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

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Abstract:

In this study, a site-specific installation was constructed in an open location used as a studio, where the concept of objectivity or neutrality of knowledge is practiced. I was inspired by this space and created a site-specific installation using recycled materials sourced from the surrounding area. These materials were identified and examined through research methods that include literature analysis and documentary studies to ensure their safety in constructing a coral garden. This study aims to contribute to contemporary art discourse while strengthening the connection between art, science, the environment, and spatial context in artistic thinking.

Keywords: Site-Specific Installation, Assemblages, Artificial reef.

Introduction and Materials Review

The world is currently facing the challenge of environmental pollution, and it cannot be denied that, at times, we either forget or remain indifferent to this issue. Much of the pollution stems from industrial activities, urbanization, excessive plastic usage, and air pollution, all of which significantly contribute to environmental degradation.

Pollution has led to many problems, from a decline in human health, loss of biodiversity, climate change, water resource depletion, and threats to marine life. Therefore, to have a sustainable future. We must be active and responsible for our actions through awareness campaigns, conservation projects, and green innovations.

All of us, whether we are individuals, industry, or the governing body, should strive and take responsibility for conservation efforts to help curb ecological damage and promote long-term sustainability.

I initiated the 'Karang Penyu' project by conducting a literature review based on journals and articles encompassing two key disciplines: art and science. The aim is to deepen my understanding and establish connections in art methodologies, movements and contemporary practices, both locally and internationally.

This site-specific Installation is deployed at 2'50'34"N 104'09'29"E , near to Jeti Kampung ABC, Tioman island at the state of Pahang. According to a research conducted by Reef Check it was found that Microplastic waste is fine pieces of plastic less than five (5) millimeters in size that are almost invisible to the naked eye and are everywhere. and they also collected A total of **2,945kg of ghost nets** were successfully removed from the waters of Pulau Tioman on the same year.

I am deeply fascinated by sculpture as it is a three-dimensional art form that interacts with its surroundings and allows viewers to experience it from multiple perspectives. Art can

tell a story, convey a message, or even narrate an event within a space. It serves as an expression of the artist's vision.

Through this research, I also hope to explore materials, techniques, or themes that have received less attention in art studies. This study has broadened my understanding that art is often closely interconnected with other fields, such as science, philosophy, psychology, and sociology.

Art can serve as a powerful message that leaves a profound impact. It is not necessarily confined to gallery exhibitions but extends across various forms of expression, creation, and science, focusing on studying coral reefs. Watching documentaries like 'Chasing Coral' helps to deepen my understanding of coral ecosystems.

I have learned about the importance of tackling coral bleach and communicating this message in raising awareness after watching this documentary. It was an effective storytelling created from an interdisciplinary approach from climate science, marine biology and media arts, establishing a strong point that collaborated to develop impact narratives. As an audience member, I found that it was a very engaging, emotional storytelling case study about the critical environment that we live in. It also highlights the logistical difficulties in underwater research, like equipment failures and unpredictable environmental conditions and how research can lead to tangible policy shifts, offering me a valuable lesson.

Coral reefs are important as they provide habitats for organisms and fish, nurseries for the young, and storm protection, but many fishes/molluscs would not be available. Sighting coral reefs in their natural environment might make the person feel connected to the ecosystems, appreciating them even more in terms of aesthetic value and worth.

A Complete reef formation can take anywhere from **10,000 to 30 million years**, depending on the scale and conditions. The growth of coral significantly depends on environmental conditions; however, Coral calcification rates have declined by approximately 18.6% over the past 31 years due to rising ocean temperatures

According to Kaandorp, J, **Massive corals (e.g., Porites lutea)** in Southeast Asia exhibit **annual growth rates between 7–15 mm (0.7–1.5 cm) per year**, with variations linked to **sea surface temperature changes**.

And in another research, Nie, B., Chen, T., Liang, M., Wang, Y., Zhong, J., & Zhu, Y**.** (1997) stated that Branching corals (e.g., Acropora spp.) can grow up to 10 cm per year, depending on environmental conditions

Environmental Art and Entropy: The Influence of Robert Smithson

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 symbolizes 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. He aimed 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 geological rather than biological time

Figure 1: The Spiral Jetty	Fig 2: The Asphalt Rundown	Fig 3: Glue Pour
		
Note: Holt/Smithson Foundation. (n.d.). Spiral Jetty. Retrieved May 5, 2025, from https://holtsmithsonfoundation.org/spiral-jetty	Note: Holt/Smithson Foundation. (n.d.). Asphalt Rundown. https://holtsmithsonfoundation.org/asphalt-rundown-0	Note: R. Smithson, Glue Pour, 1970, From left, R. Smithson, D. Lunden and L. Lippard, (Photo by Christos Dikeakos)

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 by prioritizing ecological sensitivity. Unlike Smithson's works, all the materials chosen must not harm the ecosystem but support health and be suitable for environmental restoration. To incarnate a form of 'reverse entropy,' transforming degradation into growth as a coral garden.

After studying Smithson's work, I questioned the nature of permanence in art. If an artwork like Spiral Jetty, submerged by water, eroded by salt, and revealed again by drought, exists in a state of perpetual transformation, can it ever be considered 'complete'? And if art is no longer a fixed object but a dynamic interplay with natural forces, how do we redefine its lifespan, meaning, or purpose? Smithson's Spiral Jetty is unique precisely because it surrenders to nature's rhythms: sometimes visible, sometimes hidden, always changing. This instability challenges traditional notions of artistic completion. But beyond philosophical questions, I also ask: How can art function simultaneously as an aesthetic expression and ecological agent?

Material Consciousness: Lessons from Arte Povera

In contrast to Smithson's monumental interventions, the 'Arte Povera' movement emphasized simplicity and the poetic use of everyday materials. This a question to me; can art, function as both an aesthetic element and ecological infrastructure?

Smithson created his works not to support or give new meaning to life but rather to reflect on natural process like entropy, a gradual geological decline into disorder. In contrast, I made the 'Karang Penyu' piece to provide a new meaning to the bio- habitat. The field explored by Smithson is entropy, a natural process that leads to disorder. While Smithson's art explores decay and transformation, 'Karang Penyu', a coral garden, symbolizes ecological fragility, climate change, or reef degradation, transforming entropy into a call for awareness and regeneration.

I was inspired by 'Arte Povera', the most significant and influential avant-garde movement in southern Europe in the late 1960, 'Arte Povera', refere to an italian phrase for "poor art" or "impoverished art". As described by The Art Story (n.d.), "It included the work of around a dozen Italian artists whose most distinctly recognizable trait was their use of commonplace materials that evoked a pre-industrial age, such as earth, rocks, clothing, paper, and rope: literally 'poor' or cheap materials that they repurposed for their practice. These practices presented a challenge to established notions of value and propriety, as well as subtly critiquing the industrialization and mechanization of Italy at the time"

This aligns with my vision for the project, which is to embrace eco-conscious practices by encouraging engagement with raw textures and emphasizing that materiality is integral to meaning. I aim to highlight the artistic potential of repurposed, natural, or discarded materials.

Ephemeral Aesthetics: Andy Goldsworthy's Natural Interventions

Building on the ideas of entropy and material consciousness explored by Smithson and the Arte Povera movement, Andy Goldsworthy's ephemeral installations offer a more intimate and organic dialogue with nature. Andy Goldsworthy is a British sculptor and photographer renowned for his ephemeral art, where the process is related and works with natural methods that highlight impermanence and the passage of time.

One of his works that really caught my attention is 'Storm King Wall' (1997–1998), located at Storm King Art Center in New York. It's a snaking dry-stone wall that weaves through trees and even dips into a pond, blending human craftsmanship with the natural landscape. This creates a mystery and interaction with nature. It took him the help of 5 men and 250 tons of stone to build its 2,778-foot length.

To me, 'Storm King Wall' is a masterpiece with a strong visual aesthetic, crafted in an organic method that evokes both a modern sensibility and an ancient reverence for nature.

Figure 4. The Storm King Wall



Note: Storm King Wall (1997–1998) by Andy Goldsworthy. Reprinted from Artlyst, by Hubbard, S., 2023, Artlyst.

Symbolism and Ecology

Turtles hold deep symbolic significance for local communities. They are tough herbivores surviving powerful waves and violent storms during migration. They are also ecologically pivotal to marine ecosystems. Using their form as a metaphorical design element highlights their importance in biodiversity and habitat interconnection.

The name and form of 'Karang Penyu' draw inspiration from the plight of local turtle populations, which depend on the region's rapidly diminishing coral reef ecosystem. Turtles hold deep cultural significance: in Chinese and Japanese traditions, they are sacred symbols of longevity, wisdom, and harmony with nature. Among Southeast Asian coastal communities, they are also revered as guardians of the sea.

Resilience in Artistic Practice: Navigating Failure, Growth, and Adaptation.

A Question of Worthiness.

Creating 'Karang Penyu' has been a up-and-down experience, requiring me to constantly reflect and adapt to to changing environments The time spent in the area has been significant and valuable, especially considering the journey to the site. To get there, I must drive at least six hours from where I stay, followed by a ferry ride lasting between one to two hours, depending on the weather and sea currents. After that, the journey continues with a 30-minute truck ride before finally arriving at the construction site.

Fragment and growth.

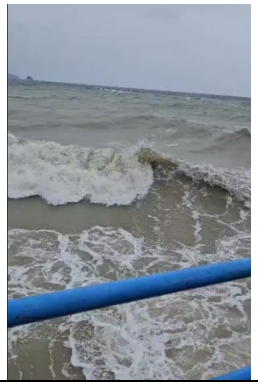
As an artistic researcher, I conducted preliminary site visits to understand the area, engage with residents, and identify potential materials that could be collected and used for this project. Additionally, I needed to look at elements such as wave patterns, topography, and weather resistance, especially given the unpredictable nature of the monsoon season in this region. to build the aesthetic function of the site-specific installation. As shown below, this is the actual scene of the monsoon season last November 2024.

During the process of relocating 'Karang Penyu', it broke apart. When I failed and could not continue my initial artwork, intended to be a larger installation placed on the ocean floor, I fell into deep distress, overwhelmed by the universal obsession with grandeur and magnificence. Failing to me is often related to an endpoint; I crumbled under the weight of my disappointment, and for a moment, the thought of abandoning my research studies crossed my mind.

It took me a long time to resume my academic research journey. I questioned and struggled with a dilemma. What scale should I build? A quiet voice in my heart reminded me that in today's world, scale plays a crucial role. I learned through this experience the importance of embracing the beauty of smallness. There is no need to create something grand to celebrate victory and success.

I told myself to embrace imperfection, impermanence, and lopsidedness and to value natural decay as an essential aspect of beauty. 'Karang Penyu' will acknowledge that art, like reefs, must change and adapt to its surroundings. It will be a reflection of nature's evolving state.

Figure 4. The monsoon season

	
Note: During the monsoon season, many areas are severely affected.	Note: Large waves have heavily eroded the cliffs around the chalet area, causing significant destruction.

Before execution, I started with initial sketches with a few criteria and observations in mind. I wanted them to reflect and relate to Malaysian culture or the local context, like bunga raya [hibiscus flower], reef, and turtle. The design must also allow burrows or designs enabling coral to grow and marine life to make homes.

I chose the turtle shape to ensure 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. The texture will be emphasized on uneven surfaces and organic formations to intentional reflections of nature's evolving state. The work acknowledges that art, like reefs, must change and adapt to its surroundings.

Figure 3. The Prototype Models

		
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.

From Waste to Reef: The Artistic and Ecological Role of Up-cycled Materials.

> **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.**

'Karang Penyu' resonates with the ideology of utilizing materials prone to erosion and transformation. In this project, I use up-cycled materials, re-purposing discarded items and giving them a second life with enhanced purpose. For example, I collected leftover wires and re-bars to make the foundation frame and crushed concrete from nearby construction sites to rebuild structures in the area. These materials are functional and reduce my workload to help reduce landfill waste and support environmental sustainability.

This practice aligns with the principles of 'Arte Povera', where the poetic re-purposing of everyday materials challenges traditional notions of artistic value and sustainability.

The installation began with a base made of metal re-bars, over which chicken wire mesh was shaped to form the structure and support layers of neutral pH cement. This type of cement was chosen to minimize the risk of altering the surrounding water chemistry and to ensure the sustainability of the reef. It also encourages coral larvae to settle and grow.

As part of a natural resource-based approach, 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. The organic contours and tactile imperfections of the materials invite corals to cling and thrive, weaving new life into the seabed and stitching together a resilient marine tapestry.

Cockle shells were also used in this project; they 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. As shown in Table 1, their composition enhances structural integrity and biological suitability for marine applications. They are rich in minerals, including calcium, magnesium, sodium, and phosphorus, which support marine life and contribute to reef regeneration.

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)

Figure 4. Tools and Equipment used.

Tools /equipment	Uses
Grinder	Cutting rebars
Gasless Welding machine	For welding purposes
Pliers	Cutting wires and shaping works
Hammer	For forming
Shovel /Hoe	Mixing motar
Gloves	For protection during welding and hammering activities.
Wheelbarrow and carts	Mobility - taking and mixing cement mixture.

Figure 5. The materials use to build the texture

		
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.

Figure 6. The Building Processes

		
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.

Deployment Observation and Ecological Assessment

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, provides the most stable foundation for sculpture placement.
III. Clear water allows easy visibility for observation and monitoring, aiding coral growth.

Figure 7. The Deployment 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

The 'Karang Penyu' project is also not exempt from the challenges posed by global weather impacts, and according to Center for Science Education, ocean temperatures are expected to rise due to global warming: The Current global ocean temperatures vary by region, but the average **sea surface temperature** is approximately **16.1°C (61°F)**

By 2030 (5 years)	Expected increase of 0.2–0.5°C depending on emissions scenarios.
By 2040 (10 years)	Projected rise of 0.5–1.0°C. By 2050 (20 years): Could reach 1.0–1.5°C above current levels.
By 2075 (50 years)	Worst-case scenario suggests an increase of 2.0–3.5°C.

Note: These projections depend on greenhouse gas emissions and climate policies. If emissions are reduced significantly, warming could be limited to the lower end of these estimates.

This predicted warming of ocean waters due to climate change directly influences the calcification process in corals, which is a key factor in the success of artificial reef systems like 'Karang Penyu'. Increased ocean temperatures may trigger coral bleaching, weaken skeletal structures, and slow reef development, threatening the installation's sustainability over time.

Recognizing the projected temperature increases, 'Karang Penyu' integrates ecologically resilient materials such as pH-neutral cement to support coral colonization. This approach ensures that the structure can withstand environmental fluctuations while fostering biodiversity.

Conclusion.

In conclusion, this artistic research created an integration between art and technology and raised awareness of the importance of marine species and environmental issues where they interact with nature, humans, and aquatic species. 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.

'Karang Penyu' has nurtured and connected my heart and soul to the universe. It broadened my understanding and instilled in me a deeper awareness of nature's perpetual process of renewal and resilience.

Moving forward, 'Karang Penyu' is likely to progress and evolve beyond a singular artistic endeavor into a collaborative platform for ecological restoration. To me personally, the 'Karang Penyu' project transformed from an environmental conservation project to one that will also serve as a storytelling or a poetic reciprocation weaving art, ecology, and cultural memory and creating a theme about themes of regeneration, coexistence, and transformation. This system is essential and must be instilled to ensure the continuity of life.

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). Under thermal stress, corals expel these algae, leading to coral bleaching, a To evaluate the success of the 'Karang Penyu' installation. Regular site monitoring, including a photographic documentation survey, will be conducted every three months using an underwater camera and marine biodiversity assessments on the sculpture's surface, which would ensure its continued ecological contribution while generating valuable research on artificial reef formations. Physiological response that, if prolonged, results in widespread mortality (Hughes et al., 2018).

Reflective Statement

The ‘Karang Penyu’ project emerged from a deep concern for the environmental degradation of coral reefs and a desire to explore how art can serve as both a poetic and practical response to ecological crises. As an artist and researcher, I sought to create a site-specific installation that not only engages with the aesthetics of nature but also contributes meaningfully to marine restoration. This reflective statement outlines the motivations, challenges, and insights that shaped my creative process.

My initial inspiration came from observing the fragility of marine ecosystems and the urgent need for sustainable interventions. I was drawn to the idea of using art as a bridge between disciplines, particularly between environmental science and contemporary sculpture. The project was grounded in a desire to work with natural and recycled materials, echoing the philosophies of artists like Robert Smithson, whose concept of entropy challenged traditional notions of permanence, and the ‘Arte Povera’ movement, which emphasized the poetic potential of humble, everyday materials.

Throughout the development of ‘Karang Penyu’, I encountered both technical and emotional challenges. One of the most difficult moments was when the original structure broke during relocation. This failure forced me to confront my expectations about scale, success, and artistic value. It was a humbling experience that taught me to embrace imperfection and to see failure not as an endpoint but as a catalyst for growth. I began to appreciate the beauty of smallness, the power of subtle gestures, and the importance of adaptability both in art and in life.

The process of designing and constructing the installation was deeply immersive. I conducted site visits, engaged with local communities, and experimented with materials such as cockle shells, river pebbles, and pH-neutral cement. A commitment to ecological sensitivity and cultural relevance guided each decision. The turtle-shaped structure, inspired by local symbolism and marine biology, was designed to support coral growth and marine life colonization, transforming waste into a living reef.

This project has profoundly shaped my understanding of what it means to be an artist in the Anthropocene. I have come to see art not only as a form of expression but also as a form of stewardship, a way to care for the world and to imagine new possibilities for coexistence. ‘Karang Penyu’ is more than an artwork; it is a living system, a collaborative platform, and a poetic response to the rhythms of nature.

Looking ahead, I plan to expand this work into a broader initiative that involves scientists, artists, and local communities in co-creating ecological art. I am committed to continuing this journey of learning, making, reflecting and being guided by the belief that art can inspire change, foster empathy, and nurture resilience in both ecosystems and ourselves.