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User Perception on The Waste Utilization in The Upcycled Garden Design at Taman Samudera, Seri Manjung Perak

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Abstract: Many cities becoming unsustainable due to the massive volumes of unrecycled municipal garbage that end up in suburban landfills. Our culture, on the other hand, appears to be generating trash in an almost inevitable manner. However, in the recent years, the merits of using salvaged and upcycled materials are started to be addressed in the landscape design and recently arose in the hardscape construction. This highlights the importance of educating people, raising awareness and promoting a better way of dealing with solid waste. Based on studies conducted in Taman Samudera, Seri Manjung, Perak, this paper attempts to analyze the user perception on the waste utilization for the upcycled garden design. This quantitative research was conducted in two phases; Phase 1; to study the user awareness, user acceptance and user preference on the upcycling hardscape and Phase 2; to propose a landscape master plan of the upcycled garden. The respondent (n=92) involved in this study are the residents of Taman Samudera, Seri Manjung, Perak. It shows that most of the respondents were aware and accepted the use of recycled materials in the upcycled garden. The finding indicates that the highest mean score for preferred recycled material used for hardscape construction were plastic bottles, tyres, and Compact Discs were suitable to be included in the master plan of the upcycled garden. The proposed Upcycled Garden at Taman Samudera, Seri Manjung, Perak will be a valuable recreational area that is environmental friendly while educating the public tackling the serious issues of poor recycling rates and waste management in Malaysia.

Keywords: Upcycle garden, hardscape, waste utilization, environment art, upcycling, reuse, recycling

1. Introduction

In today's world, the desire to pursue a more sustainable way of life has prompted a variety of concerns and attention, particularly among members of the community. Green spaces in urban areas are a must to optimize the residents' livelihood. As gardens provide benefits at multiple levels, creating an “urban oasis” that provides refuge from urban decay is very important while revitalizing city neighbourhoods (Poulsen et al., 2014). It is the ideal location for educating the public about the need of environmental stewardship and the importance of knowing the environment in which we live. In Malaysia, people are becoming more aware that they need to improve their quality of life. This has led to ecological development as a way to make the environment more sustainable (Hussain & Byrd, 2012). However, one of the most important concerns facing Malaysia is the implementation of sustainable landscaping practises. In order to maintain our environment, professional bodies and developers must take action and respond quickly to adopt the sustainability idea (Jamaludin et al., 2021). The consideration to substantially increase the use of recycle materials in Malaysia’s garden and parks need to be addressed in order to educate the public that it is one of the sustainable practices that can benefits many areas. Apart from that, sustainable waste management has emerged as a top concern for Malaysia's policymakers and other key stakeholders as the country prepares to present itself as a developed nation in the coming years. The government has made various initiatives, including the passage of new legislation and the pursuit of privatisation, but Malaysia is still falling behind in terms of sustainable waste management techniques, notably in the field of recycling, despite the efforts made. Mungkung et al. (2017) indicated that upcycling methods align with the policy on waste management that directly undergoes technology and production procedures. It considered the potential environmental consequences and greenhouse gas emissions. According to McDonough et al. (2013), upcycle principles encourage designers and anyone interested in this new approach to see everything on earth as having the potential to be something else. Grulois & Crosas Armengol (2015), in their report, stated that upcycling has the potential to give added value to a city. It can be done through resource efficiency, spatial quality and economic dynamism through new

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programmatic and morphological hybrids transforming each other's waste into new inputs. As Kevin Lynch wrote in his posthumous more renowned work, Wasting Away, "scrap unnecessary in a random mixture can suggest new forms while preserving the pathos of old meanings". Thus, this study was analyzed what is the user perception on the usage of waste utilization as part of outdoor landscape design.

2. Waste Utilization in Landscape Design

Recycle refers to the process of reintroducing waste materials and pieces that have lost their value and/or purpose into circulation. To reduce the environmental effect of both raw material manufacturing and waste disposal, recycling should be considered. Despite the fact that Malaysia has three forms of recyclable garbage; paper; plastic; and glass bottle, only a small portion of the waste is recycled (Dalzero, 2016). Taking Kuala Lumpur as an example, the current recycling rate is 4.5% of the total amount of garbage created there. In 2003, the government announced a plan to raise it to 16 percent by 2005 and 20 percent by 2020 (MHLG, 2003), which is still in effect today. While upcycles sounds bizarre and unfamiliar, but it goes way back down to history lane. Wegener (2016) mentions that upcycling has already been practised since the early human day and was part of their everyday life and existence, although the exact date is still unknown. The practice of upcycling was widespread before the Industrial Revolution and is currently customary in developed countries due to limited resources (Szaky, 2014). Recently, upcycling design has emerged as a viable alternative solution to the problems of waste management and environmentally conscious consumers (Wilson, 2016). Additionally, upcycling design is seen as a form of environmental consciousness movement that has spread from people to the national and international levels (Yu & Lee, 2019). Meyer (2001) states that the idea of recycling has reduced the need for new raw materials. Recycled concrete aggregate, post-consumer glass, scrap tires, plastics, and by-products of the paper and many more are many things (Ahmad et al., 2018). The ever-increasing waste product proposed alternative thinking based on the principles of waste hierarchy 3R; Reuse, Reduce and Recycle became more popular as a policy goal (Sreenivasan et al., 2012). A better version of the 3R, upcycling, is used as the main theme of the urban garden. Some notable designers that employ the "Light, cheap, quick" philosophy identify low-budget tactics as an intentional strategy of producing important, beautiful, well-used, social public places. The sustainable upcycled garden can be achieved through several characteristics of the upcycle design (Fig. 1). In a nutshell, recycling is a "new paradigm" that presupposes a new sensitivity toward the environment in which we live, one that extends beyond the disciplinary methods to citizens' lifestyles through outdoor landscape design.

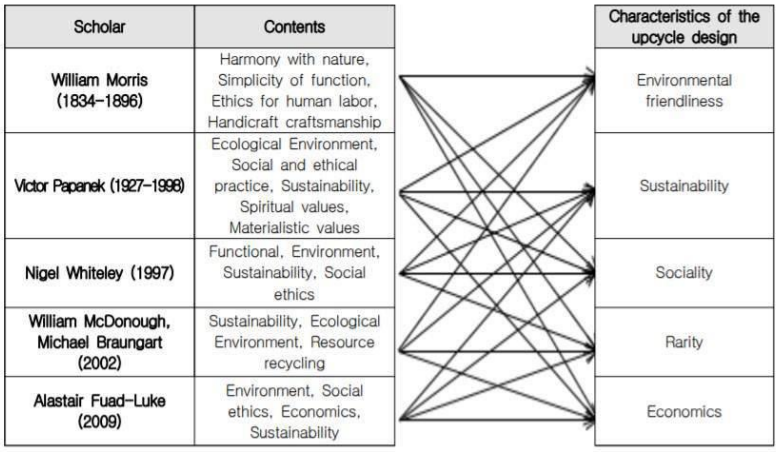

Fig. 1: Characteristic of the Upcycle Design through Analysis of Previous Research (Lee & Yim, 2015)

2.1 Public Concern on Upcycling

According to Yoke et al. (2019), awareness relates to a situation that often labels as situation awareness. Situational awareness (SA) could be described simply as "knowing what is going on around you" or "having the big picture" (Stanton et al., 2017). In the context of waste utilization and recycling, there is still a lack of awareness and poor policies in developing countries in Asia. According to Solid Waste Management and Public Cleansing Corporation (SW Corp Malaysia), the awareness in reducing waste through recycling is still low in Malaysians. On average, Malaysians generated 30,000 tonnes of waste every day in 2015. However, only about five per cent of it is recycled as referred to the Department of Statistics Malaysia (DoSM), in line with the National Solid Waste Management Policy 2016 that targeted a national recycling rate of 22% in 2020, Malaysia's recycling rate in 2019 exceeded the set target of 28.1%, an increase of 3.5 percentage points compared to 24.6% in 2018. Malaysia has a goal of reducing recyclable waste sent to landfills by more than 40% by 2025, thus turning the trash into something beneficial like a hardscape is still not in the public concern. Aside from that, Theory of Planned Behaviour (TPB) by Chan & Bishop (2013) prove that moral norms will increase recycling intention, thus increasing recycling. In the context of recycling behaviour, situation awareness has a

crucial role. Recycling awareness is essential to overcome the environmental problem, and it is a significant contributor to a sustainable environment (Montague, 2017). The household should be more concerned because they use many recyclable products such as plastics, paper, boxes, and glasses and electronics. Consumer acceptance depends on awareness of the limitations of the current alternative fuel sources and the goals of sustainability (Cudmore, 2011).

2.2 Sustainable Move

Sustainable development is defined as development that satisfies the demands of the present without jeopardising the ability of future generations to satisfy their own requirements. Understanding and engagement in local communities are critical to the long-term sustainability of a place. Reusing waste will reduce waste output from a household and indirectly plant awareness of a more sustainable livelihood. Thus, upcycling has become a staple of zero waste policies and design strategies (Zimring, 2017). Sung & Chao (2015) stress that previous research generally agrees that upcycling reduces environmental impact or contributes to a higher environmental value or performance of products. Through upcycling, the need for a new product will be reduced, thereby reducing the usage of new raw materials and the conservation of natural resources; thus, it shall minimize the use of energy, resulting in a reduction of greenhouse gas emissions. Apart from that, it can be much more environmentally friendly when upcycling is conducted at home than industrialized upcycling (Sung & Chao, 2015).

3. Methodology

Quantitative measures were used to conduct this research. Fig. 2 explains the research framework of this study.

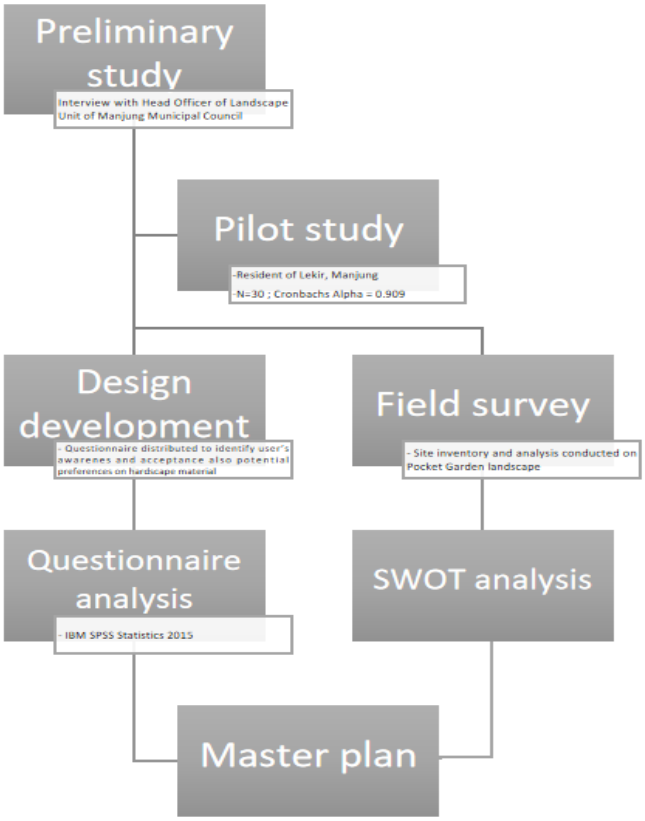

Fig. 2: Research framework of this study

3.1 Site Study

This study was conducted at Jalan Sembilang, Taman Samudera, Seri Manjung, Perak. Fig. 3 shows the location plan of this study. The main reason for the selection of this study's location is due to the existence of upcycle gardens that have been initiated by the local government in the residential and neighbourhood locales but it still new and have very limited hardscape elements integrating recycle materials.

Fig. 3: Site location plan (Source: Google Map)

3.2 Field Survey

Stahlschmidt et al. (2017) stated that analysis means conceptually separating the parts of the whole (such as a landscape) and examining their interrelationships to improve understanding. In a sense used in this text, landscape analysis is an examination of a landscape to understand its character, structure and function, and make policy, planning or design decisions concerning its future condition and management. Fig. 3 is the research area base plan. The total area of the research field is 2029.4m^2 (26.01m x 39m x 0.5m) with a perimeter of 247.09m. The site consists of recycled hardscapes made of tyres, tree logs, metal, pallets, and a few landscape plants (Lazarova & Bahri, 2004). Site inventory and analysis in Fig. 4 and Fig. 5 were conducted involving landscape aspects: microclimate, vegetation, topography, circulation, view and sensory, site context, architectural features and facilities, and utilities.

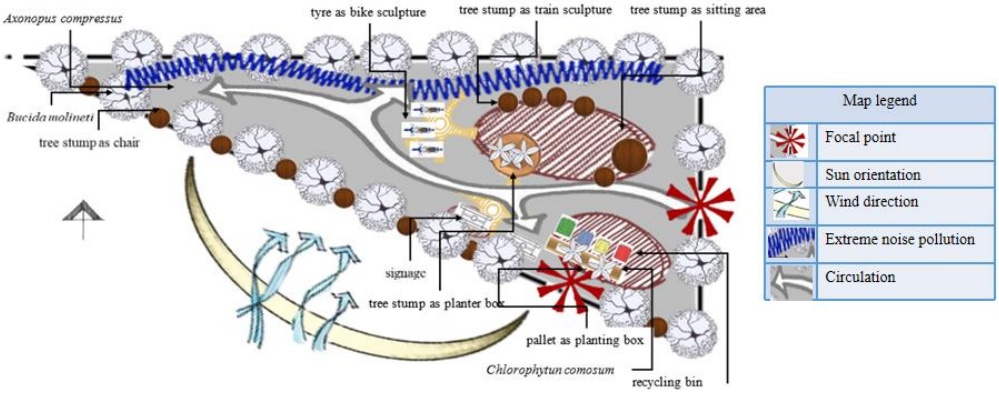

Fig. 4: Site Inventory and Analysis plan of Pocket Garden, Taman Samudera

3.3 SWOT Analysis

SWOT analysis in Table 1 is constructed to identify the research area's strengths, weaknesses, opportunities, and threats. SWOT analysis is crucial to developing a master plan.

Table 1: SWOT analysis

Vegetation			
Strength	**Weakness**	**Opportunity**	**Threats**
Turf provides safety grounding for kids. Some area has shade.	Lack of shaded area. Lack of vegetation variety.	Planting more vegetation, especially ones with different colours, can attract more visitors. Propose variation of plants that can complementing the hardscape design made of recycle items.	Vegetation planted in a tree log planter box and pallet may die due to lack of aeration and proper management.
Hydrology			
Strength	**Weakness**	**Opportunity**	**Threats**
Perimeter drain are functioning well.	Dry leaves from trees may clog the drainage system.	-	A clogged drainage system might host mosquitoes.

Circulation			
Strength	**Weakness**	**Opportunity**	**Threats**
-	User tend to create a desire path since there is no main entrance that can direct the user towards the site.	Propose a recycle signage or entrance statement for the entranceway to create distinctive entrance features with a recycled pavement.	-
View and sensory			
Strength	**Weakness**	**Opportunity**	**Threats**
Direct view towards the main road.	Noise pollution from traffic nearby.	Creating recycles screen with suitable plants that can buffer the noise pollution as well as feature wall for the park.	-
Architectural features			
Strength	**Weakness**	**Opportunity**	**Threats**
The creativity of utilizing waste into some of the hardscape may influence the user to involve in the upcycle activities at the park. Bike sculptures was utilized from waste materials as tyres and metals (Figure 4).	Lack of seating areas tend to make the area less visited and enjoyed by the nearby residents.	Provide more seating area using upcycle material.	-

Fig. 5: Existing hardscapes in Taman Samudera Pocket Garden

3.4 Survey

The Data collection was conducted by a questionnaire distributed among the respondents (n=92) out of a population (N=120) in Jalan Sembilang, Taman Samudera, Seri Manjung, Perak. The questionnaire is divided into four sections to achieve the objective of this research. The data was analysed using statistical software for its reliability, normality and

descriptive statistics (Ghasemi & Zahediasl, 2012). A master plan was developed using SketchUp software to propose a preferred Upcycled Garden at Taman Samudera, Seri Manjung, Perak.

4. Results and Findings

4.1 User Awareness on the Upcycle Garden at Taman Samudera, Sri Manjung Perak

According to Fig. 6, among 92 respondents, 51.1% of them know about recycling (B1). Item B2 shows that 51.1% of the respondents involve in recycling their daily waste. There are only 48.9% of them are concern with the current state of environment and 55.4 % agree that their participation in recycling is most influenced by what they have learned in school (B4). Besides, 46.7% of them said that their participation in recycling most influenced by their family (B5) while 41.3 were influenced by their peers (B6).

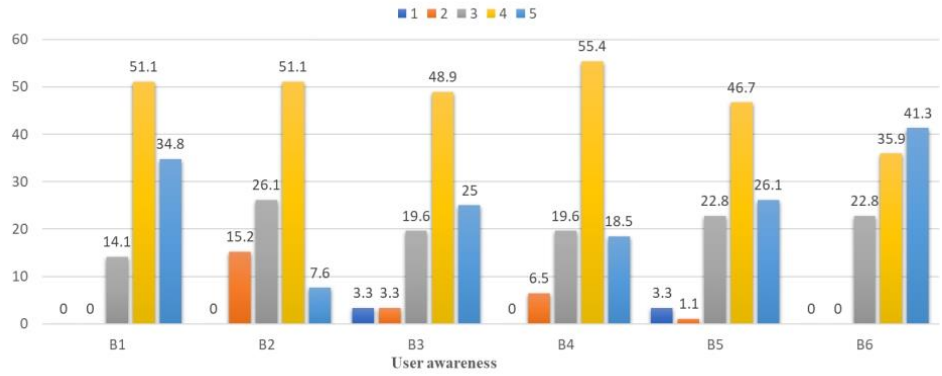

Fig. 6: Item B1, B2, B3, B4, B5, and B6 on user awareness

4.2 User Acceptance of The Existing Upcycle Garden

Nowadays, people are more aware of the benefits of sustainability. They need green space such as parks in achieving comfort and quality of life, Residents in Taman Samudera, Seri Manjung, are primarily aware of and accept the idea of the upcycled garden. Fig. 7 shows the data for user acceptance. 47.8% like the idea of implementing the Upcycled Garden nearby their area (C1) and about 50% of them are familiar with the upcycle concept implemented in the Pocket Garden near this area (C2). Therefore only 41.3% of the respondents visit the upcycled garden during their free time (C3). 50% of them were satisfied with the upcycled garden design in Taman Samudera, Manjung (C4) and 55.4% agreed that the existing Upcycled Garden has a beautiful and attractive landscape (C5). It also provides the residents the opportunity for social contact and creates sense of place (Sportza, 2006). 52.2% will suggest the Upcycled Garden to other people outside of the area to come and visit the park. It can also deduce that upcycle garden in Taman Samudera, Seri Manjung, is very important as a recreational area.

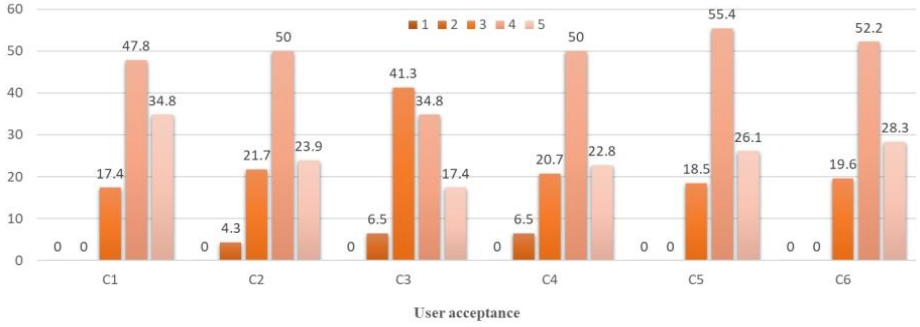

Fig. 7: Item C1, C2, C3, C4, C5 and C6 on user acceptance

4.3 Preferred Recycle Materials to be Part of The Landscape Design in The Upcycled Garden

18 upcycle hardscape design picture is included in the questionnaire to study on the user preference of household waste to create the upcycle hardscape. The design with the highest mean value will be chosen to be proposed as the landscape

elements in the master plan (Fig. 8). Table 2 shows the mean and standard deviation for user preference of recycled hardscape. DA1, DA2 and DA3 is on the pavement selection. DA1 stands for pavement made of bottle caps, DA2 is pavement made of tyres, and DA3 stands for pavement made of glass bottles. Among all the item, DA1 hold the highest value of mean that is 4.15. While for the seating elements; DB1 is benches made of old wooden furniture; DB2 made of tyres and DB3 made of plastic bottles and bottle caps. Among the bench's selection, DB2 were the most preferred with highest mean score of 4.18. As for the cycling facilities; DC1 is a bike rack made of wooden furniture, DC2 made of the pallet, and the most preferred material and design is DC3 that made of tyres. The other complementary elements being included is DD1 which is chairs and table made of the tyre, while DD2 represent chairs and table made of metal container, and DD3 stands for chairs and table made of plastic bottle caps. DD1 score the highest mean among the three of 4.29. Apart from that, the screen to buffer from bad views and bad odours were represent by DE1 which is walls made of glass bottles, while DE2 is walls made of CD, and DE3 is made of polystyrene cups. DE2 hold the highest mean score of the wall. (4.24). The other hardscape to support the softscape elements is planter box that represent by DF1; a planter box made of tyres, DF2 is made of plastic bottles, and DF3 stands for a planter box made of a glass bottle. DF2 is selected as the item that holds the highest mean record of 4.37.

Table 2: Mean and standard deviation (SD) for user preference on hardscape

Item	Mean	S.D	Item	Mean	S.D.
DA1	**4.15**	0.949	**DD1**	**4.29**	0.908
DA2	3.87	1.215	**DD2**	4.24	0.894
DA3	3.79	1.271	**DD3**	3.85	1.157
DB1	3.76	1.312	**DE1**	4.09	1.045
DB2	**4.18**	1.016	**DE2**	**4.24**	0.918
DB3	3.76	1.189	**DE3**	4.01	1.064
DC1	4.09	1.076	**DF1**	4.33	0.891
DC2	3.93	1.117	**DF2**	**4.37**	0.808
DC3	**4.10**	1.164	**DF3**	3.95	1.208

(DA1)

(DB2)

(DD1)

(DE2)

(DC3)

(DF2)

Fig. 8: The most preferred hardscape design,(DA1) Plastic bottle pavement, (DB2) Tyre bench, (DD1) Tyre bike rack, (DE2) Tyre bench and chairs, (DC3) CD wall and (DF2) Plastic bottle planter box are the user preference on hardscape design

4.4 Proposed Upcycle Garden Master Plan

Suggestions to implement the master plan design into the existing Pocket Garden can be an eye-opener to the people around Taman Samudera and will be inspired them to upcycle. Implementing the Upcycled Garden on any undeveloped or abandoned land can benefit society as it requires minimum cost (Kuzmanović et al., 2021). Based on the mean score of user preference hardscape, item DA1, DB2, DC3, DD1, DE2 and DF2 will be included in the proposed master plan. Through the site inventory and analysis and the survey findings, a master plan of upcycling hardscape (Fig. 9) is proposed. The postulate hardscape element was derived based on user's preference on household waste to construct the upcycle hardscape. Recyclable's component such as used tyres can be acquire from local tyre shop. Plastic bottle components

and CDs shall be obtained from neighbourhood household or yet local Recycle Centre. Discovering more hardscape designs and kinds that can be made using waste will boost creativity and sustainability niche.

Softscape element that is proposed in this master plan is *Agathis borneensis* as shady roadside tree, *Acalypha siamensis* as hedges, the magnificent *Saribus rotundifolius* as Malaysian's native palm representative and colorful *Hydrangea macrophylla* to add glow to the garden. From the proposed master plan of Taman Samudera Upcycled Garden (Fig. 10), it can be seen that there are sufficient amount of green space and landscape design being integrated into the existing layout. The softscape and hardscape made of recycle material serves as an ecological function to foster the equilibrium for the neighbourhood ecosystem serves as an ecological function to foster the equilibrium for the neighbourhood ecosystem.

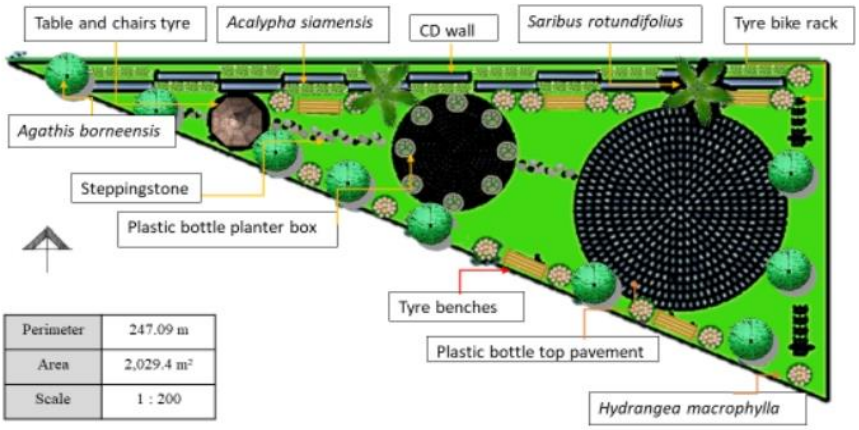

Fig. 9: Proposed master plan of the upcycled garden

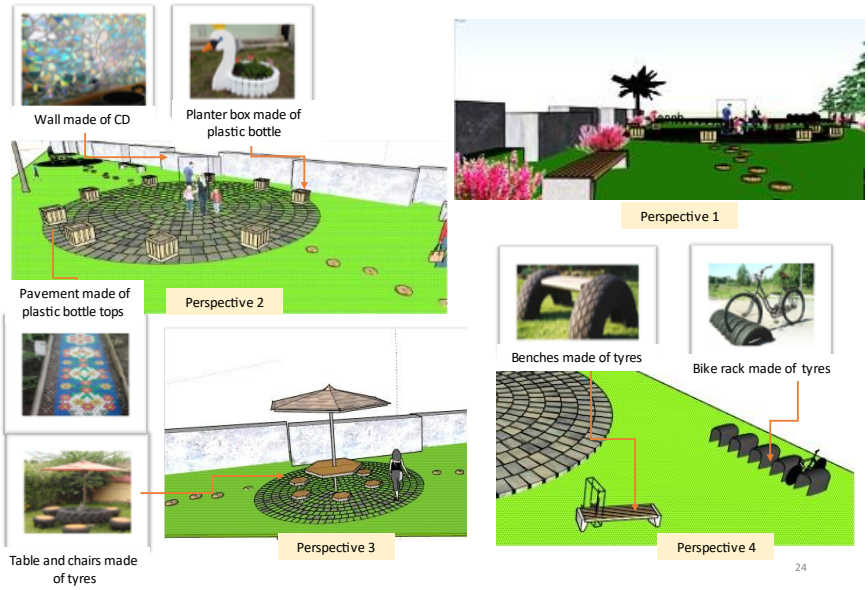

Fig. 10: Perspective drawings for the proposed master plan

5. Conclusion

This study found that the most important component of creating a sustainable outdoor environment for a residential community is to provide not only the, but also the public with the necessary information and awareness. Designing and implementing a sustainable culture in a residential setting is not an easy task, but it is not impossible. Ultimately, it is intended that this article will give important information to practitioners, particularly landscape architects, on how to employ a sustainable landscape design strategy to create an environmentally-responsive habitation. It is anticipated that the implementation of a sustainable landscape design strategy into residential area construction would not only create a conducive and pleasant living environment, but will also contribute to an increase in the aesthetics and property value of the development. Aside from that, the implementation of sustainable landscape design ideas by utilizing waste has also contributed to the preservation of biodiversity and natural resources.

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