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Karang Penyu: The Investigation of Site-Specific Instal-lation as a Coral Garden.

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Abstract

This research investigates site-specific artistic installations in the form of coral gardens as a medium for marine conservation to raise awareness about the critical role of coral reefs in sustaining marine biodiversity and food sources. The artistic approach combines sculptural methods and site-specific installations using recycled, up-cycled, and environmentally friendly materials, which include recycled stones from nearby streams, leftover gravel from construction sites, cockle shells collected from local food vendors, and pH-neutral ce-ment.These materials were carefully selected for their low environmental impact and ability to relate to the project, both the local environment and the communities. This research uses underwater photography surveys and ecological indicators to monitor how well the coral grows and how healthy the reef ecosystem is.Through this interdisciplinary approach, the research demonstrates how art and science can work together to inspire environmental stewardship and drive actionable change in marine conservation. By connecting people with nature, such as coral reefs and marine life, this project highlights the urgency of collective concerted action in protecting our planet through integrating art and science.

Keywords: *Site-Specific Installation, Assemblages, Artificial Reef.*

Introduction

Site-specific installation is a form of exhibition that goes beyond the traditional four walls of a gallery and is also a unique way to relate to and tell a story to the audience. Describing and uniting the resources and materials forms an artistic formation, creating new meaning and bringing new perspectives to the world. In this research, I develop a conceptual site-specific installation artwork to observe and understand how this artwork will submerge and transform into the sea's ecology over time.

Turtles are reptiles that have existed for millions of years. Today, their populations are sadly declining significantly, primarily due to the destruction of their habitat and food sources caused by human actions such as tourism, fishing, environmental pollution, and drastic climate changes. For this reason, the research and installation project is named *"Karang Penyu,"* or in English translated as "Turtle Reef," which is inspired by this area's history with turtles and as a call to action, representing a responsibility in the effort to restore and ensuring the sustainability of the coral and marine ecosystems.

Review of Literature, Documentaries & Talk

This study explores how artificial reef installations function as ecological restoration tools and participatory art platforms. Combining marine science and site-specific art theory, it evaluates locally sourced materials for coral growth while analyzing how these interventions reshape human-environment relationships, offering a new framework for conservation-aligned artistic practice.

Marine Science: Coral Reef Ecology, Artificial Reef Designs, And Habitat Restoration.

Coral reefs are found all over the world's oceans. It is an underwater ecosystem that is highly important to the environment and economically. Coral reefs are formed of colonies of coral polyps bound together by calcium carbonate. Today, coral reefs are in danger of several threats, such as habitat loss, global warming, diseases, and over exploitation.

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Artificial reefs and other Habitat Enhancement Structures (HES) have an extensive history dating back thousands of years. In the Mediterranean, tuna fishers accumulated ballast stones to fish between tuna seasons in Sicily. Greek temple stones were disposed of during harbor construction, creating reefs as early as 3,000 BC [1].

In modern times, Baine (2001) cites EARRN's definition as submerged structures are deliberately placed on the seabed to mimic a natural reef's characteristics [2]. Stephan stated, "Artificial reefs represent a tool by which man can elicit changes in the ecosystem to achieve benefits [3]."

While Stephan (1990) stated on using waste materials to construct concrete artificial reefs: "Most artificial reefs that have been built with various materials such as decommissioned fishing vessel, PVC pipes, concrete, discarded, fiberglass, tires and used for fishery enhancement, improve the quality of fishing and catch, providing spawning and protecting the juvenile fish, control beach erosion and also shore protection and also scientific experimental ground [4]."

Not all waste materials provide sustainable benefits some may leach harmful chemicals or degrade in ways that threaten marine life. Therefore, in this research project, a thorough material assessment is necessary to ensure artificial reefs enhance fishery habitats without introducing environmental hazards. Choosing the right materials and assessing their durability, toxicity, and suitability in marine environments will secure a better chance of protecting and supporting healthy reef growth.

Cornell mentioned that "Coral reefs are one of the world's most diverse ecosystems[5]." Coral reefs are essential as they provide habitats for various organisms, including fish and mollusks, serve as nurseries for young marine life, and offer protection against storms. Many species of fish and mollusks would not thrive without them. Observing coral reefs in their natural environment fosters a deep connection and appreciation for these ecosystems, enhancing their aesthetic and ecological value.

Cause, Impact and Views of Coral Reef Degradation.

There is an urgent need to address what Wilkinson & Scouter have reported: "20% of the world's coral reefs are currently threatened and predicted to be lost in the next 20 to 40 years, and a further 15% are critically threatened with a predicted loss in the next 10 to 20 years [6]. Globally, coral reefs are endangered not only by natural phenomena but also by human activities.

According to Epstein (2001), "Coral reefs appear to be undergoing worldwide decline. The two main global threats are seawater warming and ocean acidification [7]." Meanwhile, Galvez (2000) notes that "Destructive fishing is common in coral reef areas where population and economic pressures lead to a state of intense competitiveness among coastal villagers [8]."

Art Theory: Assemblage art, Site-specific Art, Eco-Art, and Environmental Aesthetics.

Art is a mode of creative expression that transcends disciplines, whether practiced by an artist, graphic designer, architect, industrial designer, or landscape designer. It brings multiple layers of meaning to the human experience. As Gordon Graham notes, "None of them can on its own explain the special value of great art [9]." Art is a medium that functions as a thought experiment for creative pleasure. It makes us ponder questions and offer solutions, contributing to intellectual development or evoking emotion by drawing us into unfamiliar experiences.

Assemblage Art

Assemblage art is a practice that involves combining found and discarded materials to create new, often conceptually rich works. Jean Dubuffet advanced this approach, whose *assemblages d'empreintes* utilized materials such as butterfly wings and various found objects to challenge traditional definitions of artistic media. His works had a significant influence on contemporary assemblage practices.

Site-Specific Art

This concern with context and spatial engagement also underpins site-specific art, which derives its significance from its relationship with its environment. Site-specific art derives its significance from its relationship with its environment. As Miwon Kwon (2002) articulates, site-specific art is "unavoidably tied to its context," emphasizing that such artworks cannot be fully understood or appreciated when detached from their original environment. By integrating with their surroundings, site-specific installations establish a dynamic dialogue with physical, historical, and social dimensions, ultimately shaping their significance and reception [10].

An influential example of the spiral Jetty by Robert Smithson (1970) was created in Utah. Great Salt Lake immerses and amplifies a dynamic interplay of their spatial, historical, and social settings, often redefining the space to form the artwork. The 1,500-foot-long spiral formation, composed of rocks, earth, and salt crystals, not only symbolises to the rhythms of nature but evolves with them, its form is continually altered by the lake's fluctuating water levels, salinity and environmental conditions.

It's a significant example of environmental aesthetics; Spiral Jetty engages directly with landscape and ecological transformation, exploring entropy and temporality and integrating natural processes into artistic practice.

His methods suggest a framework where art can be reflected, critiqued, and meaningfully interact with natural environments while fostering deeper contextual awareness and a more ecologically attuned form of artistic engagement.

Smithson's work explored the concept of entropy by immersing itself in natural and industrially transformed environments. His aim was to reflect the effect of human civilization on ecologies. His work underlined the irreversible effects of time, transformation, and human activity on the landscape.

His works, including "Asphalt Rundown" and "Glue Pour," show his interest in natural processes such as erosion and sedimentation forces that progressively break down and reshape the land. These process forces activate on geological rather than biological time scales, a contrast that Smithson's practice brings to the forefront.

Through "*Karang Penyu"*, I'm exploring how artistic practice can respond to the urgent environmental challenges we face today and create space for dialogue, awareness, and meaningful engagement with the natural world. This project is guided to prioritize environmental sensitivity. Unlike Smithson's works, all the materials chosen must not harm the ecosystem but support health and be suitable for ecological restoration. To incarnate a form of 'reverse entropy,' transforming degradation into growth as a coral garden.

Methodology

In this study, I examine E.O. Wilson's significant insight into the emotional bond between humans and nature. The idea that we're inherently connected to the natural world [11]. The "*Karang Penyu"* project aims to intensify marine species and people's emotional and psychological connection with marine environments by combining art and science and highlighting the ecological importance of coral reefs to create immersive, site-specific experiences that inspire active conservation efforts.

The "*Karang Penyu"* was deployed at this area, 2'50'34"N 104'09'29"E based on the factors outlined below:

I. Availability of ample up-cycled materials and natural resources, such as pebbles and rocks.

II. Firm sandy sea-bed and depth between 15-20 m, most suitable stable to place the sculpture.

III. Clear water easy visibility to do observation and monitoring and also intended for coral growth.

Turtle

Turtles hold symbolic significance for local communities. They are recognized as esteemed resilient and hardy herbivores that travel vast distances and survive oceanic challenges. They are also ecologically pivotal to marine ecosystems. Using their form as a metaphorical design element highlights their importance in biodiversity and habitat interconnection.

This artwork is not in the form of a static, autonomous object such as a metal or bronze sculpture or a figure on a Pedestal but rather is integrated with the landscape to function as an ecological intervention. As Rosalind Krauss asserts, "The logic of the site-specific work is inseparably bound to its physical context, refusing the autonomy of the modernist object and instead generating meaning through its interaction with the surrounding environment [12]." By relinquishing the conventions of gallery-bound art, this project prioritizes symbiosis with the marine ecosystem, regenerating damaged spaces through its material and conceptual integration with place.

The "*Karang Penyu"* is sculpted in the form of a turtle, ensuring structural stability and durability in unruly seabed conditions, especially during the monsoon seasons. The aerodynamic shape encourages optimum water flow around the structure, reducing sediment upsurge. The grooves and contours are crafted to support the attachment of broken corals, create microhabitats, and foster coral growth and marine life colonization.

Conceptually, the "*Karang Penyu"* work aligns with Kwon's articulation of the 'social-institutional' dynamic within site-specific art practices of the 1960s and 1970s. Kwon argued, "It was a vital element in the artistic practice of the 1960s and 1970s to investigate institutional critique and reconfigure the site as a relay or network of interrelated spaces and economies (studio, gallery, museum, art market, art criticism), which together frame and sustain art's ideological system. She indicated this as the 'social-institutional,' characteristic, in which artists worked with 'the actuality of a location and the social conditions of the institutional frame' [13].

Materials

Framework and Structure.

The installation is built on a base made of metal re-bars, with chicken wire mesh shaped over it to form the structure and support layers of neutral pH cement. In this project, I also use up-cycled materials as listed below to help cut down on landfill waste and support environmental sustainability.

Benefits of Cockle Shell for Coral Growth.

Cockle shells used in this project were collected from local food stalls, cleaned, sun-dried, and prepared for use. Some were crushed and mixed with cement, while others were applied directly as textured surfaces on the The "*Karang Penyu"* is sculpted in the form of a turtle, ensuring structural stability and durability in unruly seabed conditions, especially during the monsoon seasons. The aerodynamic shape encourages optimum water flow around the structure, reducing sediment upsurge. The grooves and contours are crafted to support the attachment of broken corals, create micro habitats, and foster coral growth and marine life colonization.

body. They are rich in minerals, including calcium, magnesium, sodium, and phosphorus, which support marine life. As shown in Table 1, their composition enhances structural integrity and biological suitability for marine applications.

Table 1. The Mineral Composition of Cockle Shells.

Component	Percentage (%)
Continuous assessment component (Cac)	98.7
Magnesium (Mg)	0.05
Sodium (Na)	0.9
Phosphorus (P)	0.02
Others	0.2

Note. Data adapted from Ramakrishna, B., & Sateesh, A. (2016). Exploratory study on the use of cockle shell as partial coarse & fine aggregate replacement in concrete. International Research Journal of Engineering and Technology, 3(6) [14]

Benefits of Coarse Aggregate, Pebbles and Rock

As part of a natural resource-based approach, the texture and irregular shapes of the materials promote marine organisms such as coral to grip onto the surface, enhancing biodiversity and accelerating the growth of a thriving marine ecosystem. The coarse aggregates are primarily sourced from leftover construction materials and local suppliers. Pebbles and rocks were also collected from a stagnant stream, which, when cleared, helped improve water flow to the surrounding orchards.

Benefits of Sand

Sand is an essential element that acts as a foundational material by providing stability and anchorage for reef structure. Sand in this research project is vital as it mimics the seabed environment, making it recognizable and favourable for marine organisms to settle as their habitation.

Using a Neutral PH Cement

Neutral PH cement was used in this research project to minimize the risk of alteration of the surrounding water chemistry and to ensure the sustainability of the reef; this will also encourage the coral larvae to settle and grow.

		
Pebbles and rocks were also collected from a stagnant stream, which, when cleared, helped improve water flow to the surrounding orchards.	Cockle shells used for this project are collected from local food stalls, washed, dried under the sun, and dried before use.	The reef-safe epoxies used for securing broken corals. These epoxies are formulated to avoid leaching harmful chemicals into marine water.

Fig. 1. The Materials Use to Build the Texture

Design Stages and Production of Site-Specific Installation

Before execution, I produced several sketches to develop the concept for the site-specific installation. The developed designs must meet a few criteria I have outlined. I wanted them to reflect and relate to Malaysian culture or the local context, like bunga raya [hibiscus flower], coral, and turtle. They must also allow for burrows or designs that would enable coral to grow and marine life to make homes.

		
Prototype Model 1: 3D rendering to test how different textures, finishes, or supports will translate to the final material. Assess proportions, composition, and aesthetics before committing to large-scale production.	Prototype Model 2: Forming proportions, structures with paper clay to analyze shapes and groove patterns.	Prototype Model 3: Study and experimentation of adhesion techniques on cockle shells, rocks, pebbles, and cement to ensure the applied materials remain intact and to estimate the materials required for the artwork

Fig. 2. The Prototype Models

		

		
Design Process 1: Fabricating the frame/structure with re-bar and chicken wire mesh.	Design Process 2: Applying rocks and pebbles to enhance. texture and form the base structure.	Design Process 3: Forming body structures and refining surface texture.

Fig. 3. The Building Processes

		
Transferring the site-specific installation to the shore for deployment process.	Development process at the depth of 4 metre.	The Site -specifc now located at 2’50’34”N 104’09’29”E

Fig.4. The Deployment Processes

Deployment Observation and Ecological Assessment

Climate change poses an existential threat to coral reef ecosystems globally. Rising sea surface temperatures disrupt the symbiotic relationship between coral polyps and zooxanthellae (photosynthetic algae), which provide up to 90% of the host’s metabolic energy through photosynthesis (Hoegh-Guldberg, 1999) [15]. Under thermal stress, corals expel these algae, leading to coral bleaching a physiological response that, if prolonged, results in widespread mortality (Hughes et al., 2018) [16]. To evaluate the success of the “*Karang Penyu”* installation, a photographic survey will be conducted every three months using underwater cameras to document the settlement and growth of coral larvae on the sculpture's surface, bleaching resilience under seasonal temperature fluctuations.

Conclusion

This research concludes that integrating artistic practice with scientific knowledge significantly enhances the value and impact of site-specific installations in environmental restoration. Using recycled and locally sourced materials such as cockle shells, river pebbles and sand, and pH-neutral cement demonstrates their dual function as both ecologically supportive and aesthetically compelling components in artificial reef construction.

Beyond environmental conservation, the “*Karang Penyu”* project fosters emotional and cultural resonance, offering symbolic and artistic narratives within the underwater environment. This interdisciplinary approach contributes to sustainable ecological design and expands the role of art as a transformative tool for environmental awareness and community engagement.

References

[1] Surman, C. (2015). Artificial reefs in Australia: A guide to developing aquatic habitat enhance-ment structures [Unpublished manuscript]. Murdoch University.

[2] Baine, M. (2001). Artificial reefs: A review of their design, application, management and performance. Ocean & Coastal Management, 44(3–4), 241–259. https://doi.org/10.1016/S0964-5691(01)00048-5

[3] Stephan, C. D. (2002). Texas artificial reef plan. Texas Parks and Wildlife Department, Coastal Fisheries Branch.

[4] Stephan, C. D., Dansby, B. G., Osburn, H. R., Matlock, G. C., Riechers, R. K., & Rayburn, R. (1990). Texas artificial reef fishery management plan (28 pp.). Texas Parks and Wildlife Department, Coastal Fisheries Branch.
[5] Connell, J. H. (1978). Diversity in tropical rain forests and coral reefs. Science, 199(4335), 1302-1310. https://doi.org/10.1126/science.199.4335.1302
[6] Wilkinson, C. (2008). Status of coral reefs of the world: 2008. Global Coral Reef Monitoring Network.
[7] Epstein, N., Bak, R. P. M., & Rinkevich, B. (2001). Strategies for gardening denuded reef areas: The applicability of using different types of coral material for reef restoration. Restoration Ecology, 9(4), 432-442.
[8] Galvez, M. R. (2000). Destructive fishing and resource competition in coastal villages. Journal of Marine Resource Management, 12(3), 45-56.
[9] Graham, G. (2005). Philosophy of the arts: An introduction to aesthetics. Routledge.
[10] Kwon, M. (2002). One place after another: Site-specific art and locational identity. MIT Press.
[11] Wilson, E. O. (1984). Biophilia. Harvard University Press.
[12] Krauss, R. (1979). Sculpture in the expanded field. October, 8(Spring), 30-44.
[13] Yüksel, O., & Yüksel, İ. (2024). Ephemera and permanence: Dichotomies of process and product in contemporary ceramic art practice. Ceramics, Art and Perception, 123, 96-101.
[14] International Research Journal of Engineering and Technology. (2016). International Research Journal of Engineering and Technology, 3(6). https://www.irjet.net/archives/V3/i6
[15] Hoegh-Guldberg, O. (1999). Climate change, coral bleaching and the future of the world's coral reefs. Marine and Freshwater Research, 50(8), 839-866. https://doi.org/10.1071/MF99078
[16] Hughes, T. P., Kerry, J. T., Álvarez-Noriega, M., Álvarez-Romero, J. G., Anderson, K. D., Baird, A. H., ... Wilson, S. K. (2018). Spatial and temporal patterns of mass bleaching of corals in the Anthropocene. Science, 359(6371), 80-83. https://doi.org/10.1126/science.aan8048.