

The Waste Management Approach for Water Settlement to Improve Quality of Life for Local Resident

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Global climate change is predicted to cause an increase in sea level rise and the frequency and size of storm and storm surge. This will contribute further to the shoreline erosion; flood damage, inundation of land salwater intrusion into the freshwater lens aquifer, among others. The special rapporteur observes that Malaysia is a high performer and that the accessibility of water and sanitation services is truly impressive. However, some groups still do not enjoy their human rights to water and sanitation as they collect water from surface sources that are often compromised in terms of quality and use inadequate sanitation services. There is no public awareness of the proper waste management approach and water pollution issue affected to the living environment. In this research, case study will be used as the research inquiry on the wastewater management approach for water settlement in order to improve the quality of life for local resident. However, this study only highlights the impact of climate change-induced inappropriate wastewater management and untreated water treatment on marine ecological living environments. The qualitative research data collection will be required in this case study to leads towards the archival analysis in the unit measurement and data collection strategies by using 12 number of interview questions generated from 2 deductive code and 2 sub-research question. This research will formulate wastewater treatment by using farming system to improve the social and econmy in this Pulau Ketam. The Majlis Perbandaraan Klang & Pulau ketam local community will be benefited and this research will formulate a new community farm house to improve the social and economic for local resident. Future research will conduct the qualitative research study on the effect of the wastewater management approach for water settlement in this Pulau Ketam.

Keywords: Waste Management, Water Settlement, Quality of Life

1. INTRODUCTION

Background Study

Malaysia is blessed with an abundance of water resources, some 971 billion cubic metres of rainfall each year. The Special Rapporteur visited the country during the monsoon season and saw several tanks to collect rainwater in both urban and rural areas. In terms of access to adequate

water and sanitation services, the Special Rapporteur observes that Malaysia is a high performer and that the accessibility of water and sanitation services is truly impressive. According to the 2015 report of the World Health Organization/United Nations Children's Fund Joint Monitoring Programmed for Water Supply, Sanitation and Hygiene – the first monitoring report after the adoption of the 2030 Agenda for Sustainable Development – 92 per cent of the population of Malaysia had access to safely

managed water services and 82 per cent to safely managed sanitation services. Similarly, the Joint Monitoring Programme estimates near universal access to water, sanitation, and hygiene services in schools. The Special Rapporteur commends the Government and the population of Malaysia for these achievements, which are the result of a historic commitment to the provision of public services.

However, when this picture is observed from a human rights perspective, it is a great concern that some groups still do not enjoy their human rights to water and sanitation as they collect water from surface sources that are often compromised in terms of quality and use inadequate sanitation services. The situation as regards access to drinking water and sanitation for all, with an emphasis on leaving no one behind, would be quite different if water and sanitation were legally recognized as human rights and if Malaysia explicitly recognized the obligation to realize those rights. Building on the current efforts to ratify the relevant international human rights treaties, the Special Rapporteur strongly encourages the Government to consider his observations and recommendations in the present report and to take urgent action to address the situation of access to water and sanitation by the groups that have been left behind.

The garbage situation at Pulau Ketam was at its worst as residents would litter right under their wooden stilt homes. Not only that, the littering caused various pollutions and damage to the water that affected the health of the marine life, and ultimately, the people who consumed the seafood, (Roxanne Tai, 2019). Improper and unorganized disposal of solid waste in open areas and into the sea have a negative impact on the living conditions of human being as well as the overall environment. It results in spread of communicable and non-communicable diseases among human being and animals, thus affecting the livelihood, economic productivity and eco-tourism activities. In addition, it causes contamination of surface water, ground water and generation of toxic and green-house gases. However, using adequate information, resources and efficient management practices, one can turn solid waste into useful resources, (Malaysian Nature Society). 1,000 timber houses on stilts are clustered on the shore of a tropical island. There is no sewer system underneath them. So, raw sewage plummets directly into the sea, the ebb and flow of the tides mixing it with household trash and plastic debris.

The stench, not to mention the risk of disease, is overwhelming (United Nations Environment Programme).

Xuesong Guo, Zehang Liu, Meixue Chen, Junxin Liu & Min Yang (Jan 2014) highlighted that sewage treatment in rural areas can be developed appropriately, to provide reliable and affordable wastewater treatment, in Chinese villagers. M. Anda; R. M. S. R. Mohamed; K. Mathew; S. Dallas; G. E. Ho (Sept 2010) states that decentralized wastewater recycling and irrigation systems is still under monitoring for the urban villages in Perth. The clustering of towns and villages with the approach aspects in an analytical model in master plan for wastewater management (Abd El Gawad, Hassaan A. Butter, J. H.C.(1995)). The investigations are needed to develop the concept of planning as a preliminary design in the management of urban scale off-site system with centralized-WWTP and a wider pipeline network system (J Harahap (2021)). The fishermen communities living condition, it took into account the minimum service standard of a settlement area (Irwan Wunarlani, Sugiono Soetomo, Iwan Rudiarto (25 Aug 2020)). The most local villagers disposing the domestic wastewater directly to the sea because of it is an easy way to throw the wastewater, while other mentioned there is no wastewater drainage available at their place (Byung-Gon Jeong (Jan 2010)).

There are no public awareness of the proper waste management approach for water settlement. Furthermore, there is the water pollution issue and affected to the living environment. However, this study only highlights the impact of climate change-induced inappropriate wastewater management and untreated water treatment on marine ecological living environments. Therefore, this study will approach the wastewater management for the water settlement and formulate the methodology of the wastewater treatment to reduce the impacts of the wastewater direct dispose to the sea.

2. LITERATURE

2.1 Wastewater Management

Sino, H., Ibrahim, M., Mustapa, M. H., & Mahadi, Z. (2019) states that the Unsystematic household waste management in water villages

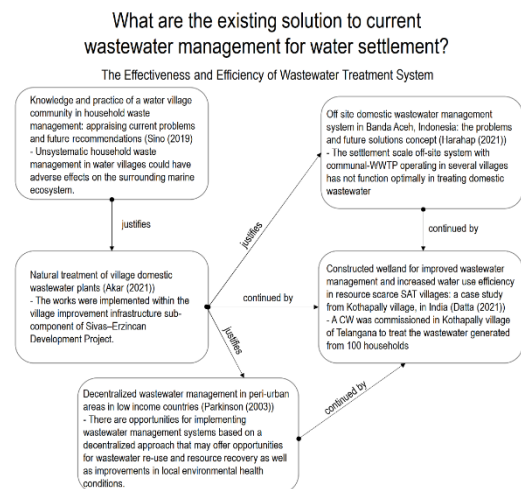
could have adverse effects on the surrounding marine ecosystem. Natural treatment plants were constructed in 30 selected villages of Sivas and Erzincan provinces of Turkey. 16 of those villages were from Sivas province and 14 were from Erzincan province (Akar, D. (2021)). Banda Aceh has been dealing with several problems related to pollution caused by domestic wastewater. According to previous studies, shallow groundwater and surface water in Banda Aceh have been contaminated by domestic wastewater produced by the community (Harahap (2021)). Datta (2021) states that the evaluation a field-scale of constructed wetland (CW) for the treatment of rural wastewater (WW), in resource-scarce semi-arid tropic (SAT) villages, to provide improved wastewater management and increased water use efficiency. In peri-urban areas in low-income countries, conventional centralized approaches to wastewater management have generally failed to address the needs of communities for the collection and disposal of domestic wastewater and faecal sludges from on-site sanitation (Parkinson, (2023)).

Akar, D. (2021) states that the village improvement infrastructure sub-component of Sivas-Erzincan Development Project. The settlement scale off-site system with communal-WWTP operating in several villages has not function optimally in treating domestic wastewater (Harahap, (2021)). Datta (2021) states that the a CW was commissioned in Kothapally village of Telangana to treat the wastewater generated from 100 households. There are opportunities for implementing wastewater management systems based on a decentralized approach that may offer opportunities for wastewater re-use and resource recovery as well as improvements in local environmental health conditions (Parkinson, (2023)).

The contributing factors to household waste mismanagement in this area were the knowledge and practices of the villagers, and the ineffective household waste management system (Sino, H., Ibrahim, M., Mustapa, M. H., & Mahadi, Z. (2019)). Akar, D. (2021) states that the natural treatment plants were constructed after constructing septic tanks between the years 2007 and 2011 to treat domestic wastewater of the villages. Harahap (2021) highlighted that the service coverage which is still very small only 2.12% of the total population. Average COD, sulfate and inorganic nitrogen removal efficiencies observed were 65%, 60% and 67%

respectively, for the study period in 1 year, (Datta(2021)). Parkinson (2023), states that the decentralized approaches may also offer increased opportunities for local stakeholder participation in planning and decision-making.

Sino, H., Ibrahim, M., Mustapa, M. H., & Mahadi, Z. (2019) states that to evaluate the knowledge and practices regarding household waste management by using a survey approach, data was obtained from the use of a guided questionnaire. Constructed wetlands with reeds were used for the natural treatment systems, (Akar, (2021)). Harahap, (2021) states that to develop a concept of domestic wastewater management using an urban scale off-site system that considers environmental characteristics. Removal efficiency for total coliform was consistently above 80%. The treated wastewater was stored in a farm pond and was utilized for irrigation in the nearby agricultural fields, (Datta, (2021)). Parkinson, (2003) states that the importance of building the capacity of local organizations in all aspects of decentralized wastewater management.



LITERATURE REVIEW			
Document	Result	Conclusion	Remarks
Sino (2019) - Knowledge and practice of a water village community in household waste management: appraising current problems and future recommendations	the waste management system should be tailored to the nature of the settlements.	Future waste management system should incorporate effective household waste system, intensive monitoring and enforcement, continuous education on household waste management, property tax and community engagement.	This study lacking in term of the effectiveness of household waste system and the knowledge of the waste management for water village.
Alkar (2021) - Natural treatment of village domestic wastewater with plants	It can be concluded that the average change rate of related parameters in the water taken from discharge of septic tanks and outlet of natural treatment is mostly more than 0.66%.	average change rate of related parameters in the water	This study lacking in term of the understanding of the wastewater management with the natural treatment systems for water village.
Harahap (2021) - Off-site domestic wastewater management system in Banda Aceh, Indonesia: the problems and future solutions concept	It is require an acceleration of service improvement, by developing urban scale off-site system with centralized-WWTP and a wider pipe line network system.	This paper aims to develop a concept of domestic wastewater management using an urban scale off-site system that considers environmental characteristics in Banda Aceh as an alternative to mitigate the occurrence of water body pollution by domestic wastewater.	This study lacking in term of the understanding of the wastewater management between the settlement and urban scale off-site system.
Delta (2021) - Constructed wetland for improved wastewater management and increased water use efficiency in resource scarce SAT villages: a case study from Kotahapally village, in India	Novelty statement Field-scale performance evaluation of constructed wetland based wastewater treatment in a semi-arid tropic village is scarce in the literatures.	The work presented gives a feasibility assessment for this technology critical for its wide-scale application to augment rural wastewater management in resource poor villages.	This study only focuses on 100 households wastewater removal efficiency for the improvement of wastewater management at Kotahapally village.
Parkinson (2003) - Decentralized wastewater management in peri-urban areas in low-income countries	The paper concludes that a concerted capacity-building effort is required to overcome the constraints that hinder the implementation and sustainability of decentralized wastewater systems, and proposes a framework for achieving this goal.	The paper concludes that a concerted capacity-building effort is required to overcome the constraints that hinder the implementation and sustainability of decentralized wastewater systems, and proposes a framework for achieving this goal.	This study lacking in term of determination of wastewater treatment type for the wastewater management.

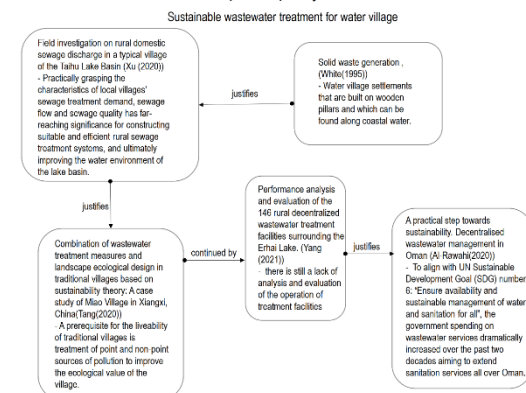
2.2 Quality of Life for Water Settlement

Rural sewage is an important non-point pollution that aggravates eutrophication, (Xu (2020)) and a prerequisite for the liveability of traditional villages is treatment of point and non-point sources of pollution to improve the ecological value of the village, (Tang (2020)). Al-Rawahi, 2020 states that Oman has undergone major transformations during the past few decades, which have resulted in growing water scarcity and an increase in the domestic wastewater production. White (1995) states that the life in an estuary and at the beach are unique settlement patterns in the history of Malaysia. The decentralized wastewater treatment is considered as an effective way to control the water pollution in rural areas and it has been rapidly developed in many countries (Yang (2021)).

Practically grasping the characteristics of local villages' sewage treatment demand, sewage flow and sewage quality has far-reaching significance for constructing suitable and efficient rural sewage treatment systems, and ultimately improving the water environment of the lake basin, (Xu (2020)). Al-Rawahi, (2020) states that to align with UN Sustainable Development Goal (SDG) number 6: "Ensure availability and sustainable management of water and sanitation for all", the government spending on wastewater services dramatically increased over the past two

decades aiming to extend sanitation services all over Oman. White(1995) states that the water village settlements that are built on wooden pillars and which can be found along coastal water and there is still a lack of analysis and evaluation of the operation of treatment facilities (Yang(2021)).

How to improve and design the effective waste water system for water settlement in order to improve quality of life for local resident?



Xu (2020) states that a field investigation and continuously monitored sewage flow and sewage quality in the mode of sewage classification. Tang (2020) states that the combination of water pollution control measures and landscape design improves the aesthetic and ecological sustainability. The expansion of the wastewater infrastructure will have to address the conditions of rural and suburban settlements in order to reduce network and pumping requirements and the risk of technical failure to the minimum and to ensure cost efficiency (Al-Rawahi(2020)). Yang (2021) states that the rural decentralized wastewater treatment facilities were analyzed and evaluated for one whole year.

Xu(2020), states that the development status of the typical village and demonstrated the rules of rural domestic water consumption and sewage discharge. Interviews, field surveys and various discussions were conducted, and the study believes that by connecting the various sewage outlets, (Tang (2020)). Al-Rawahi(2020), states that the main objective of the project is to establish a research, demonstration and training facility aiming at developing, promoting and facilitating the implementation of sustainable and effective sewage and reuse management solutions. White (1995) states that to measure the solid waste generation and composition in 150 households at select water villages. The running status, treatment technologies including anaerobic-anoxic-oxic membrane bio-reactor

(A2/O-MBR) facultative membrane bio-reactor (FMBR) and soil purification tank (SPT) were identified, and only 94 sets were in normal running status during the whole year of four times evaluation, with a total yearly serviceability ratio of 64.4%, (Yang (2021)).

LITERATURE REVIEW			
Document	Result	Conclusion	Remarks
Xu (2020) - Field investigation on rural domestic sewage discharge in a typical village of the Taihu Lake Basin	It was found that the total sewage discharge flow in summer was around 88.90 L/cap. d) and the hourly variation coefficient was around 3.92. Kitchen sewage, washing sewage, and toilet sewage had significant differences in sewage quality. Particularly, the nitrogen and phosphorus nutrients in toilet sewage were quite rich, accounting for 84.42% and 61.90% of the corresponding total load, respectively.	the ideas of properties-classified treatment and resource treatment were worth being introduced into the rural sewage treatment process.	This study lacking in term of wastewater treatment type and the different of the wastewater management for improving the water village environment.
Tang (2020) - Combination of Wastewater Treatment Measures and Landscape Ecological Design in Traditional Villages Based on Sustainability Theory: A Case Study of Miao Village in Xiangxi, China	Treatment ponds (tanks) transformed curved rice fields into secondary treatment tanks and stabilised ponds. Native plants were classified before stable and treatment ponds were excavated. Submerged, floating and emergent plants were artificially planted in the water, and medicinal plants were cultivated around the pond and banks of the creek.	These biomass plants are relatively large for the nutrition in the wastewater. Adsorption and digestion of the substance can not only reduce the direct discharge of sewage to downstream regions but also beautify the landscape of the sewage treatment facility.	This study lacking in term of wastewater treatment type and the different of the wastewater management for improving the ecological value of the village.
Al-Rawahi (2020) - A practical step towards sustainability: decentralised wastewater management in Oman	This preliminary assessment indicates that under current conditions a solution on household level is the most cost-effective option.	semi-and decentralised scenarios gain in cost-effectiveness, when future population growth and settlement patterns are anticipated in the analysis.	This study lacking in term of the recommendation of the wastewater system to housing design.
White (1995) - Solid waste generation	the total waste generation is 1519.30 kg and the average solid waste generation rate per household is 0.29 kg/person/day. The main component of solid waste is food waste, which comprises 37% of the total waste generated, followed by plastic waste at 31%, paper waste 14.7%, glass 7.2%, and metal 6.3%. The remainder (3.8%) includes bulky waste, furniture, wood, etc.	the solid waste generation rate is comparatively low, it will create a negative impact on the environment and public health if proper management of solid waste is not practiced.	This study lacking in term of the recommendation of the wastewater system to housing design.
Yang (2021) - Performance analysis and evaluation of the 146 rural decentralised wastewater treatment facilities surrounding the Erhai Lake	The annual average standard-achieving ratio of 94 sets facilities for COD and BODs reached more than 70%, whereas it was 44.68% and 55.32% for TN and NH3-N. Particularly, it was merely 4.26% for TP, suggesting that how to improve TP treatment efficiency is the primary target in future research. The A2/O-MBR in normal running status could achieve an annual removal efficiency of 75.5% TN, 89.4% NH3-N, 64.1% TP and 72.8% COD, which demonstrated a significant advantage in organics degradation, denitrification, and dephosphorization.	In contrast, the FMBR demonstrated a weaker capability for removing phosphates, whereas the SPT showed a lower nitrogen removal. On this basis, some suggestions in design, operation, and management are put forward.	This study lacking in term of the understanding of wastewater management and activities to control the water pollution in rural area.

4 CONCLUSION

This paper aims good methodology of waste management approach for water settle in order to Improve quality of life for residence. In the results found the combination of wastewater treatment measures and integrated farming system can be developed in this water village to improve the social and economic. Creation of understanding wastewater management and optimal policy can be developed with integrated farming system to resolve human settlement and different qualities of waste.

The data collected from the interview questioning found that the potential of wastewater to be treated for irrigation purpose. This was taking opportunity to re-introduce the wastewater management integrated with farming system and reuse the water / water cycle technology to improve the local social economy and the people of the living. Therefore, the local council and local community need to operate this wastewater management integrated with farming system to making the effects in this Pulau Ketam.

5 CONTRIBUTION

This research will contribute to the knowledge of wastewater management approach by using the farming system in order to improve quality of life for local resident. The Majlis perbandaraan klang & Pulau ketam local community will be benefited and this research will formulate a new community farm house to improve the social and economic for local resident.

3 CONCEPTUAL FRAMEWORK

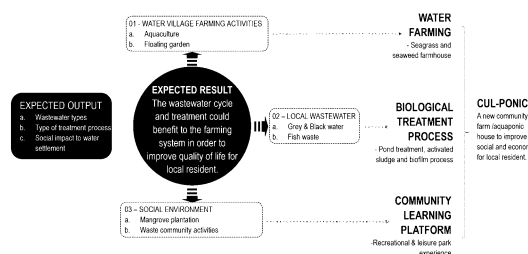


Figure 1. Model of Conceptual Framework

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