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Domestic wastewater and excreta treatment

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1.0 INTRODUCTION

Kajang is a small town located about 25 kilometers south of Kuala Lumpur. Due to it's strategic location, the Kajang township has grown tremendously in the last ten years. Presently, it is the main trading, administrative, housing plus scores of other activities in Ulu Langat District. Figures 1 and 2 show the study area and the sampling locations respectively.

1.1 MATERIAL AND METHODS

The study was divided into four parts. The first part involves surveying the study area to identify the types of sewage treatment and domestic wastewater disposal systems for residential and business premises. The second part of the study was the analysis of water samples taken from the six sampling stations. The next part of the study was the water quality analysis of the effluent taken from three selected sewage treatment systems i.e an Imhoff tank, an oxidation pond and a septic tank. The Imhoff tank is located at Kampung Sri Jambu and it has been operating for six years. It serves a total of 26 houses. The oxidation pond selected for the study was located at Taman Kajang Baru and Sungai Jelok and it serves 523 houses. The effluent from the septic tanks was taken at Taman Mahkota from each individual houses.

The last part of the study was the analysis of domestic wastewater. The water samples were taken at the effluent pipe of Kajang Police Station Flats.

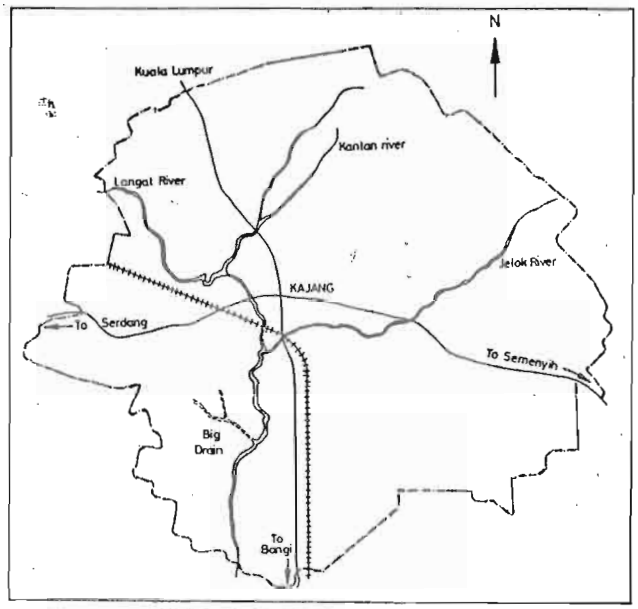

Figure 1 The area of study (Kajang Town)

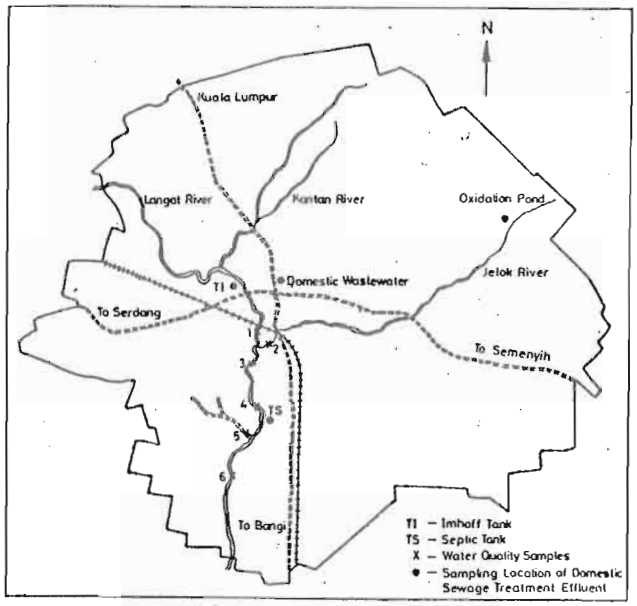

Figure 2 Sampling station on Langat River and wastewater effluent.

1.2 Water quality parameters

The parameters measured in the study are included temperature, pH, dissolved oxygen, conductivity, alkalinity, turbidity, 5-day B.O.D, total coliform, total nitrogen, C.O.D, suspended and dissolved solids. The parameters such as pH, temperature, dissolved oxygen and conductivity were measured in situ and whenever possible were verified in the laboratory. The other water quality parameters like suspended solids, total solids, biochemichal oxygen demand, chemical oxygen demand, alkalinity, turbidity, total nitrogen and total coliform were analysed in the laboratory. All analytical methods were based on Standard Methods (APHA, 1985).

2.0 RESULTS AND DISCUSSION

2.1 Sewage treatment systems

There are four types of treatment systems available. They are the septic tanks, Imhoff tanks, oxidation ponds and bucket laterines (night soil are later

treated by the Majlis Daerah Hulu Langat). However, a significant number of houses did not have any waste treatment system; raw sewage is released directly into the Langat River. Table 1 shows the number of houses with different treatment systems while Table 2 shows the water quality data for the whole study.

2.2 Sungai Langat water quality

On the average, the dissolved oxygen concentration was within the expected values except for sampling station number 5 which has dissolved oxygen levels of 3.4 mg/l i.e relatively low when compared with other stations. This low dissolved oxygen content might be due to the high organic load recieved from the huge moonsoon drain which is located upstream. This is more evident when we examined the BOD5 value of 22.1 mg/l, which is about 100 percent more than that of other stations.

The COD levels for all stations is within the range of 27.8 mg/l to 68.6 mg/l. However, station number 5 again showed the highest concentration. For dissolved and suspended solids all stations showed a high range of 42.8 mg/l to 152.4 mg/l for suspended solids and 86.0 to 226.8 mg/l for dissolved solids. As for organic nitrogen, station 5 showed the highest level with 13.0 mg/l. Station 5 recieve discharges from the monsoon drains which contain domestic wastewater and solid wastes. This tend to increase organic nitrogen concentration in the water (Witt et. al, 1974).

Other parameters worth mentioning here is total coliform where all stations showed high total counts. This indicates that the Sungai Langat is contaminated with fecal metaerial. At this juncture it is very important to know the sources of contamination, whether it is due to the inefficiency of the treatment systems or due to the disposal of untreated sewage into the river or both.

Let us now look at the effluent quality from various sewage treatment systems sampled (Table 3). From Table 3, shows that the oxidation pond has the highest dissloved oxygen value of 2.9 mg/l. Septic tank has the highest BOD5 value of 81.6 mg/l while that of oxidation pond has the lowest value of 31.5 mg/l.

The effluent from the septic tank has the highest dissolved solid concentrations while the lowest value is the effluent from the oxidation pond. As for turbidity, again the septic tank shows the highest value.

For the conductivity levels, the effluent from the oxidation pond has the highest value of 328 umho/cm while that of Imhoff tank show the lowest value 196 umho/cm.

Table 1 Number of Houses with Different Treatment Systems

Treatment Systems	Number of Areas	Number of Houses	% Total
1. Septic tanks	28	4162	75
2. Imhoff tanks	5	611	11
3. Oxidation ponds	1	523	9
4. Night soil	1	30	1
5. Pit laterine	-	220	4

Table 2 Water Quality at Different Sampling Stations

	Stations					
Parameters	1	2	3	4	5	6
D.O (mg/l)	7.5	6.6	7.5	8.6	3.4	7.1
BOD5 (mg/l)	7.2	9.6	7.8	6.7	22.1	10.2
COD (mg/l)	27.8	34.6	28.6	30.8	68.6	36.8
S.S (mg/l)	141.0	112.0	138.0	152.4	42.8	134.2
D.S (mg/l)	104.4	86.0	91.2	84.4	226.8	90.2
Turbidity (FTU)	67.8	63.2	63.0	63.4	39.0	60.0
Conductivity (umho/cm)	39.2	45.2	39.4	38.6	83.2	54.4
pH	6.7	6.8	6.7	6.7	6.6	6.8
Temperature (C)	26.6	26.6	26.6	26.6	25.8	26.6
Alkalinity (mg/l as CaCO3)	5.5	10.7	5.0	4.3	4.9	6.1
Total Nitrogen (mg/l)	8.2	3.8	8.9	5.6	13.0	5.1
Total Coliform (X 1000/100 ml)	1.1	1.5	1.3	1.0	1.5	1.1

D.O = Dissolved Oxygen
BOD5 = Biochemical Oxygen Demand (5 days)
COD = Chemical oxygen demand
S.S = Suspended solids
D.S = Dissolved solids

3.0 CONCLUSION

This study has shown that the effluent from wastewater treatment systems and domestic wastewater has increased the value of certain parameters in the Sungai

Table 3 Effluent Quality for Various Treatment Systems

	Treatment Systems			
	A	B	C	D
Parameters				
Dissolved Oxygen (mg/l)	0.7	2.9	1.6	0.7
BOD5 (mg/l)	80.0	31.5	35.2	81.6
COD (mg/l)	257.6	95.4	115.4	254.8
Suspended Solids (mg/l)	688.2	85.0	103.0	671.4
Dissolved Solids (mg/l)	312.8	117.4	248.4	363.0
Turbidity (FTU)	47.2	16.4	14.0	47.6
Conductivity (umho/cm)	196.0	328.0	296.0	206.0
pH	6.7	6.7	7.1	6.7
Temperature (C)	26.4	25.9	26.0	26.8
Total Coliforms (X 100 000/100 ml)	9.2	5.0	5.7	10.3

A = Imhoff Tank
B = Oxidation Pond
C = Domestic Wastewater
D = Septic Tank

Langat. Wastewater disposal into Sungai Langat had reduced the dissolved oxygen concentrations and conversely had increased the BOD. Pyrde (1974) had also shown similar pattern in his study. Depletion of dissolved oxygen levels may result in fish kills and other undesirable effects to Sungai Langat.

This study has also shown that a sizeable number of Kajang population used septic tanks for wastewater treatment. With proper maintenance, this type of treatment is quite good. Qualitative analysis of the effluents from the various treatment systems, showed the effluent from the oxidation ponds has the best quality having values of BOD, COD, suspended solids, dissolved solids and total coliforms of 31.5 mg/l, 95.4 mg/l, 85 mg/l, 117.4 mg/l and 50,300 counts/100 ml respectively.

It is therefore recommended that Kajang township should upgrade their wastewater treatment facilities in order to reduce the organic loads from the wastewater to the Sungai Langat. It is also recommended that oxidation ponds be selected as a suitable the treatment systems since it has been shown to have the best effluent quality.

4.0 BIBLIOGRAPHY

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