

Designing the Demise of Aral Sea: Strategies to Sustain Aesthetics and Performance in Anthropogenic Landscapes

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ABSTRACT

Facing the irreversible decline of anthropogenic landscapes, what should be the aesthetics for landscape architects to design a perishing site? How should landscape design inform ecological grief from disappearing sites? This article evaluates the intersection of landscape aesthetics and material performance as agencies in the drying Aral Sea for design intervention.

This article challenges conventional ways of landscape conservation which aim to halt or reverse ecological degradation. Instead, it proposes a paradigm where the design for the anthropogenic landscape in the Aral Sea is not to solely conserve what is left, but rather allows a dignified decline. This perspective suggests that the aesthetics of designing anthropogenic landscapes depends on making visible the impact of human actions on the land and addressing resultant ecological grief, where non-human elements and their agency play a vital role in addressing the ecological losses.

The proposed design interventions involve creating a system of brine pools, tillage mounds, sand-capturing dunes, and ecological markers, and seek to employ non-human entities, including both inorganic and organic materials like sand, salt, and plantings, in mitigating the demise of the Aral Sea. In essence, this article strives to make human devastation in the Anthropocene perceptible by designing an educative experience while slowing the disappearance of the dying sea.

KEYWORDS

Anthropogenic Landscape; Landscape Aesthetics; Non-human Entanglement; Aral Sea; Desertification; Ecognosis; Ecological Grief

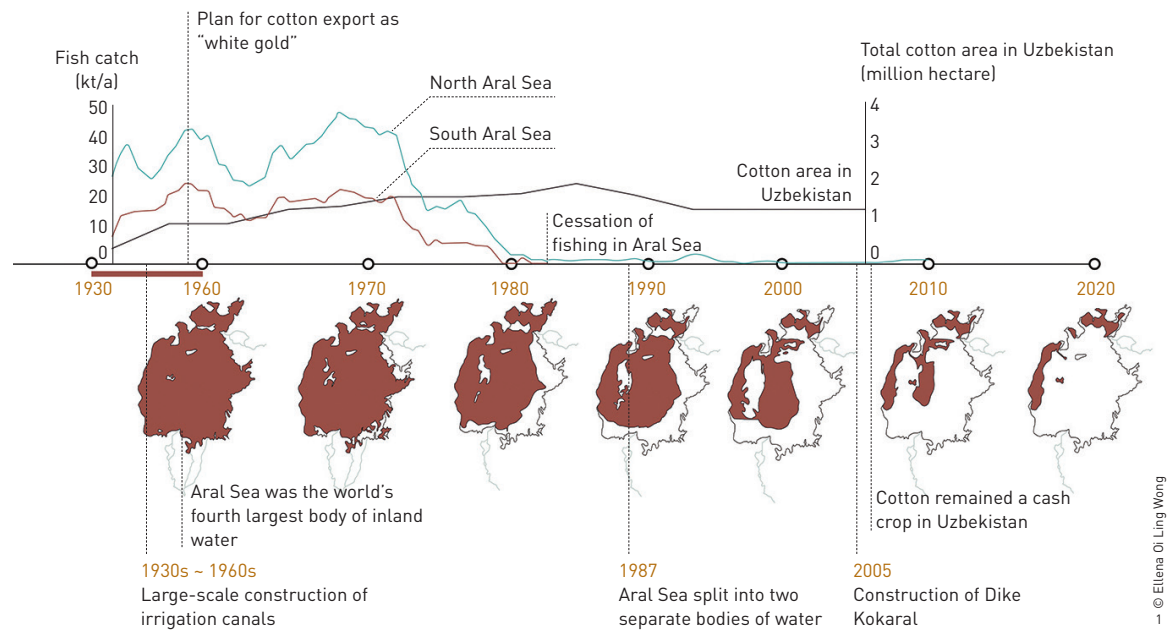
HIGHLIGHTS

- Challenges conventional environmental conservation by designing the beautiful death of the Aral Sea
- To sustain beauty in anthropogenic landscapes is to make human impact visible
- To address ecological grief by working with local materials and magnifying their performance
- Proposed strategies involve systems of brine pools, tillage mounds, sand-capturing dunes, and ecological markers

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1 Introduction

Entering the Anthropocene, humans are confronted with a grim yet peculiar state of increasing natural landscapes inching closer to extinction. Natural lakes, such as the Aral Sea in Central Asia, the Owens Lake and the Great Salt Lake in the USA, and Lake Chad in Africa, all teeter on the brink of disappearance due to a combination of mismanagement, water exploitation, and climate change. Notably, the Aral Sea retains a mere 10% of its original volume^[1], highlighting the urgency of the situation. This article proposes a theoretical landscape design intervention for this desiccating lake, exploring approaches to designing a beautiful demise for such



1. Timeline of the Aral Sea's desiccation and the exploitative history.

fading natural wonders. Given that extinction is irreversible, it also questions how landscape design can adapt to these “new-sublime landscapes” and investigates the role of landscape architects in assisting the public to process and navigate ecological grief.

2 Theoretical Support

The Aral Sea, originating at the end of the Neogene Period and fed by the Amu Darya and Syr Darya rivers with meltwater from the Tianshan Mountains^[1], was once the fourth-largest lake in the world. Intensive water diversion for cotton plantation across Uzbekistan, Kazakhstan, and Turkmenistan since the 1960s has resulted in its significant reduction (Fig. 1). Meanwhile, the desiccation of the Aral Sea leads to the emergence of a new desert—Aralkum Desert.

This transformation introduces sand, salt, and dust across the Aral Sea Basin, causing salty dust storms that carry toxic pesticides from cotton fields, leading to respiratory issues, soil degradation, and decreased crop productivity in nearby areas^[2]. Moreover, the disappearance of this substantial water body has altered regional climate, resulting in colder winters and hotter summers, and accelerated the melting of adjacent glaciers^[3] (Fig. 2). The decline of the Aral Sea has far-reaching effects, as dust from the lakebed spreads globally to areas as distant as Europe, the Himalayas, and even Antarctica^[4].

The desiccation of the Aral Sea foretells the increasingly frequent

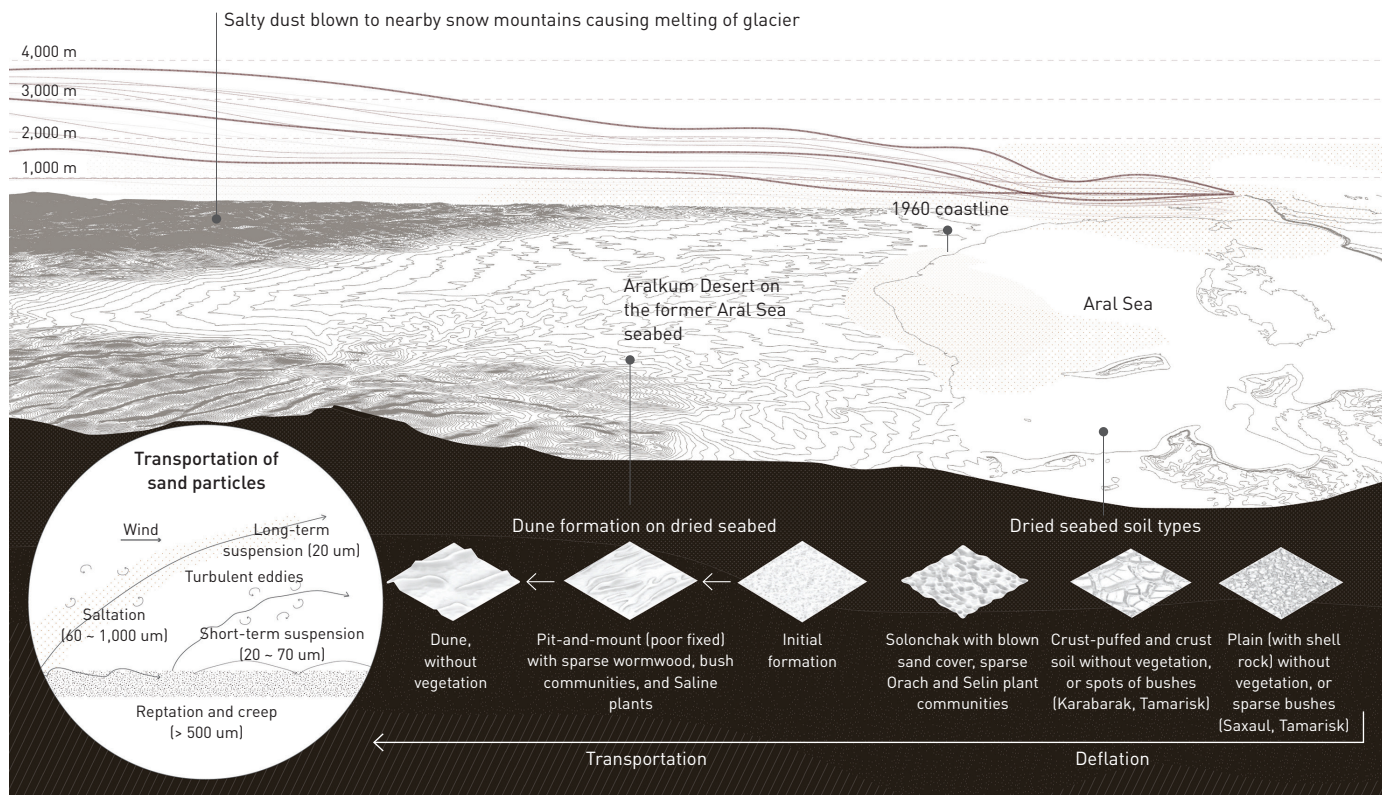
experience of losing landscapes, ecosystems, and existing cultural man-land relationships. This encapsulates the concept of “ecological grief,” a “natural response to ecological losses” as defined by Ashlee Cunsolo and Neville Ellis^[5]. The following session will discuss various theories and approaches related to ecological grief.

2.1 Approaches to Ecological Grief

In the book *Mourning in the Anthropocene*, Joshua Trey Barnett further delves deeper, portraying ecological grief as a multifaceted emotional response to humans’ overpowering and uncontrollable relationship with nature^[6]. According to Barnett, this encompasses feelings of “awe, fear, disgust, enchantment, wonder, sympathy, empathy, anxiety, despair... gratitude.” Building on ideas of environmental philosopher Glenn Albrecht, Barnett criticizes how mere awareness of the planetary crises is insufficient for mitigating the learned disasters. He warns that the acknowledgment of our guilt for intensifying ecological disasters might exacerbate “resignation and self-loathing” reactions since “enormous challenges can only be solved through collective action.”

There are two approaches of ecological grief examined here: a self-resignation approach adopted by Michael Heizer in his artwork *City*, and a human-centric problem-solving mindset based on Owen Lake’s geoengineering approach.

In Heizer’s *City*, he critiques the built environment through the abstraction of vast urban structures^[7] and symbolizes the extensive



2. Regional spread of dust in the Aralkum Desert.

capacity of human activity to transform natural landscapes. Its immense scale is to serve as a marker of human existence should human disappear on earth. The artwork successfully demonstrates the magnitude of human destruction. However, this earthmoving project is yet another destructive, human-centric project with negligence to the local site context and ecologies.

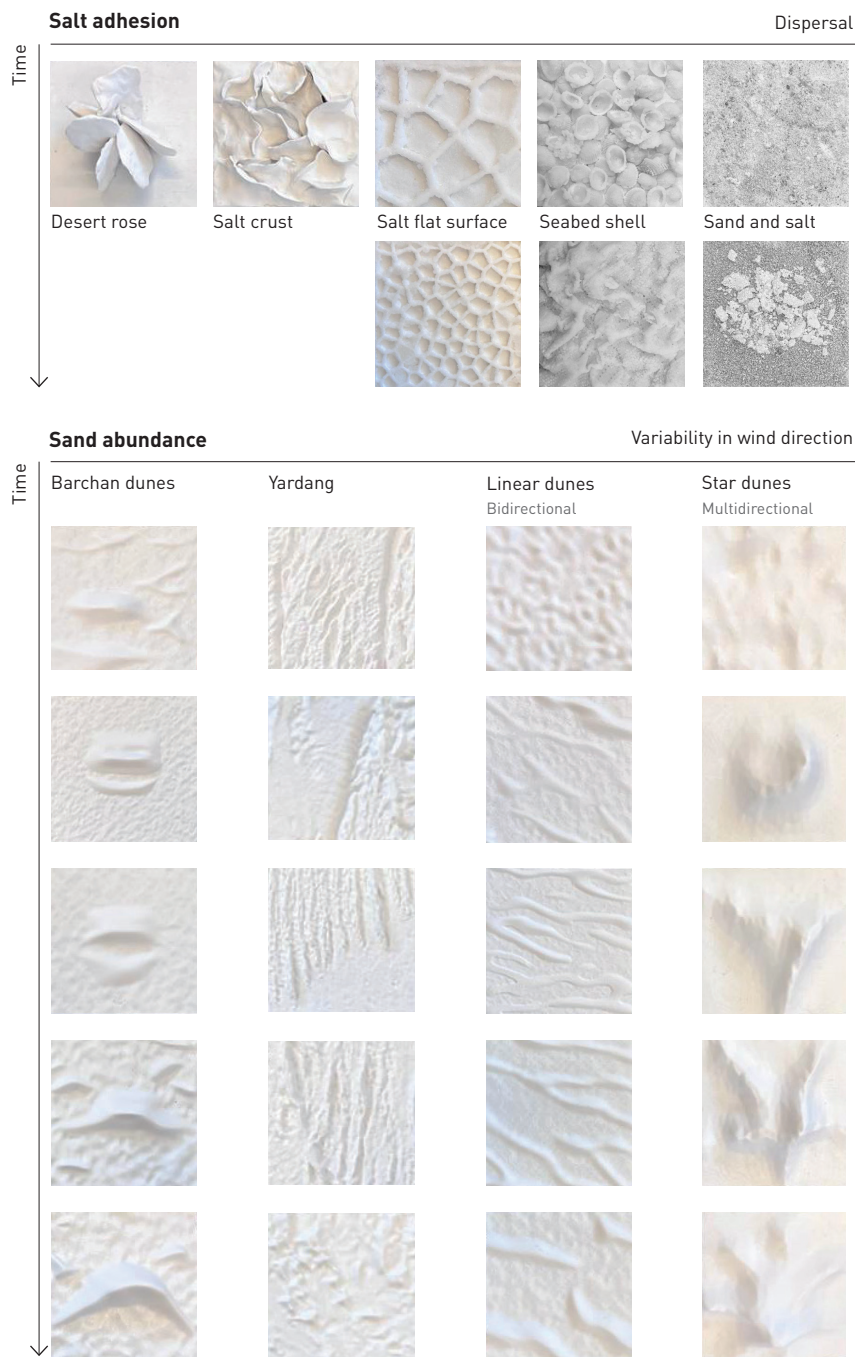
Geoengineering presents an alternative approach to addressing landscapes altered by human activities. For instance, Owens Lake, which, like the Aral Sea, is a drying lake threatened by severe dust storms. The region has adopted geoengineering-heavy waterless dust control measures that might provide valuable references for similar interventions in the Aral Sea. These measures include managing vegetation and designing tillage and sand-fence arrays for dust control and the retention of the lake, albeit requiring continuous maintenance to curb dust storms effectively. Such projects face criticism for their anthropocentric focus, neglecting the potential for symbiosis with non-human entities. Non-human as agencies is a concept from New Materialism advocated by Jane Bennett, Bruno Latour, and other anthropologists. They hold that all living things, abiotic chemicals, materials, and energy processes can impact and shape our environments^[8], acknowledging that humans are not in control of every aspect of the world in the Anthropocene.

Thus, designing anthropogenic landscape calls for a more inclusive approach that actively embraces coexistence with non-human entities.

This perspective emphasizes reevaluating landscape interventions to foster ways of mourning ecological loss, suggesting that material performance studies and collaboration with non-human agencies could inform a new aesthetic for designing landscapes amidst ecological decline. This approach advocates for transforming ecological guilt into appreciation and, eventually, propels a deeper connection with non-human entities as a means to navigate ecological grief.

2.2 Learning “Ecognosis”

In *Dark Ecology: For a Logic of Future Coexistence*, Timothy Morton introduces “ecognosis” that encapsulates a process of “becoming accustomed to strangeness”^[9]. Given the new normal of ecological extinctions, he advocates for a shift from depression to ecological awareness, urging a reimagination of human existence that incorporates the non-human realm at the “earth magnitude,” instead of moralistic illusions of destruction. This perspective challenges us to accept and adapt to the unsettling coexistence with the non-human.



3. Material catalog of the Aral Sea.
 4. Performance of sand under simulations of the sand table test.

3 Material Performance of the Aral Sea

Incorporating insights from anthropologist Anna Tsing, this article emphasizes designing non-human entanglement, i.e., to “recognize the liveliness of the material through the liveliness of our knowledge apparatuses for engaging with it”^[10]. With the emergence of new lands from the desiccated Aral Sea, and new materials of salt, dust, and sand traversing the region, it is necessary to understand

the material performance (Fig. 3).

The development of Anthro-po-markers relies on the natural processes of the Aral Sea, particularly focusing on how salt and sand contribute to the area’s changing topography. Lessons from the Owens Lake show how salt crystallization and crust formation can mitigate dust storms by trapping moisture in the lower layer while forming salt surface^[11].

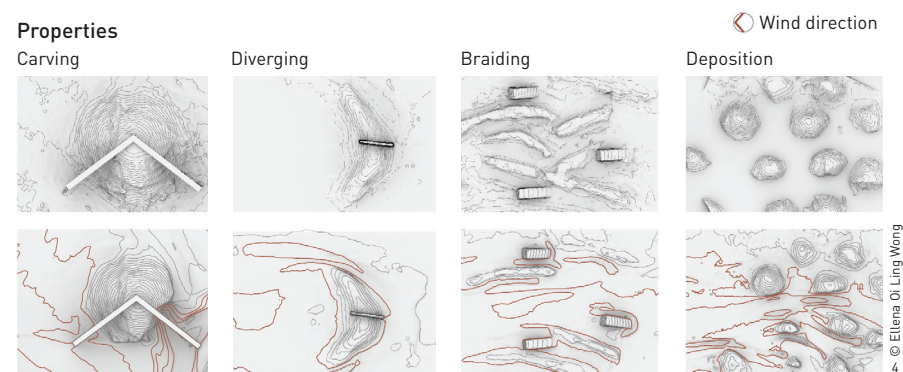
Meanwhile, the evolving desert floor of the Aral Sea, creates both depositional and erosional landforms based on wind directions and the abundance of sand, including barchan, linear, and star dunes, as well as common yardangs near the Aral region^[12].

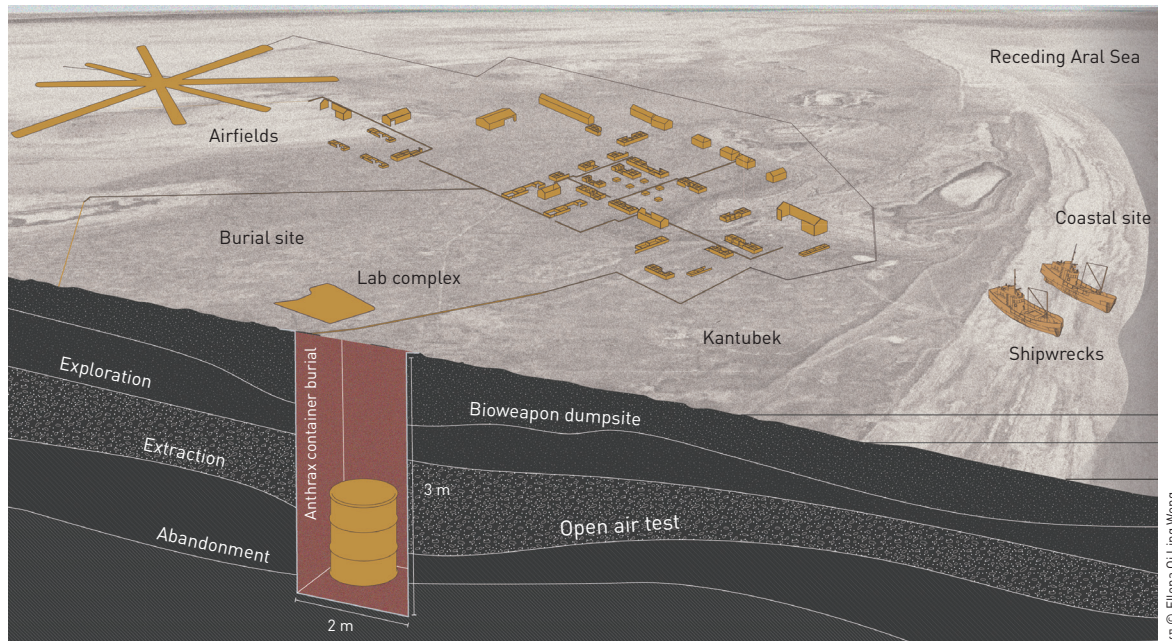
These processes informs the design approach for the demise of the Aral Sea, which aims to highlight the aesthetic of the landscape by developing experiences that encourage “noticing, exploring, wondering in, and learning about the surroundings”^[13]. Using sand table tests that simulate wind forces, this project explores how various wind-related interventions affect landscape formation and examines the resulting spatial qualities. Four properties of carving, diverging, braiding, and deposition emerge, guiding the design aesthetic and language representing the Aral Sea’s ecological shifts (Fig. 4).

4 Designing the Aral Demise

4.1 Site and Stakeholders

This project introduces a series of Anthro-po-markers for the transformation of the Aral Sea. Collaborating with potential organizations such as German Corporation for International Cooperation (GIZ), the Aral Sea Fund by the German Federal Foreign Office, the initiative seeks to mitigate dust impacts and address ecological grief, emphasizing synergy with non-human elements. Local forestry and farmers, as well as local ecological restoration






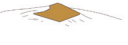

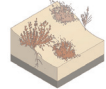



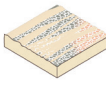









5. Site condition of Vozrozhdeniya Island.
6. Design strategies of the anthropo-markers.

and reconstruction, will benefit from the suggested strategies.

One focus of the project is the Vozrozhdeniya Island (Rebirth Island) straddling the border of Kazakhstan and Uzbekistan within the Aral Sea. It is previously a clandestine bioweapon test site^[14]

and now exposed due to the receding waters (Fig. 5). In the past, tourists have approached this location without being informed of the site's hazards. Thus, the project prioritizes the safekeeping of this historically and ecologically sensitive area, proposing design strategies that secure the buried toxins and promote ecological restoration like accumulation of soil. Highlighted intervention sites include the burial site (Aralsk 7) and a coastal zone impacted by the lake's retreat, aiming to memorialize the site's complex legacy while safeguarding against its hazards.

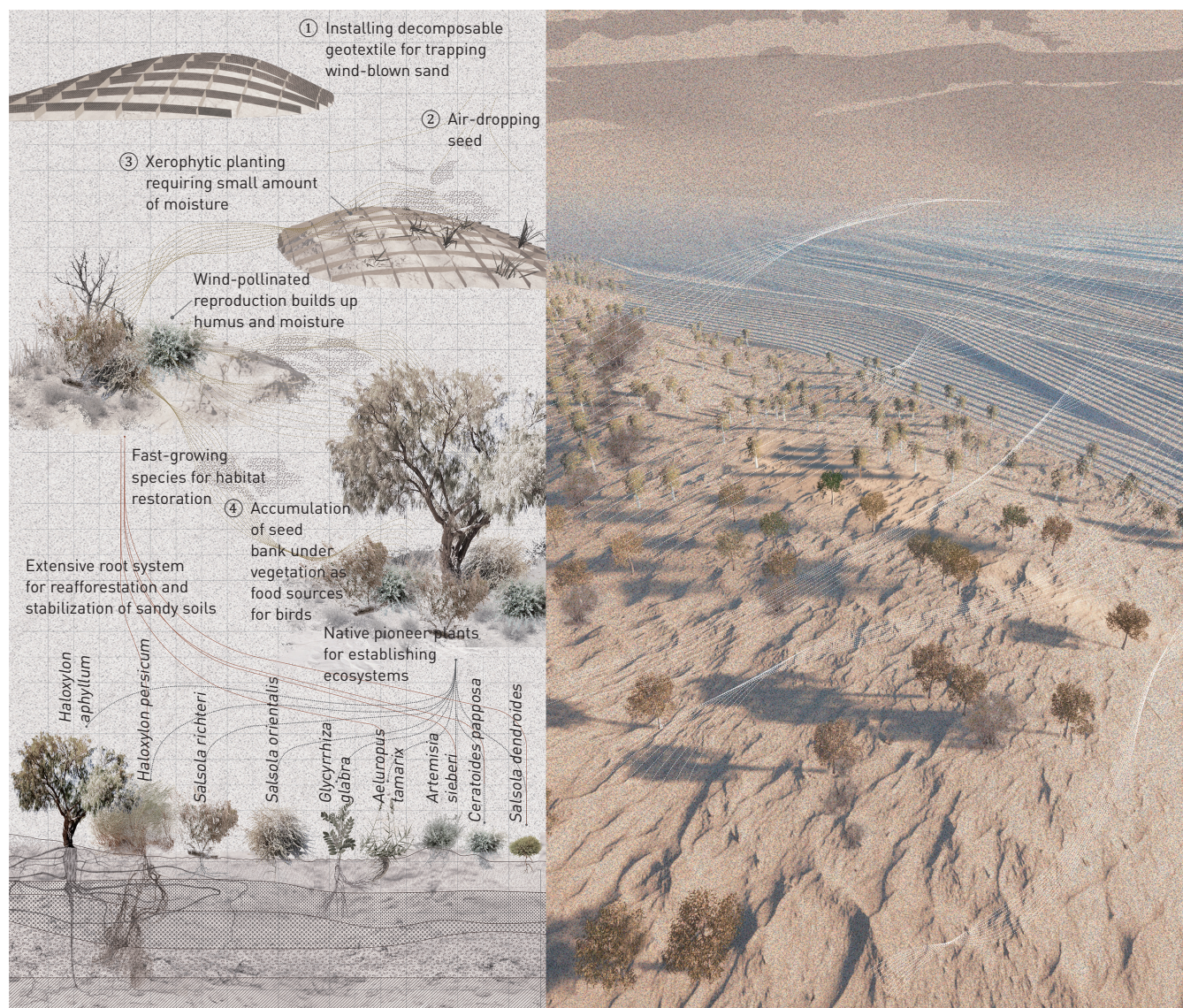
Site feature	Approach	Material	Design program	Travel mode
 Airfield	→ Stasis	 Sand	Maintain the status quo	 Air
 Bioweapon burial site	→ Accumulation	 Sand and vegetation	 Saxaul and licorice plantation greenbelt	 Air
 Receding sea water	→ Slowing down	 Salt	 Brine pools  Tillage	 Bus  Walking
 Shipwrecks	→ Amplifying decay	 Rust	 Shipwreck salt installation	 Walking

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4.2 Strategies of Setting up Anthro-po-markers

This proposal introduces strategies of “Anthro-po-markers” for the Aral Sea advocating for humans to be an integral part of the alliance between humans and non-humans—in other words, to focus on evolving in ruination rather than attempting to halt it. In the design of anthropogenic post-human landscape for the Aral Sea, we can make human devastation noticeable by revealing the slow death of the lake. These markers shall be memorials and educational tools guiding us to properly adapt to Aral Sea's evolving ecosystem. They aim to document the gradual ecological changes, fostering new forms of coexistence between humans and non-humans, as well as highlighting the significant impact of human activities on the planet.

This project integrates local materials, including salt-tolerant plants, sand, water, and iron, honoring the site's inherent characteristics. It outlines four strategic approaches—stasis, accumulation, slowing down, and amplifying decay—to developing Anthro-po-markers with respective design programs and travel modes (Fig. 6).



7. Sand-capturing dunes.

4.2.1 Stasis—Existing Anthro-marker

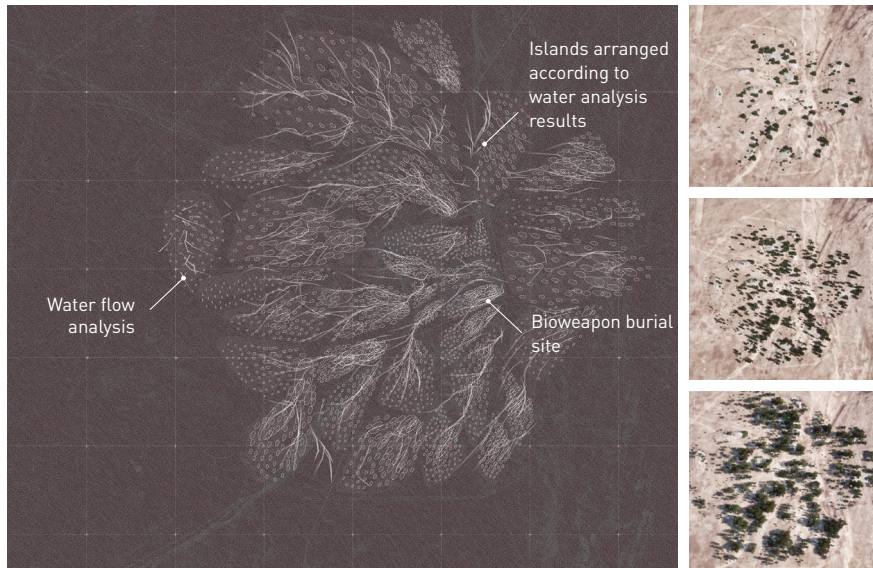
This strategy identifies an existing star-shaped airfield as an Anthro-marker, highlighting its historical role in bioweapon testing. By preserving this airfield, the project designates it as a monument that underscores the extent of human intervention in the area.

4.2.2 Accumulation—Ecological Markers of Sand-capturing Dunes

The strategy of accumulation can be adopted in the bioweapon burial site and Aral Sea shores to form an evolving ecological marker in the meadow Solonchaks^[15]. They are sand-capturing dunes each 10 m in height and 30 m in width. This involves deploying machinery to spread a decomposable geotextile sand net over the area, designed to capture wind-blown sand and facilitate soil accumulation at low points based on historical water

flow. Seeds of salt and drought tolerant plants are then dispersed by airdropping to encourage plant growth. Supported by wind pollination, seed reproduction will contribute to the enhancement of humus and moisture retention, thus promoting the formation of seed banks beneath shrubs, solidifying the sandy, saline terrain (Fig. 7).

This strategy relies on non-human agencies such as wind and drought-resistant halophytes for soil deposition and habitat restoration^[16], gradually creating thousands of islands that serve as ecological markers of the rejuvenated landscape and allowing a self-sustained ecosystem to expand (Fig. 8). These processes symbolize a transition of the site from desolation to renewal where ecological markers shall cover the toxic ruins and form a new legacy, and the established islands along the old access road shall become new windbreaks, and new landform formations.



recesses, each spanning 50 meters in width and half a meter in depth. Evaporation leaves behind a dense brine, crafting a protective salt crust over the underlying soil (Fig. 9).

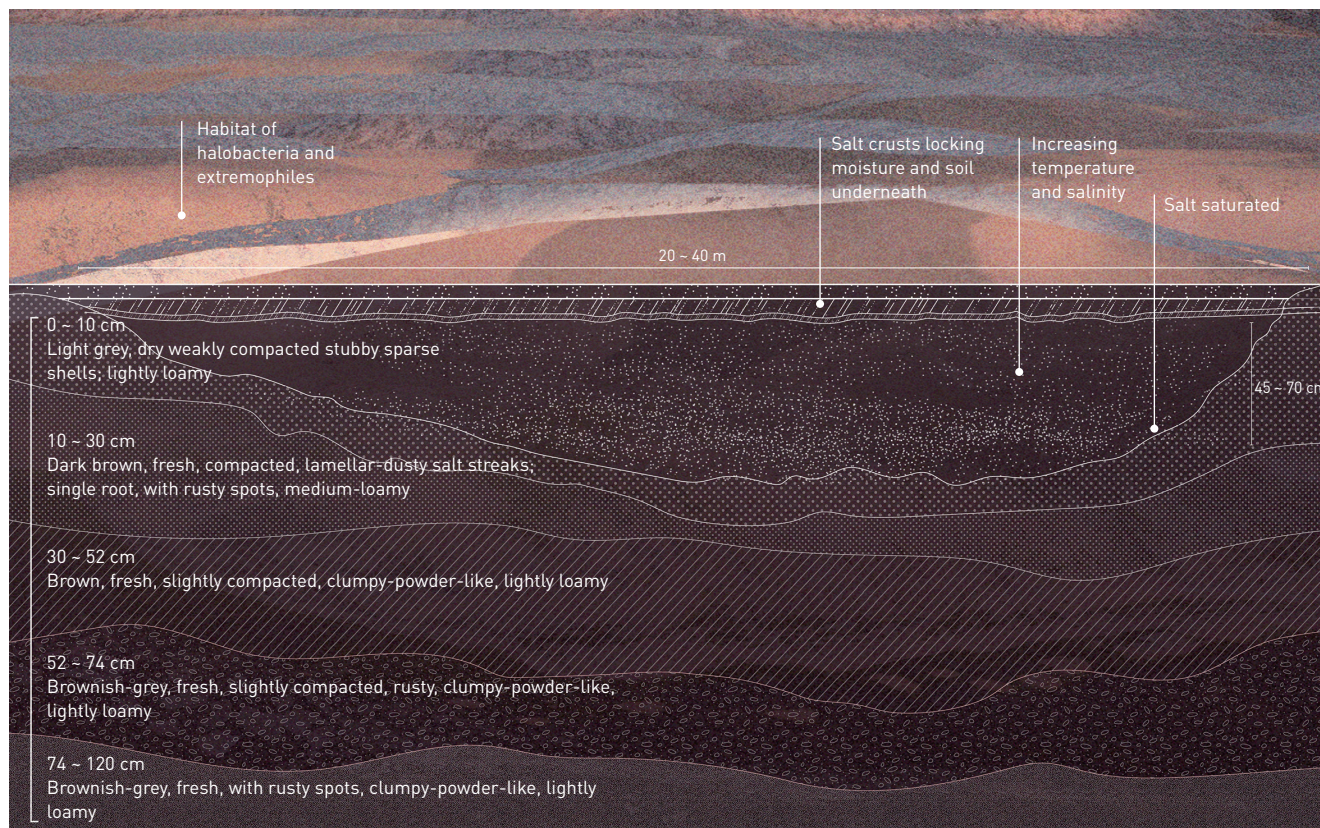
The project envisions a unique ecosystem emerging around the brine pools, supported by the thriving halobacteria and halophilic microorganism community. As the depth of the brine pools increases, a gradient of colors becomes visible. This micro-habitat, nestled between the salt crust and brine pool, provides a sanctuary for various arthropods. The newly formed protective crystalline crust effectively locks soil and moisture below, fostering a salt microbe spa for life to adapt to and thrive under extreme conditions (Fig. 10).

4.2.4 Amplifying Decay—Shipwreck Salt Marker

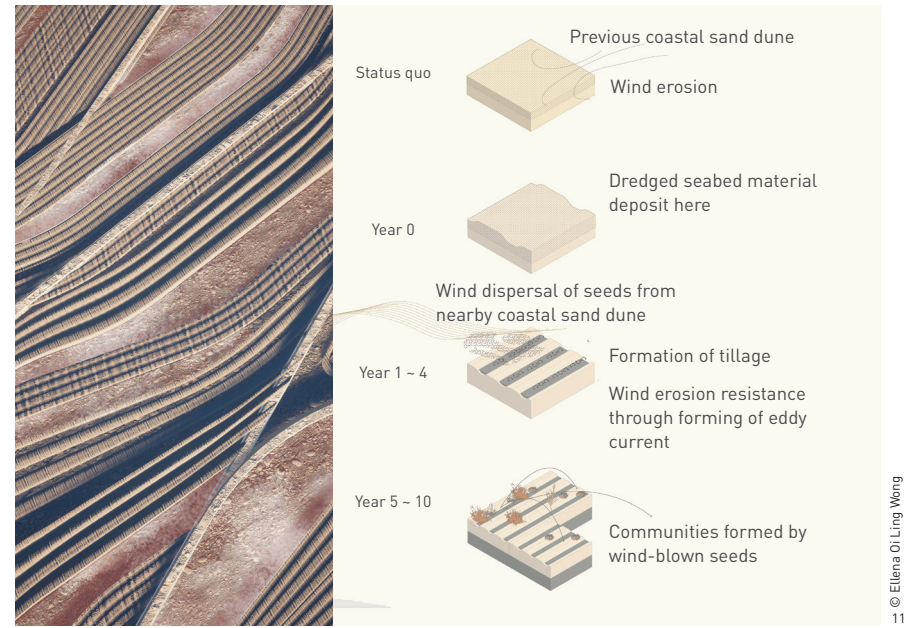
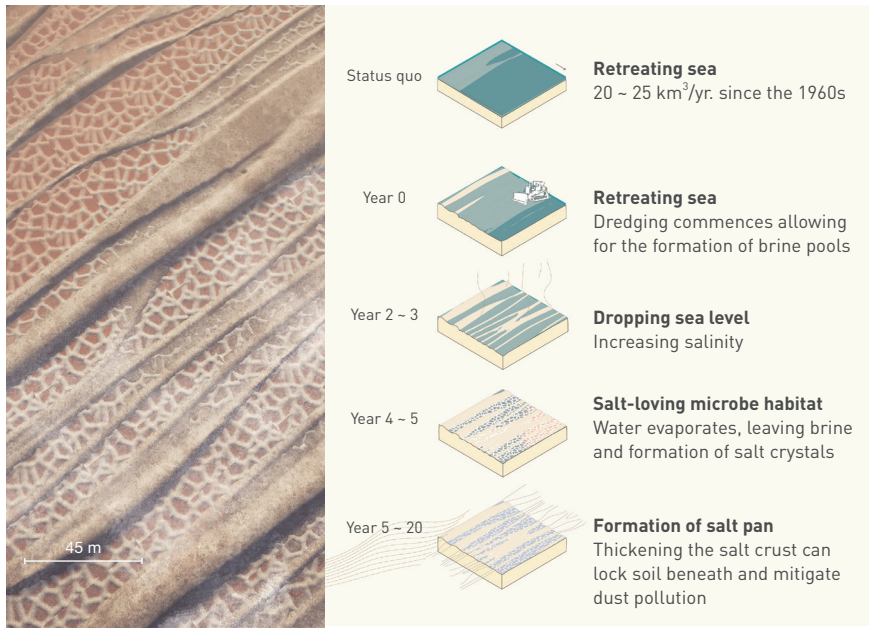
Within these brine spa pools are the vestiges of shipwrecks, which now undergo a unique transformation. The high saline content of the brine accelerates the deposition of salt on these wrecks, hastening their corrosion and decay, ultimately morphing them into distinctive salt sculptures. During this process, these shipwrecks become unique salt markers in the brine pools (Fig. 10). The intensified decay of the shipwreck indicates the magnitude of past destructions and the power of the non-human agencies such as salt.

4.2.3 Slowing Down—Brine Pool System

To mitigate the spread of salt, dust, and pesticides along the shrinking shoreline, the project takes cues from the dust control tactics employed in Owens Lake, integrating brine, gravel cover, braiding ridges, and tillage design^[17]. The goal is to lessen desiccation effects by constructing brine pools in the seabed's



8. Growth of the ecological markers.
9. Section of the brine pool systems.
10. Overview of the brine pool system.
11. Tillage mounds along the retreating pattern of the Aral Sea.
12. Overall section of the strategies.



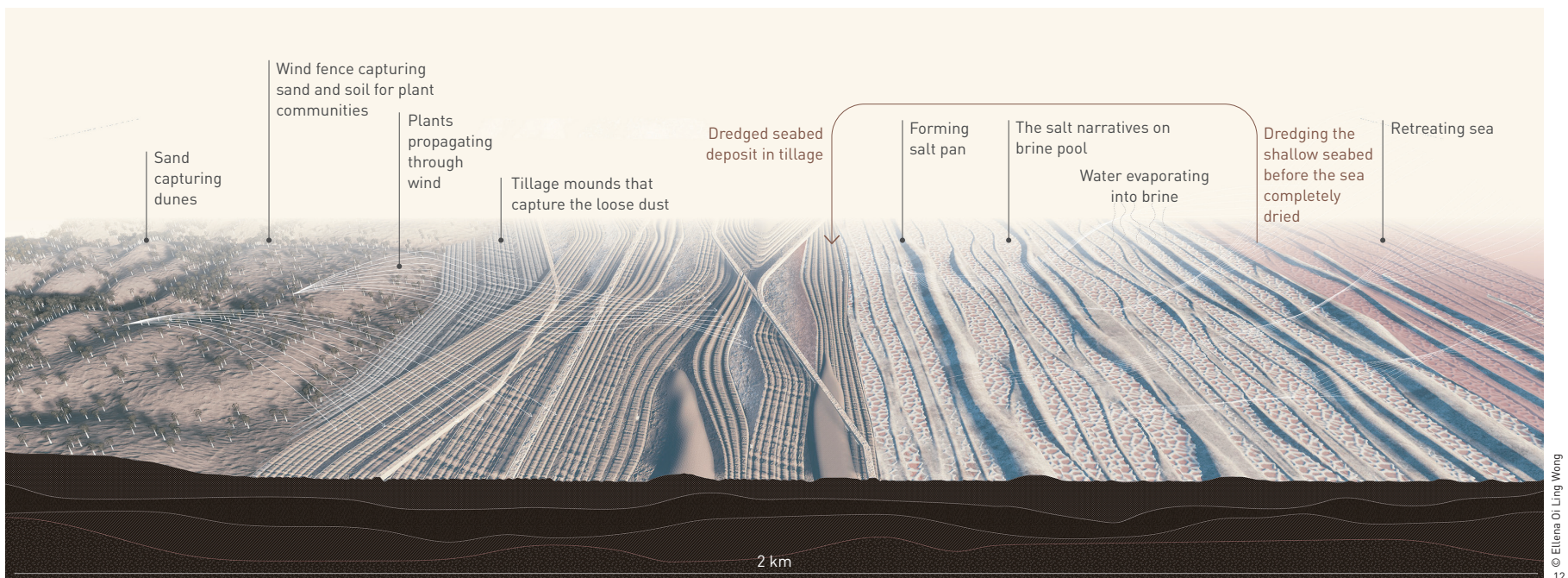
4.2.5 Tillage Mounds of Resistance and Erosion

As tractors traverse the site, creating a landscape of furrows and trenches, the soil excavated from the seabed can be strategically placed beside brine pools to form tillage areas. This process follows the patterns of the receding waters, marking another aspect of the Aral Sea's legacy. By roughening the soil surface and generating turbulent eddy current, these areas not only reduce wind speed at ground level, enhancing resistance to wind erosion^[11], but also act as traps for airborne soil particles (Fig. 11).

Collaborating with the non-human agencies, all these markers collectively foster a system that gracefully transitions the Aral Sea into new life forms, marking a beautiful end and a new beginning (Fig. 12).

5 Discussion

There are numerous fragile, vanishing, anthropogenic yet beautiful landscapes like the Aral Sea. These new sublime



landscapes, marked by their impurities, demand a novel aesthetic appreciation, attention, and remembrance. Through design intervention, this project aims to demonstrate the transformative power of materials and their ability to reconnect us with these fading landscapes. The proposed design—encompassing ecological markers, brine pools, tillage mounds, and sand-capturing dunes—seeks to address the ecological grief.

The design initiative for the Aral Sea's demise explores approaches to reconceiving landscape at different scales, from microscopic level of the halophilic organism to regional scale of salt flats. It is crucial to acknowledge that landscapes are defined not solely by their scale, but also by their material performance, which is frequently underestimated. Across various scales, micro, human, or mega, each material contributes significantly, necessitating human comprehension and collaboration. As we move forward, the new legacies we create, in partnership with non-human entities, ensure that life in its diverse forms continues to flourish.

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REFERENCES

- [1] National Aeronautics and Space Administration. (2012, July 18). *Aral Sea*. Landsat Image Gallery.
- [2] United Nations Educational, Scientific and Cultural Organization. (2020). *Aral Sea and the Aral region*. UNESCO Tashkent Office.
- [3] Lioubimtseva, E. (2014). Impact of Climate Change on the Aral Sea and Its Basin. In: P. Micklin, N. V. Aladin, & I. Plotnikov (Eds.), *The Aral Sea*. Springer Earth System Sciences.
- [4] Wismayer, H. (2022, August 29). *The Lessons of Uzbekistan's Lost Sea*. The Washington Post.
- [5] Cunsolo, A., & Ellis, N. R. (2018). Ecological grief as a mental health response to climate change-related loss. *Nature Climate Change*, (8), 275–281.
- [6] Barnett, J. T. (2022). *Mourning in the Anthropocene: Ecological Grief and Earthly Coexistence*. Michigan State University Press.
- [7] Greenberger, A. (2022, August 31). *Michael Heizer's 'City,' explained: Why the world has its eyes on one of the biggest artworks of all time*. ARTnews.
- [8] Dürbeck, G., Schaumann, C., & Sullivan, H. (2015). Human and non-human agencies in the Anthropocene. *Ecozon@*, 6(1), 118–136.
- [9] Morton, T. (2016). *Dark Ecology: For a Logic of Future Coexistence*. Columbia University Press.
- [10] Tsing, A. (2019). When the Things We Study Respond to Each Other: Tools for Unpacking “The Material”. In: P. Harvey, C. Krohn-Hansen, & K. G. Nustad (Eds.), *Anthropos and the Material* (p. 221). Duke University Press.
- [11] National Academies of Sciences, Engineering, and Medicine. (2020). *Effectiveness and Impacts of Dust Control Measures for Owens Lake*. The National Academies Press.
- [12] National Park Service. (2022, December 1). *Aeolian (Dunes) Landforms*.
- [13] Meyer, E. K. (2008). Sustaining beauty. The performance of appearance. *Journal of Landscape Architecture*, 3(1), 6–23.
- [14] James Martin Center for Nonproliferation Studies. (2021, November 16). *Vozrozhdeniye Open-Air Test Site*. Nuclear Threat Initiative.
- [15] Issanova, G., Abuduwalli, J., Tynybayeva, K., Kalybayeva, A., Kaldybayev, A., Tanirbergenov, S., & Ge, Y. (2022). Assessment of the soil cover in the dried Aral seabed in Kazakhstan and climate change in the region. *Water, Air, & Soil Pollution*, (233), 525.
- [16] Breckle, S.-W., Wucherer, W., & Dimeyeva, L. A. (2011). Vegetation of the Aralkum. In: S.-W. Breckle, W. Wucherer, L. A. Dimeyeva, & N. P. Ogar (Eds.), *Aralkum—A Man-Made Desert* (pp. 127–159). Springer.
- [17] Los Angeles Department of Water and Power. (2013). *Owens Lake Master Project*.

设计消亡中的威海 ——人类世背景下景观美学与效能的融合

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摘要

本文以威海作为景观设计干预的场地, 探索在不可逆的人为损害环境的背景下, 景观设计师应该如何巧妙地融合美学与效能, 使逐渐消逝的湖泊在人类世背景下以尊严和美感谢幕。文章提出, 针对威海的设计方案不仅旨在保留其现有部分, 更在于赋予正在消失的景观新的生态价值和意义。本研究认为, 在对遭遇人为破坏的景观进行设计时, 应着重思考如何使人类清晰地认识到自身对土地的影响, 并通过设计手段来纾解人们因环境退化而产生的生态悲伤。本文强调, 设计过程必须考量“非人类因素”及其作用, 从而更全面地应对挑战。

在针对威海的设计方案中, 本文提出了一系列创新措施, 包括构建盐池系统、实施耕作措施、建造捕沙沙丘和设置生态标识。设计拟采用场地中的自然资源(如沙石和自然盐等无机材料)和植被等有机材料, 以减缓威海的消亡。

本文深入探讨了应对威海生态悲伤的设计策略, 倡导景观设计不仅要解决问题的角度出发, 还应深刻理解非人类因素对于景观效能的影响。文章突出了人类世背景下与环境 and 物质共存的必要性, 通过探讨场地中的物质作为非人类因素在景观效能中的角色, 推动从以人类为中心的景观保护观念向感激自然界所有组成部分的态度转变, 消解对生态破坏的罪责感及人类作为环境保护唯一媒介的无力感。设计中采用的地球工程学方法和对沙漠材料性能的研究, 展现了景观设计如何能与威海的自然元素和材料互动, 以营造一种超越人类中心主义的美学视角。文章的核心目标在于通过设计激发人们对生态的新认知, 使人们在人类世背景下深刻体会威海的消逝, 并通过突出自然元素的效能来缓和这一消逝过程, 开辟新的生态可能性。

关键词

人类世景观; 景观美学; 非人类纠缠; 威海; 沙漠化; 生态意识; 生态悲伤

文章亮点

- 通过设计消逝中的威海, 挑战了传统的环境保护方式
- 维持人类世背景下景观美学的途径之一是呈现人类对景观的影响
- 就地取材并优化威海自身的物质效能, 以应对生态悲伤
- 提出建立盐池系统、实施耕作措施、建造捕沙沙丘和设置生态标识等设计策略

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