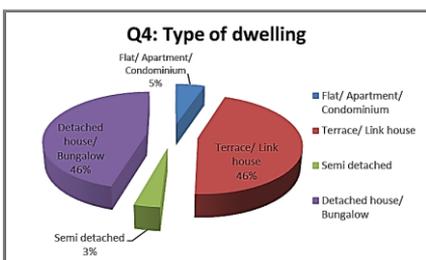


Figure 1: Type of Dwelling

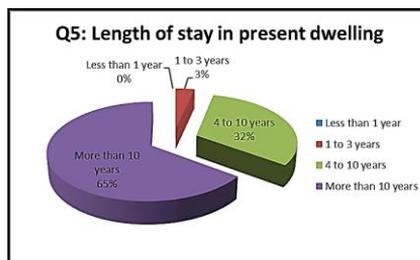


Figure 2: Length of Stay

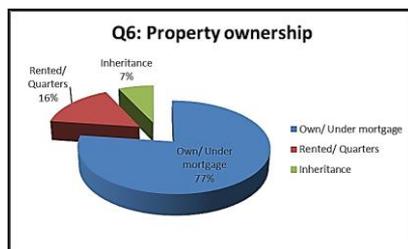


Figure 3: Property Ownership

Table 3: Determination of the Extent of Economic Impact of Soil Erosion on the Affected Community.

Question		Answer (%)			Total (%)
		Yes	No	Not Sure	
4a	Has the erosion resulted in loss of source of income?	0.0	100.0	0.0	100
4b	Has the erosion resulted in reduced income?	0.0	100.0	0.0	100
4c	Has the erosion resulted in reduced rental rate/ value of house and/ or land?	3.7	63.0	33.3	100
4f	Has the erosion resulted in damage to your property?	11.1	88.9	0.0	100

Table 4.0: Determination of the Extent of Psychological Impact of Soil Erosion on the Affected Community.

Question		Answer (%)			Total (%)
		Yes	No	Not Sure	
4d	Has the erosion resulted in you being unable to continue with recreational activities like fishing etc. in the Langat River?	51.9	40.7	7.4	100
4e	Has the erosion resulted in migration of local people to other places?	25.9	14.8	59.3	100
4g	Has the erosion resulted in damage to public property such as roads, bridges etc.?	96.3	3.7	0.0	100
4h	Has the erosion resulted in flooding in affected area especially during heavy rain?	70.4	22.2	7.4	100
4i	Has the erosion resulted in anxiety and feeling of unsafe when at home/ work place located near to the affected area?	66.7	29.6	3.7	100

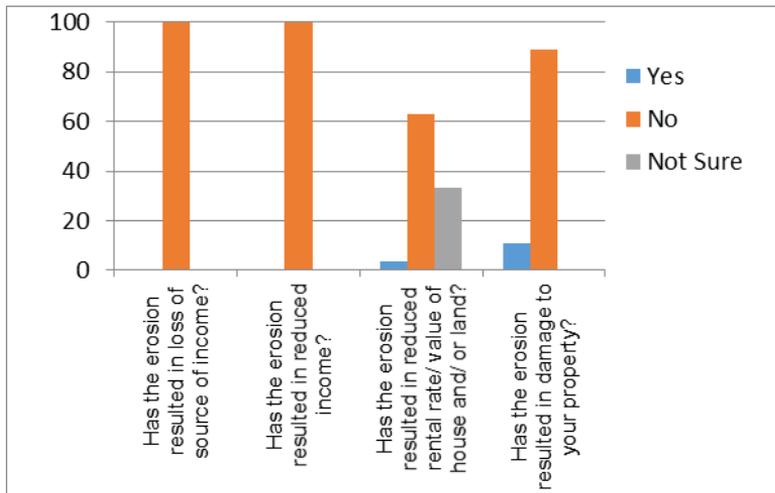


Figure 4: Determination of the Extent of Economic Impact of Soil Erosion on the Affected Community

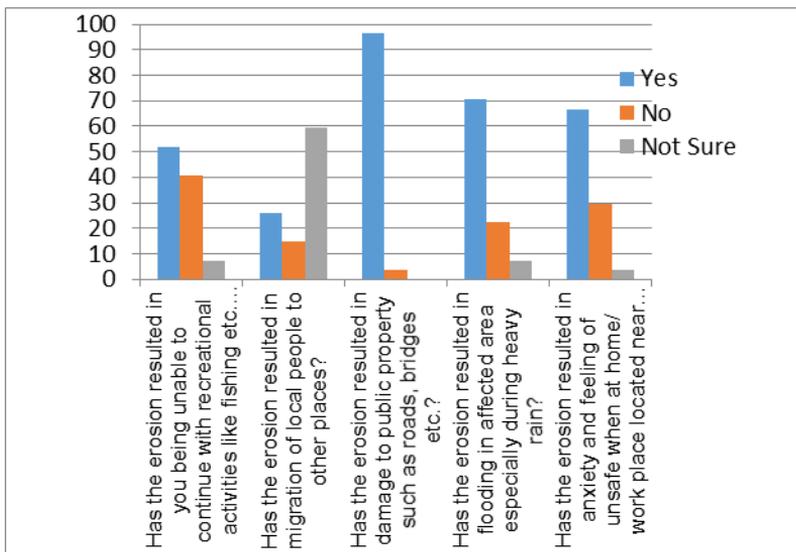


Figure 5: Determination of the Extent of Psychological Impact of Soil Erosion on the Affected Community

DISCUSSION

Community affected by the soil erosion occurrences along the Sungai Langat area are generally from the middle income group with monthly household income of between RM3, 000.00 to RM5, 000.00. Household sizes varies between three to five family members which could indicate a young family comprising parents and a child and a standard Malaysian family that normally comprise parents and two to three children. Majority own either detached or terrace houses located near the affected area and had been staying in the area for either more than ten years or between four to ten years, which could indicate original and new settlers of the Hulu Langat area respectively.

Areas of soil erosion occurrences identified by respondents in the survey coincide with areas that had been identified in the soil sampling activities carried out in the major research component. A total of 87% of the people interviewed had either visited the areas or heard about the soil erosion occurrences from people living in the Hulu Langat area.

Perceived Economic Impact of Soil Erosion on the Affected Community

In general soil erosion occurrences along the Sungai Langat area has no significant impact on properties located in the area. Neither has it caused any loss or reduction of income to the affected community, as shown in Figure 4.0. This is because majority of the people interviewed are salary earners working in the private or public sectors (46%) and self-employed (30%), mainly with own businesses and their livelihood is not dependent on the land, like farmers etc. Only a fraction (3.7%) of those interviewed was of the opinion that reduction in rental rate or value of properties in the affected area was caused by the soil erosion along Sungai Langat. It therefore could be concluded that the soil erosion occurrences in the area do not have any significant economic impact on the affected community.

Perceived Psychological Impact of Soil Erosion on the Affected Community

Significant number of people interviewed had expressed their concerns on the potential impacts of the soil erosion occurrences along the Sungai Langat. These concerns include flooding at the affected areas especially during heavy rain, damage to public properties and not being able to carry out recreational activities as shown in Figure 5.0. A significant 66.7% of the respondents admitted to feeling unsafe when being in or near the soil erosion areas. 25.9% of the people interviewed were of the opinion that migration of local people to places located outside the affected area are due to the soil erosion occurrences in the area while 59.3% were not sure whether or not this is the cause for migration. Prolong exposure to psychological threats on safety of lives and properties of this nature if not resolved could eventually lead to psychological impact that could eventually impair the community's ability to function as a social group.

CONCLUSION

Based on findings from the survey and interview carried out at the affected areas in Hulu Langat, it could be concluded that the soil erosion occurrences at Sungai Langat which was found to be at its worst in the Hulu Langat area does not have significant economic impact on the affected community. However, feedback gathered from the affected community during the survey indicated potential psychological impact that could include but not limited to increase in anxiety about safety of both lives and properties.

REFERENCES

- [1] Terrence J. T., George, R. F., Kenneth, G. R. (2002). *Soil Erosion: Processes, Prediction, Measurement, and Control*, John Wiley & Sons.
- [2] Gregersen, J. A., Lauridsen, P. E., Kaas, M., Lopdrup, U., Veihe, A., & Van Der Keur, P. (2003). *Land Use And Soil Erosion In Tikolod, Sabah, Malaysia*.
- [3] David , P. (2006). *Soil Erosion: A Food And Environmental Threat*. *Environment, Development and Sustainability* 8: 119-137.
- [4] University of Malaya Consultancy Unit, 2003.