

Handling of water treatment plant sludge in an eco-friendly manner through revenue generation to the National Water Supply and Drainage Board

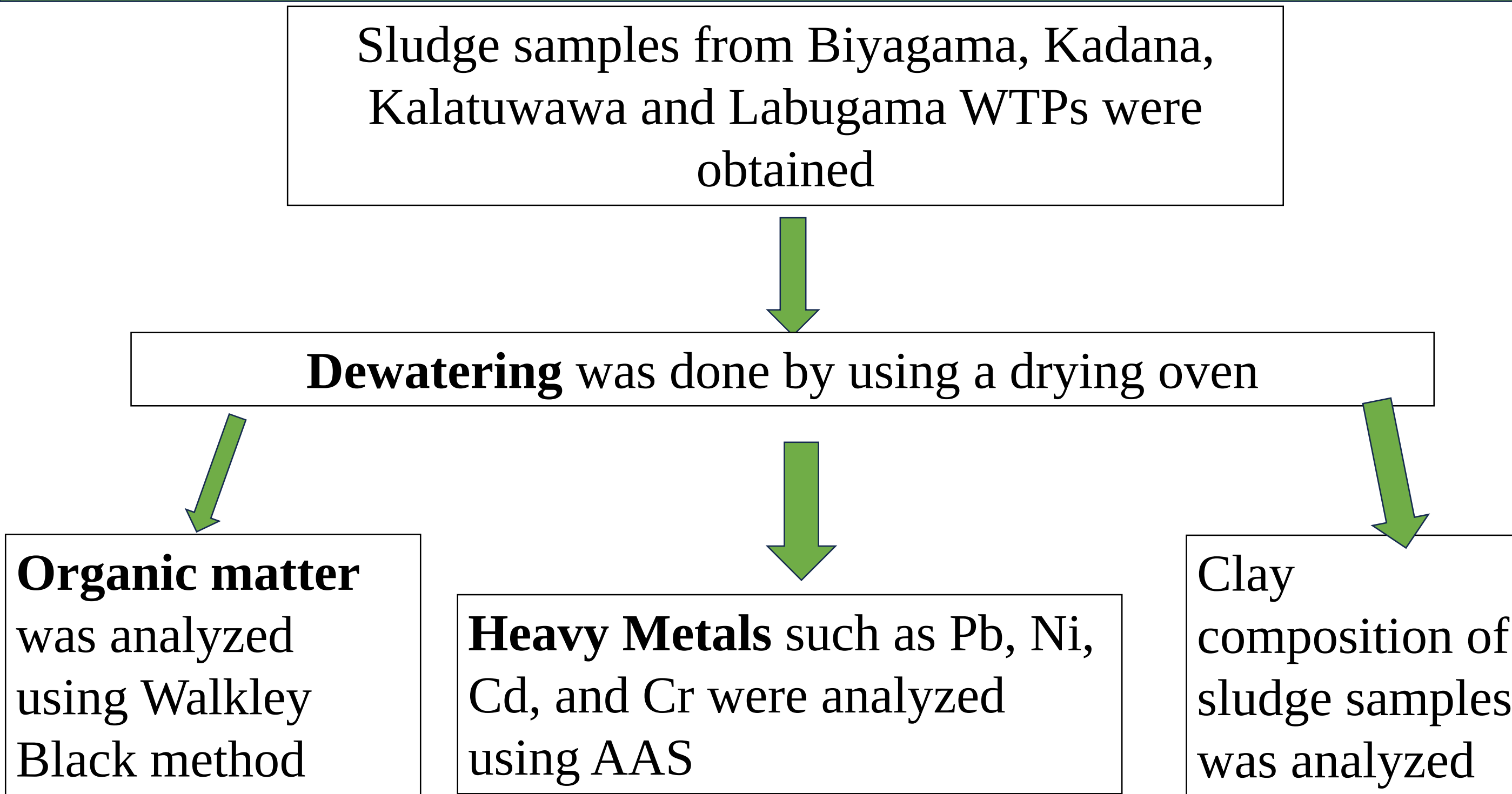


P. I. U. S. Perera ¹, K. L. U. Maithreepala²and D. N. P. Welikala²
College of Chemical Sciences, Institute of Chemistry Ceylon ¹, National Water Supply and Drainage Board²

Introduction

- Turbidity removal is one of major task in water treatment for drinking water, which coincides with the accumulation of water treatment plant sludge
- Removal of sludge is a huge burden to water treatment
- The research done to find out the best economic and environmentally sound option to the problem of sludge disposal and management is inadequate in Sri Lanka
- This study was done to find out the potential usage of water treatment plant sludge as a partial substitute for clay in making cricket turf and in making handicrafts

Methodology



Results and Discussion

Table 01 : A comparison of soil composition of each WTP and Reference

Test/ Unit	Biyagam a WTP/ % by mass	Kadana WTP/ % by mass	Labgama WTP/ % by mass	Kalatuwa wa WTP/ % by mass	Reference / % by mass
Coarse sand	23	10	59	46	2
Medium sand	10	1	5	7	0
Fine sand	4	29	1	1	2
Silt	25	66	17	0	43
Clay	8	3	0	31	52
organic matter	8	3.26	20.39	13.47	4.2

Table 02 : Heavy metal content present in each sample and LOD

WTP	Pb / ppm	Ni / ppm	Cd/ ppm	Cr/ ppm
Biyagama	ND	ND	0.0258	0.0258
Kadana	ND	ND	ND	0.0449
Labugama	ND	ND	0.0253	ND
Kalatuwawa	ND	ND	ND	ND
LOD/ ppm	0.05	0.02	0.002	0.02

Heavy metals were analyzed using AAS
All four samples are safe to reuse



Figure 01 : Handicrafts made from Kandana WTP sludge

- Analysis of organic matter content using Walkley and Black method results in following reactions
- $3\text{C} + 16\text{H}^+ + 2\text{Cr}_2\text{O}_7^{2-} \rightarrow 4\text{Cr}^{3+} + 8\text{H}_2\text{O} + 3\text{CO}_2 \dots\dots\dots 1$
- $14\text{H}^+ + 6\text{Fe}^{2+} + \text{Cr}_2\text{O}_7^{2-} \rightarrow 6\text{Fe}^{3+} + 2\text{Cr}^{3+} + 7\text{H}_2\text{O} \dots\dots\dots 2$

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- Clay content shall be >50% by mass and Organic matter contents shall be <4% by mass for the cricket turf applications, but WTP sludge contains only 0 – 31% of clay and 3.3 %– 20.3% organic matter respectively.
- Reference - Clay sample of cricket turf of Colombo Colts Cricket Club
- Sludge from Labugama and Biyagama didn’t comply with activities in making handicrafts.
- Properties of handicrafts made from Kalatuwawa and kandana was compared.

Conclusion

- WTP sludge does not conform as it’s for the application of cricket turf
- Kadana WTP sludge is recommended to use as a partial substitute (Clay : WTP Sludge = 2 : 1) for clay for making handicrafts

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