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# DOES AQUASCAPE HAVE THE ABILITY TO PROVIDE THERAPY?

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**Abstract**: *Even though aquariums are well-known and have physiological benefits, the term aquascape in aquarium appears to be unfamiliar to Malaysians. Aquascape has recently gained popularity as a hobby in Malaysia. This activity, also known as underwater gardening, entails creating a landscaped area with a conspicuous natural or constructed aquatic feature, and artfully arranging aquatic plants, as well as rocks, stones, cavework, or driftwood, in an aquarium in an aesthetically pleasing manner. Stress is unavoidable in both the household and the workplace. As a result of its impact on emotions and its negative connotation, excessive tension may result in an unhealthy way of life. It is well known that some people visit a fish shop to relax, and aquascape therapy may be able to reduce tension. This study empirically investigates the perspective of aquascape on the therapeutic effect of aquarium viewing. Consequently, based on the current circumstance, it could be an excellent time to investigate further. This study empirically examines the perspective of 114 customers regarding aquascape as the therapeutic effect of observing aquariums, using a local fish store as the study context. The respondent's insightful perspective on the investigation issue could make a positive contribution to pyhsiological-specific academic perspectives*

**Keywords**: *Aquarium, Aquascape, Aquatic Environment, Malaysia*

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## Introduction

After dogs and cats as pets, fish keeping is a popular hobby around the globe. Keeping animals in a tank or in an aquarium is likely well-known to the majority of people. This pastime has been reported to be therapeutic and capable of providing tranquilly and peace. As stated by previous researchers, these environment preferences appear to be mediated by perceptions that nature provides elements of psychological well-being, such as positive emotions, reduced stress, cognitive fascination with elders, and the development of responsibility in children (Cracknell et al., 2016; Saba et al., 2020). Many clinics and hospitals choose to display fish aquariums in their waiting rooms, and many restaurants do the same in their dining rooms, due to the environmental benefits. According to Cracknell et al. (2016), this phenomenon is attributable to the uniqueness of aquarium systems that promote good health, and aquariums can be viewed as beneficial for sustaining good psychological and physiological health, particularly in regards to cardiovascular benefits.

Several researchers have suggested that people favour natural settings to urban ones (Cracknell et al., 2016; Ulrich et al., 1991). Frequently, an aquarium's natural setting includes ornamental fishes or aquatic fauna of diverse species, colours, shapes, origins, and behaviours. In an aquarium or a garden pool, ornamental fishes are maintained as pets for amusement and aesthetic purposes. According to Arif et al. (2018), ornamental fishes are typically maintained in a glass aquarium; hence, they are commonly referred to as "aquarium fishes." These living gems need not always be brightly coloured, as their peculiar characteristics, such as body pigment, morphology, and feeding behaviour, can also contribute to their beauty. According to Faat and Nor (2019), aquarium maintenance is regarded as one of the finest hobbies due to its aesthetic and recreational value. The hobby of keeping ornamental fish is popular in developed nations (Pandey and Mandal, 2017) and is acquiring popularity in many developing nations, such as Malaysia.

Recently, aquascape has become a popular hobby in Malaysia. Aquascape is defined as a landscaped area with prominent natural or constructed aquatic features, and the art of arranging aquatic plants as well as rock, stones, cavework, or driftwood in an aquarium in an aesthetically pleasing manner. Aquascape, according to Febrian and Wardhana (2018), is an art form that constructs an ecosystem consisting of plants, wood, stone, and fish in an aquarium. Despite the fact that aquascaping is relatively new in Malaysia, Malaysian participants have achieved first place at The International Aquatic Plants Layout Contest in 2017, 2019, and 2020 (IALPC 2020). This demonstrates that aquascape is more than a hobby for many Malaysians. However, there appears to be a dearth of information about this hobby due to the scarcity of stores selling aquascape products. According to the authors' personal experience and observation, customers typically acquire aquascaping knowledge from the shop proprietor during the purchasing process. When no aquascape component is available, either the shop proprietor is unaware of the variety of aquascape components or he or she lacks knowledge of the aquascape products available on the market.

On the basis of previous research, it is possible to conclude that aquascape in aquariums has a therapeutic influence and could enhance the motivation and quality of work life. There is an abundance of research on ornamental fish (Arif et al., 2018; Cutshaw, 2019; Pargunan & Alagappan, 2020), but empirical research on aquascape in Malaysia is scarce. According to Mohammad et al. (2021), information on aquascape in Malaysia is scarce and undocumented. It seems reasonable that understanding of aquariums and aquascapes is still in its infancy; therefore, the purpose of this study is to gain knowledge and an in-depth comprehension of

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these topics. This study examined the perceptions of customers after observing the aquarium in a local fish store.

## Literature review

### Aquascape

Aquascape is the art of constructing an artificial ecosystem in an aquarium, also known as a nature aquarium or an aquarium-based natural park in Japan (Duffy, 2018; Sutabri et al., 2019). Similarly, Widjaja (2013) defined aquascape as the discipline of arranging aquatic plants in an aquarium to create a natural garden. On the same note, Martin (2013) defined aquascape as the art of arranging stones, plants, detritus, and corals in an aquarium, and emphasised that aquascape requires more attention (e.g., control of temperature, light, media, and food sources) than water and aquarium quality maintenance. Aquascape provides a description of the meaning of life based on a natural miniature that is full of synergy, such as plants that require food from plant media, fish that release CO2 required by plants, and plants that produce O2 required by fish, as well as all components that are interdependent (Hariyanto et al., 2018). According to Hariyanto et al. (2018), aquarium life becomes balanced and resembles that of natural waters. The equilibrium of the aquascape media is determined by nutrition, dissolved CO2, and illumination. Sutabri et al. (2019) conducted interviews with aquascape proprietors and found that light, temperature, and nutrition are crucial to the success of aquascape maintenance. The International Aquatic Plants Layout Contest (IALPC) has a 20-year history of providing an international level of competition for various 'aquatic plan layouts and is regarded as one of the most prestigious competitions.

### Aquascape and Therapeutic Effect

In Malaysia, the aquarium fish trade was evolved in the 1950s and has developed significantly ever since (Rahim et al., 2013). Ornamental fishes were started to become popular when entrepreneurs in Johor started to collect species from the wild and breed them and accumulated earned RM 252 961 million in 2013 (Ng, 2016). Today, Malaysia has been considered as one of the top ten countries in the world that produces freshwater ornamental fishes (Lokman et al., 2019; Saba et al., 2021). Malaysia contributed approximately 9% of the global trade and holds the second position after Singapore (Mohd et al., 2017). As stated by Faat and Nor (2019), aquascape is an activity of imitating nature by integrating the usage of bogs wood, stone, to create hardscape and integrate with the creativity to scape and design the tank with aquatic plants and fauna, whereby to bring in the outside into the inside for relaxation and tranquillity.

In 2015, a study by Deborah Cracknell, Dr. Sabine Pahl, and Dr. Matthew White from The National Marine Aquarium, University of Plymouth & University of Exeter found that people who spend time sitting and watching fish in an aquarium can improve their physical and mental well-being. The more fish they watched, and the longer time spent viewing underwater nature eventually helps improve their mood. Dr. Sabine Pahl also mentioned that “In times of higher work stress and crowded urban living, perhaps aquariums can step in and provide an oasis of calm and relaxation” (University of Exeter, 2015). This provides evidence that doses of exposure to underwater settings could have a positive impact on people's wellbeing. Specifically, it shows that spending time in a natural environment such as underwater has a therapeutic effect on humans. It helps the blood pressure and heart rate lowered whilst viewing the aquarium. For that reason, if we can identify any mechanisms that underpin the benefits of what we are seeing, we can effectively bring some of the 'outsides to inside’, thus improving the wellbeing of people without ready access to nature. By doing this, provides an exciting for

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people who have a limit to access to outdoor natural environments due to hectic lifestyles and work. Windhager et al. (2010) conducted a study at a shopping mall and found people were more interested to pay attention if there is an aquarium in a shop, thus, improve their behavior.

'To be more effective and to ensure our little friend is happy, it is advisable to keep your fish or shrimp in real habitat by scaping nature with real aquatic plants, substrate, and bog woods' (Faat & Nor, 2019). As mentioned by Rajessa and Kutanto (2018), aquascape is the art of organizing water plants, stones, and wood naturally in the aquarium to give an effect like gardening underwater. These plants are real and easy to grow to achieve such lush in colours and this new art is called aquascape. When people are stressed, take a few moments off and observe these tiny aquatic friends, and the person will feel recharged. So, the question is how to start. As noted by Sutabri et al. (2019) aquascaping is a complex hobby that requires constant care and attention, thus many enthusiasts have been attracted to the hobby due to the beauty of freshwater aquatic ecosystems. As a result, the hobby is associated with significant economic value. As a beginner, the first thing to do is to choose an aquarium that fits the space that can be used. Then, need to carefully select a fish. If a person is to afford to have a large tank can go for a variety of fish and large monstrous ones. But if the space is limited, the best choice is to get betta, shrimp, tetra, or some other small fish. Furthermore, to create an aquascape needs aquatic plants and to grow plants require a special substrate called aqua soil. Meanwhile, to grow than plants need good light. If the people do not go for the high demanding plants, then probably do not need a pressurized $CO_2$ system. Before adding fish, remember to cycle the tank and use a good filtration system for the health of faunas. To conclude, most people are working hard and tend to put so much pressure on their shoulders these days, so why not make aquascaping because having an aquarium with fish or shrimp and real aquatic plants is a good therapy and worth the deal to brighten the day.

## Methodology

This study aims to examine the perception of customers after viewing the aquarium with flora and fauna in a local fish store in the northern region of Malaysia. Specifically, in Seberang Perai, Pulau Pinang. In addition, the researchers are interested in measuring the effect of aquascape on the therapeutic effect experienced by aquarium visitors. To reach this objective, a local ornamental fish and aqascape in Seberang Perai Utara, Pulau Pinang, Malaysia was chosen. Other aquascape shop in Seberang Perai Tengah is unable to reach due to the restriction movement during Covid-19. A convenience sampling was used because the collection of information from members of the population who are conveniently available to provide. The researchers invited 120 participants who are also patrons of a local fish store to participate in this study, but only 114 showed up. The participants were then divided into two categories (57 for the control group and 57 for the experimental group). According to Brysbaert (2019), a straightforward comparison of two within-participant conditions with 80% power requires 50 participants. Permission was acquired from the store's management to conduct field experiments (i.e. observation, survey distribution) on customers who visit the store. Table 1 contains information regarding the local fish establishment.

**Table 1: Sampling site information**

| | |
|---|---|
| **Business** | Fish store specialist in aquascape |
| **Business Nature** | Selling live stocks, aquascape supplies, and providing scaping service |
| **Operation Hours** | 10:00 am to 8:00 pm |
| **Type of Business and Operations** | Sole proprietorship / Independent |

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| | |
|---|---|
| **Tank Capacity** | 98 Tanks |
| **Number of Staff (full & part-time)** | 2 Full time and 2 part-time |

**Aquarium Setting**This research involves two types of aquarium tanks (Tank A is a basic aquarium tank containing only freshwater and faunas; Tank B is an aquarium tank with an aquascape setting that includes hardscape, full-plated flora, and faunas). Two aquarium containers measuring 60cm x 35cm x 35cm were used, and there was a one-meter gap between the tanks and the participants. Tank A is an aquarium with only freshwater and flora, similar to the fish tanks that were common in those days. Tank B, in contrast, is adorned with flora, fauna, and hardscape. LED lamps were used to provide sufficient lighting for the containers' growth and cycle processes. In this investigation, the Simpson's index of Diversity (1-D) for plant species was calculated to be 0.804. Such as Rotala (Lythraceae sp), Ludwigia, lichen, Eleocharis acicularis "Mini", and Micranthemum tweediei. The investigations were conducted between the hours of 10:00 a.m. and 5:00 p.m., during operational hours. This project has been approved by the university's Research Ethics Committee (REC/06/2021 (MR/482)). Further details are elaborated on next.

**Phase 1**

Each participant was asked to spend five to ten minutes observing Tank A (no decoration), followed by Tank B (aquascape decoration including hardscape, full-plated flora and faunas) (Figure 2). It was determined how long the participants spent observing the aquarium exhibit. According to previous research, considerable changes in physiological responses can occur within a few minutes (less than four minutes) to ten minutes of prevention (Ulrich et al., 1991; Wells, 2005). Previously, Katcher et al. (1984) stated that participants will become bored with extended interventions (20 minutes). Given that this study was conducted during the COVID-19 pandemic, the researchers gave each participant between five and ten minutes to view the aquariums. Clements et al., 2019 and Cracknell et al., 2016 found positive relationships between psychological well-being and the duration of self-selected visits to natural environments, and between aquarium components and voluntary exposure time to the tank. In addition, the researchers monitored the psychological responses (e.g., mood) of the participants seated in front of the two displays (Tank A and Tank B). Cracknell et al., 2016 determined the relationship between indices of psychophysiological well-being (such as positive mood). Adaptive evolutionary theory predicts that, depending on the stress response, restoration should occur relatively rapidly (in minutes rather than hours) (Cracknell et al., 2016; Ulrich et al., 1991).

**Phase 2**

A self-completed questionnaire was developed based on items adapted from the previous studies (Cracknell et al., 2016; Gee et al., 2019). These instruments and scales have been validated in many studies examining the impact of exercise on mood at multiple time points and show reliable patterns of change over time (Cracknell et al., 2016; Ekkekakis et al., 2000). A Likert-type scale was used ranging from 1 to 7, measuring their feeling and arousal. The survey was then distributed to participants who had completed Phase 1. Data from the respondents were analyzed using the Statistical Package for Social Sciences (SPSS) version 20.

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**Figure 1: Aquarium Setting**

## Result And Discussion

### Section A (Observation)

A total of 114 individuals were selected at random from the general public who were observed during a visit to the local aquascape fish store. During the two (2) phases, normal aquarium setup (n = 57) and fully decorated (n = 57), observations were conducted. The 'target area' was less than one metre away from aquarium tanks A and B. Researchers who were positioned at the rear of the designated area made the observation. From the time participants entered the target area until they exited the aquariums, they were timed in seconds. The researchers subsequently waited for another subject to pass by the designated area. Scheduled observations were conducted to reduce potential bias. The collection of data was performed daily, at various periods of the day. The number of observations varied between conditions due to the volume of visitors on sampling days.

As for the preliminary analysis of visit duration, a substantial positive was discovered, reflecting the fact that although the majority of visitors (58%) spent less than six minutes at aquarium tank B, a few spent significantly longer, up to twenty minutes. The majority of participants (M=4.15, SD=1.63) spent more time at the aquarium that was fully planted (tank B) based on the results of section A. In contrast, aquarium tank A demonstrates that each participant spent less time (M=3.17, SD=1.46) with the partially planted plant (tank B) than with the fully planted plant (tank A). Participants spent more time in aquarium tank B (M=0.59, SD=0.17) than aquarium tank A (M=0.46, SD=0.20) when log base 10 transformations were applied. Fourth, an ANOVA analysis using log 10 revealed a significant difference between the two (2) containers at the p.05 level: F (3,110) =1.4, p =.01. Despite statistical significance, the actual difference between tanks' mean scores was quite modest. Calculated using eta squared, the effect magnitude was 0.03. It can be concluded that participants remained longer in tank B (tank with plants) than in tank A (tank without plants), possibly due to the attractiveness of the aquascape.

**Table 1: Mean and Standard Deviation. (*N*=114)**

| Item | *M* | *SD* |
|---|---|---|
| I enjoyed watching the aquatic flora | 6.05 | .781 |
| I feel better after watching the aquatic flora | 5.96 | .845 |
| I would be happy to watch this aquatic flora again | 6.18 | .827 |
| I enjoyed watching the aquatic fauna | 6.04 | .709 |
| I feel better after watching the aquatic fauna | 5.94 | .781 |
| I would be happy to watch this aquatic fauna again | 6.15 | .770 |
| I enjoyed watching this aquarium and aquascape | 6.18 | .639 |
| I feel better after watching this aquarium and aquascape | 6.08 | .733 |
| I would be happy to watch this aquarium and aquascape again | 6.29 | .679 |

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| | | |
|---|---|---|
| I found this aquarium and aquascape | 5.71 | .738 |
| I would be happy to watch this aquarium and aquascape for another . . .5,10,15,20, min | 3.18 | .820 |
| | | |
| Mood | | |
| Valence | | |
| Pre (Baseline) | -2.40 | 1.177 |
| Post | 2.53 | 1.037 |
| Arousal | | |
| Pre (Baseline) | 3.51 | 1.237 |
| Post | 4.45 | 1.044 |

**Table 2: Reliability Test**

| Variable | Items | Cronbach's Alpha |
|---|---|---|
| Flora | 3 | 0.943 |
| Fauna | 3 | 0.934 |
| Aquascape | 5 | 0.748 |

Reliability analysis is a measurement procedure to determine a research study's strength or accuracy. Flora variables with 3 items and the results of reliability are 0.943. Next, product Fauna with 3 items achieves the results of reliability is 0.934. Meanwhile, Aquascape with 5 items, resulting in 0.748. The results of the reliability analysis show that all variables manifest internal consistency with an excellent and acceptable result.

**Section B**

After completed with section A, the participants were approached by the researcher to participate in the next section. At this moment, participants were briefly informed of the study conducted to see on how their perception and psychological effect in response to watching an aquascape. In this section, they need to watch aquarium one (tank A) and two (tank B) within the time frame given. As this study was a natural experiment, unable to randomly allocate participants to conditions. Participants were informed of the confidentiality of their responses and their right to withdraw. They were seated quietly, and two measures of psychological mood were taken before and after watching aquarium one (tank A) and two (tank B): The Feeling Scale (adapted from Hardy & Rejeski, 1989) and the Felt Arousal Scale (adapted from Svebak & Murgatroyd, 1985). As stated by Cracknell et al. (2016), the feeling scale is a single item 11-point bipolar scale (very bad to very good, −5 to +5), designed to measure affective valence. The Felt Arousal Scale uses a single-item 7-point scale (low to high arousal, 0 to +6). These measures recognize the fact that mood is related to two orthogonal dimensions (valence and arousal), so for instance, one can be in a positive mood with high arousal (excited) or low arousal (calm) or a negative mood with high arousal (angry) or low arousal (depressed). Combined, these scales have been validated in many studies examining the impact of exercise on mood at multiple time points and show reliable patterns of change over time (Ekkekaki et al., 2000).

Finally, participants were asked to complete five evaluation statements: "I enjoyed watching the exhibit," "I feel better after watching this exhibit," "I would be happy to watch this exhibit again" (on a 7-point scale: not at all to very much, 0 to +6), "I found watching this exhibit" (very boring to very interesting, 0 to +6), and "I would be happy to watch this exhibit for another (5, 10, 15 or 20) minutes." At the end of the study, the participants were debriefed and thanked

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for their time. Based on the mean scores reported in Table 1, people love to see flora in the aquarium (*M*=6.05, *SD*=.781). There felt much better after watching the flora (*M*=5.96, *SD* =.845) and felt happy to watch flora (*M*=6.18, *SD*=.827). However, they also enjoyed with fauna are also denoted high mean (*M*=6.04, *SD* = .709), feel better after watching fauna (*M*=5.94, *SD*=.781) and happy to watch the fauna again (*M*=6.15, *SD*=.770). Overall, it also shows that participants are enjoyed watching the aquarium and aquascape (*M*= 6.18, *SD*=.639). Feel better after watching (*M*=6.08, *SD*= .733) and am happy to watch again (*M*=6.29, *SD*=.679). To conclude, the participant felt that the aquarium and aquascape are either slightly interesting or interesting (*M*=5.71, *SD*=.738). They are willing and would love.

## Conclusion

According to the analysis and findings reported in section A, the participants remained longer in front of the full planted tank (tank B) with fauna due to feelings of attractiveness, excitement, and relaxation. Such findings are comparable to a study by Cracknell et al., (2016), in which visitors stayed longer in front of the exhibit when it contained the most marine life due to interest, fascination, and the opportunity to disengage from the mundane, all of which have been demonstrated to aid in psychological restoration. In the end, from a psychological standpoint, this environment provides greater benefits. Moreover, section B's findings regarding the participants' perceptions of the aquascape revealed that they were willing to view the planted tank again within a specified time frame. This is supported by the fact that decorated aquariums tend to appear more appealing, which is consistent with previous research demonstrating the psychologically restorative effect of aquatic environments in general (Cracknell et al., 2016; White et al., 2013). This prompts individuals to begin scaping their aquarium tanks so that they appear more natural and harmonious. To imitate nature specifically, the aquarium featured flora, fauna, and even a hardscape design. They will feel mesmerised as a result of this process, leading to feelings of excitement, relaxation, and mental tranquilly. In addition, in all likelihood, the Malaysia aquarium industry, particularly in aquascape, is experiencing rapid development, as Malaysian contestants have won the International Aquatic Plants Layout Contest (IALPC) in 2017, 2019, and 2020. This has caused the pastime to become well-known and popular. Malaysia possesses the necessary component to develop the industry to its maximum potential. To increase the generalizability of the results, future research should include more fish shops and participants. Furthermore, future research could conduct interviews with fish shop proprietors to glean their perspectives on aquascape and the potential business involvement of this hobby. The ornamental fish industry in Malaysia, particularly in aquariums and aquascapes, has a vast untapped potential and the capacity to drive community or even agricultural economic development.

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Volume: 8 Issues: 55 Special Issue [August, 2023] pp. 109 - 118
Journal of Islamic, Social, Economics and Development (JISED)
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