



Land Art Reimagined: Confronting the Climate Century

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Abstract

Every day, more people are being impacted by climate change. Scientific evidences proves the growing effects of global warming although action and the creation of social responses to climate change are challenging. The majority of people are trailing behind in taking action because of the challenging issues in their comfort zone. The creation of social awareness in order to generate demand is crucial then ever. Art is now the most important factor for collective action. Along with climate change art, contemporary approaches to land art are emerging as an important social awareness driver of climate action. Within the scope of the research, it is aimed to investigate contemporary and traditional land art projects comparatively and to identify the components of land art that can be integrated into contemporary sustainable landscape design.

The research examines contemporary approaches to land art and uses a mixed method. First, the link between land art and climate change was evaluated. Second, the role that land art can play in the landscape as climate action becomes more prominent was examined. Ten land art cases were then examined on a comparative matrix to identify what climate-related issues they could address and what elements they could combine them with, such as materials or stakeholders. Nineteen factors were compared between five cases from the 1960s and 1970s, when land art first emerged, and five cases from the 2000s when climate change was at its peak. Consequently, by comparing the contemporary and traditional land art projects, the research investigates at which characteristics of land art have emerged in response to environmental concerns and could potentially be used in sustainable landscape design.

Keywords

climate action; climate change; climate change art; land art; sustainable landscape design.

1. Introduction

1.1 - Climate Change Facts & People Taking Action

Climate change is affecting landscapes. Today it affects people directly more than ever in a century where scientific evidence demonstrates the reality of climate change. The level of carbon in the atmosphere has increased exponentially in the last century (IPCC, 2023), however, the progress on climate change mitigation is relatively stable. Many developing countries around

the world are becoming more and more vulnerable to climate change. Millions of people are forced to migrate. Soon, people will face the effects of the climate crisis on a much larger scale. Awareness can be a key point in understanding global warming, however, the translation of awareness into social responsibility is the most critical step of all.

Until today, various initiatives have been taken to transform the scientific knowledge of climate change

into awareness. For instance, in 2006, the Al Gore documentary 'An Inconvenient Truth' was released to explain the scientific basis of climate change. However, the documentary was criticized by various reviewers as insufficient to mobilize people to take action. At this point, Dunaway (2009), while questioning whether having more information would be effective in mobilizing people, stated that information alone would not be enough and messages with emotional connections may have more impact.

"Even though we know about [climate change], we don't know about it . It's not ingrained in us; it's not part of our culture." (Doll & Wright, 2019; Bill McKibben, 2005)

Although climate data is getting stronger and stronger every year, the fact that people do not believe or act according to such information was discussed in terms of facts and beliefs and is defined as the *psychological climate paradox* by Stoknes(2015). It is emphasized that if the facts are not in line with people's beliefs, they are not stored in the mind. The traditional climate strategy failed because it expected people to change their behavior when given information. As a result, more apathy is observed in people. Especially in developing countries that face climate change head-on, the level of concern about climate change is higher, whereas in developed countries such as the USA or Norway, the level of concern is lower, which is in serious conflict with scientific data. In developed countries, in the fight against climate change, people are being offered a lifestyle change that will take them out of their comfort zones, leading to feelings that are difficult to accept. The most important conclusion to be drawn from these facts is that a new communication channel is required as a strategy for climate change and a radical reorganization is needed (Stoknes, 2015).

Knowledge itself has failed to mobilize people (Doll & Wright, 2019). and stopping or mitigating climate change can only be a result of social action. Accepting climate change and taking measures against it requires social awareness with action following responsibility.

1.2 - Art & Land Art

In the post-industrial era, the way humans live and use land is one of the most important points in confronting climate change. The process, which should be shaped by the actions of very large-scale companies and the sanctions of politicians, is triggered primarily by demand. The most fundamental point is the formation and development of social awareness in order to create demand. At this point, art plays the biggest role.

Art has taken on various roles in the response to climate change in the current century. A new art movement emerged, called climate change art. Trying to draw attention to the climate crisis, it aims to raise awareness. From another perspective, land art is an art form that emerged in the 1960s, shaping the land to raise awareness about environmental concerns. Today, it is being reconsidered with contemporary approaches and gaining a new form that confronts climate change.

Contemporary land art, which is particularly diversified today, draws attention to the many levels of climate change and in doing so becomes part of landscape design. Land art from around the world, such as the contemporary, the Arctic Biennale, high water line, etc., establishes connections between landscape and socio-cultural structure. In addition, in today's world, it is being discussed that art should be carbon-zero (*Julie's Bicycle | Homepage*, 2024). Some competitions investigate the contribution of land art, and energy landscapes, to climate and energy and try to implement the best-selected ones (*Land Art Generator Initiative*, n.d.).

It is a question mark as to which components of land art's contemporary stance it is able to reach out to society and which factors influence it. Since each artist has individual approaches, land art cannot be grouped under general typologies, however, when it is considered as a part of landscape design, it is found to be associated with many components from management to materials. It is a question mark whether the percentage of achieving the goal of the arts that relate to sustainable landscape design factors is comparable. The research aims to derive design principles and strategic guidelines that

explain how contemporary interpretations of land art that have emerged due to environmental concerns can be integrated in a sustainable way into landscape design as climate action. As a result, the following research questions emerge:

- How is the relationship between climate change and land art established based on landscape design?
- How can land art be considered a climate action tool supporting energy-water-carbon cycles?
- Which components can land art respond to which impacts of the climate crisis?
- What are the sustainable design principles and strategies that can be derived from land art projects?

The research follows a three-stage mix method (see Table 1). Firstly, for the depiction of the relationship between climate change and land art established based on landscape design, a literature review was conducted in three different steps. As a result, a theoretical framework was obtained, which resulted in the response of art to

climate change, the new potentials of land art in relation to climate change art, and a diagrammatic approach to interrelations. In the second stage, to identify how land art works as climate action, contemporary approaches with various cases, landscape impact, and sustainability were reviewed in the literature. As a result, assessment parameters were obtained depending on the results of diversity in confrontation, climate action commitment principles of organizations, and goals and indicators.

Further, in order to identify land art components, 10 case studies were examined and a comparison matrix was obtained based on their response to climate change, scale, and components as materials and stakeholders. Finally, to measure the reflection on sustainable design strategies, the cases were evaluated on assessment parameters and the comparison matrix was expanded. As a result, it has been identified how land art as a climate action uses sustainable methods to confront the climate crisis and in which ways these can be reflected in landscape design.

Goals		Method and Tools	Output	
Depiction of the relationship between climate change and land art established based on landscape design	the relation of art & climate change	Literature Review	the response of art to climate change	
	the relation of climate change art & land art		the new potentials of land art in relation to climate change art	
To identify how land art works as climate action	contemporary approaches	Literature Review + CASES	diversity in confrontation	assessment parameters
	landscape impact	Literature Review	climate action commitment principles of organizations	
	sustainability	Literature Review	goals and indicators	
To identify the components of the land art		Case Studies	Comparison Matrix: components, responses, scale	

Table 1. The research methodology.

2. Climate Change and Land Art

2.1 - Climate Change & Art

Art has the ability to evoke emotions, to connect individuals deeply with their environment, and is a tool to strengthen emotional bonds, raise awareness, and strengthen efforts to mitigate the climate crisis. The use of art - illustrations, infographics, visual stories, artworks, images, and much more - can make complex climate science more communicative and help everyone better understand human and ecosystem impacts. It has also been a period of awareness raising, where the talent and power of artists to raise awareness has emerged. Reflecting society and culture, art has an extraordinary ability to tell stories. Artists help integrate climate awareness into public perception, while collaborative art projects involving activists and scientists can bridge communication gaps between different sectors of society (ICPAC, 2023). Analyzing an exhibition that aims to make people associate climate change with their own lives, Dunaway (2009) found that the artworks in this exhibition, prepared in collaboration between artists and scientists, can create new forms of perception. The discussion of social power dynamics and environmental justice, rather than only individual responsibility, creates important points in the relationship between art and climate change.

Moreover, it is possible to say that many artists are activists. Artists produce works to raise awareness and mobilize. Art can also emerge as a rallying point for environmental movements. Furthermore, the use of art as an educational tool in community programs and schools can help students and the community in creative and interactive learning (ICPAC, 2023). Miles (2010), questioning whether contemporary art addressing climate change contributes to a shift in social and individual consciousness, argues that art's effectiveness in confronting public issues and its creative imagination can lead to insights into imagining new social forms. A significant shift in art history occurred in the 1990s when geographers turned to everyday cultural forms to provide insights into the production of space and the content of forms of representation. Compared

to traditional art history, sociological critiques have begun to examine the relationship between art and the conditions of production and absolute values. This shift has led to an increase in the criticism of gendered structures in art and urban planning, as well as an increase in the exploration of their multi-sensory and performative dimensions (Miles, 2010).

Especially since the 1960s, nature and the environment have gained importance as art themes. Using natural materials and techniques, artists such as Richard Long and Andy Goldsworthy have blended the aesthetic aspect of art with environmental conservation. However, these works have often reconstructed nature through cultural frames such as 'landscape', leading to debates about how art can help develop sustainable lifestyles. Goldsworthy's approach to art has evolved to create transitional sculptures with natural materials. In the 90s, the works examined by geographers Matless and Revill were criticized for being limited to an aesthetic point of view, when they could be perceived as a critique of nature against the harms of industrial agriculture. Despite their different geographical locations, two art exhibitions focusing on climate change and environmental themes took place in Aachen and Pittsburgh: *Natural Reality* (1999) and *Groundworks* (2005). *Natural Reality* questioned the difference between the concepts of nature and culture, arguing that nature is a cultural production, while *Groundworks* focused on the connection between nature and society, and sought to bring art together with social processes through the collaboration of artists with communities (Miles, 2010).

The Climate Museum is one of the best examples of art intertwining with climate. It is the first museum in the US dedicated to climate and is described as a home for climate art, learning, and action. At a time when people need shared spaces, the Climate Museum serves through arts and culture programs to welcome and build communities and enable safe and just climate action. Since 2018, the museum has collaborated on 16 exhibitions, organized more than 300 events, and welcomed nearly 170 thousand visitors. The pessimistic

nature of the dominant climate information pushes people into an anxious silence. On the contrary, the museum invites people to be part of a community that talks about climate and takes action. When it is difficult to talk about climate, people say they are taking action through a civil dialog. The museum states that it uses a pioneering methodology and brings together the concepts of art-action-learning. Because art touches emotions, it will break the climate silence and motivate visitors to see their own activism (The Climate Museum, n.d.).

“Art can move us powerfully towards civic activism on climate, enhancing our sense of agency to an almost astounding degree. To have the best chance of doing so, it does not need to be upbeat, but it must be aesthetically strong, interesting, and paired with explicit suggestions for collective and civic (rather than individual and consumer) action.” (Massie, 2023).

While examining the capacity of artworks to raise awareness and mobilize, the relationship between art and representation and intervention is questioned. It is argued that in projects where art is expressed as visual representation, the viewer may still remain in the position of a consumer and cannot be transformed into a real movement. However, in art projects where intervention takes place, it is argued that individuals can be encouraged to take action. On the other hand, there are criticisms that art can remain small-scale in raising awareness. As a result, the difficulty of a large-scale mobilization is emphasized. Art has the capacity to change daily routines and perceptions by questioning the underlying mental structure of problems, rather than directly seeking a solution. Miles (2010) also notes that while these projects can be useful for individual awareness, the real change needs to come from industries and government policies. For art to be a tool for awareness, compromising its aesthetic value and traditional categories may be seen as an acceptable price to pay. However, for art to have a critical and creative function, it is emphasized that art should not be instrumentalized. It is recognized that art has an important role in questioning and transforming existing perceptions (Miles, 2010).

2.2 - Climate Change Art & Land Art

Artistic forms, which have a unique ability to evoke emotional responses, have been identified as a key component in creating cultural change. Although artistic production on climate change has not yet led to widespread social change, art projects continue to be effective in raising awareness through collaborations (Miles 2010). Although climate change art, as a form of artistic expression that addresses the effects of climate change on the environment and society with a holistic approach, has existed for a long time, it gained importance and increased visibility in the early 21st century. Although there is no specific starting date for this artistic expression, a significant increase was observed in the 2000s. Taking many different forms, climate change art meets the need for urgent action through various mediums. These forms and mediums include visual storytelling, geospatial maps, visual arts, performing arts, film and theater, street art, and installations (ICPAC, 2023).

Climate change art is not yet widely recognized as an art period. It is more often treated in the category of land art and environmental art movements. While all climate change art can be said to be environmental art, not all environmental art is climate change art. Environmental art makes visible the place and temporality in which people live and triggers the creation of new strategies to respond to the usual changes in nature. It is also more specifically defined as art that represents the changes in the environment and nature caused by anthropogenic behavior. In 2005, McKibben is recognized as a pioneer of climate change art, as he defined art as a bridge between climate and human experience. Before him, in 2001, David Buckland created a project that sees art as a communication tool that provides an interface between climate science and local communities. Even before that, in 1991, Felica Young founded Earth Celebrations, which aims at social change through participation in the arts (Doll & Wright, 2019).

An important example of climate change art is Chris Jordan's *Running the Numbers: Portrait of Human Mass Culture* art project from the 2000s. With his photo-based series method, Jordan addresses various environmental

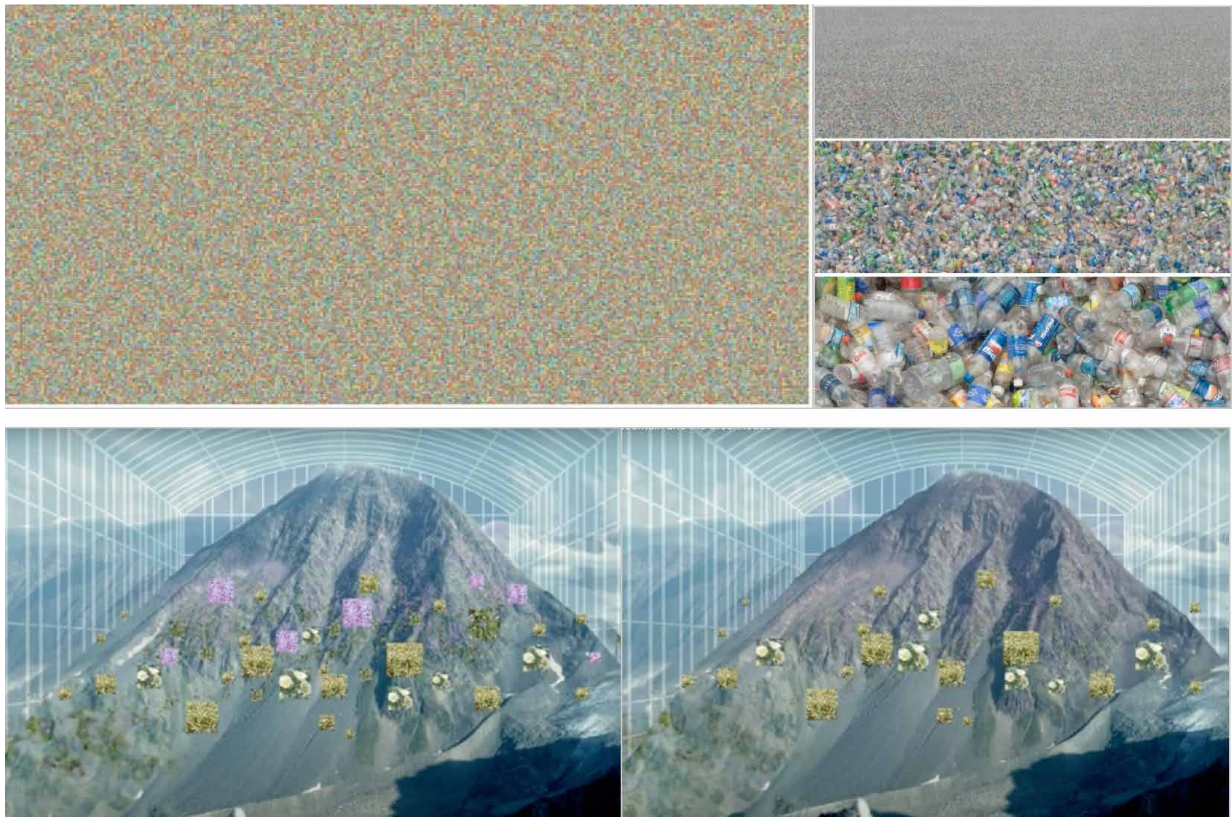


Figure 1. Shipping Containers, Chris Jordan, 2007. (Chris Jordan Photographic Arts, n.d.) and The Mountain in . the Greenhouse, The Harrison Studio (*The Mountain in the Greenhouse - Video – the Harrison Studio*, n.d.).

problems and transforms them into artworks. For example, in *Shipping Containers*, he photographed 38,000 shipping containers (Figure 1). This number defines the containers processed through American ports every twelve hours (Chris Jordan Photographic Arts, n.d.). Similarly, The Harrison Studio's *The Mountain in the Greenhouse* video (*The Mountain in the Greenhouse - Video - the Harrison Studio*, n.d.) analyzes plants on a mountain according to their elevation level. These plants can move up in altitude as the temperature rises. At the same time, however, some plant species are observed to disappear with increasing temperatures (Figure 2).

As a result, it is argued that climate change art is a platform for expressing concern about the future and that knowledge sharing has emerged as a potential solution to climate problems (Doll & Wright, 2019).

Besides, land art, which is accessible by design due to its development outside the boundaries of a gallery, can influence even those who are not intentionally interested in art or who do not visit exhibitions. Land art strengthens social bonds through shared experiences and strives to evoke a shared response without worrying about following current trends. Land art is not only about an aesthetically placed outdoor sculpture. The concept most emphasized by its artists is that land art is site-specific. In this sense, it can be distinguished from portable mobile artworks. These art forms often change as part of nature, transcending the artistic value of their creation. On the other hand, technology is also involved in this process, for the archiving of art through photography and documentation (Fearing, 2019). The creative elements of land art (the use of size, materials and space) began to be discussed towards the end of the

20th century. Artists such as Walter De Maria, Michael Heizer, and Robert Smithson distinguished themselves from traditional sculpture by relating it to the forces and processes of nature. Smithson embodies in his work the dialectic of nature between creation and destruction. He strongly emphasizes the idea of entropy or chaos, as well as how nature undergoes change and metamorphosis. However, Morris argues that the viewer must experience these works with all their senses, as they cannot be fully understood physically (Beardsley, 1982).

Rather than the traditional architectural understanding of space as a physical environment and the project as an intervention in this space, land art, and conceptual art projects show that space is part of the design process. At the same time, it interrogates space as a process of design and production itself and is not only seen as a ground to work on. Seeing space as a combination of imagination, time and place can be envisioned as a way to bring out new ideas in architecture. Space can be created in the mind and become the project itself. In this context, it is predicted that land art will enable the development of new approaches in architecture (Hogue, 2004).

3. Land Art As Climate Action Tool

3.1 - Climate Action Today

Climate action is an inevitable part of climate change nowadays in terms of its social aspect. Today, many entities and individuals, from COP Meetings to various organizations, from non-governmental organizations to artists, are aware that climate change mitigation can be achieved through climate action. The most fundamental and compelling elements in terms of action are the meetings of global organizations and the climate action plans they have signed on climate change. In the last century, although agreements such as the Kyoto Protocol or the Paris Agreement have been signed between governments, it is obvious that action plans with higher enforcement power to mitigate climate change need to be followed. Climate action is also included in the Sustainability Development Goals (SDGs) of the United Nations (UN). Within this context, the research first examines the relationship between

climate action and art, then the path that landscape has followed with global organizations in the context of action, and finally the UN SDGs.

When the current state of the art as climate action is analyzed, it is observed that art is now discussing the concept of net zero. To achieve net zero emissions, studies are being conducted in the field of art, and reports on the carbon footprint of art are being prepared. According to the ART OF ZERO Report, the greenhouse gas emissions of the visual arts are mainly caused by three sources: building energy use, transporting artwork and people, and procuring and selling goods and services. The global carbon footprint of the arts is estimated at 70 million tons per year, of which 26% is accounted for by art shipment, business travel, and building, and 74% by emissions of visitor travel. Digital impacts, which are still small, are increasing (2021). Furthermore, the impact of key profiles on greenhouse gas emissions in the field of art is visualized individually. An assessment was made according to six important parameters: material, art shipment, goods & services, energy, business travel, and visitor travel. Artists, private galleries, public institutions, art fairs, auction houses, private collectors, public funders, private funders, trade bodies, logistics companies, exhibition design, and publications are seen as stakeholders in carbon emissions. These profiles have different activities that cause emissions of climate change.

In terms of land art, new approaches have emerged around the world, especially in the last quarter century. These formations harmonize art with land and try to communicate the effects of climate change through various services and climate action. These can create ecological centers on the axis of architecture, come together with sectoral elements to define a new job, or create international multidisciplinary competition areas.

Established as a cultural ecological center in art, design, and architecture, Climate Action and Visual Culture is able to reach a wider interaction with its ecologically based approaches. Instead of a wasteful economy, the Center emphasizes the need for an economic system change where long-term impacts can be reduced. It

basically aims to achieve two objectives: to understand and interpret scientific knowledge by considering alternative interpretations of data, and to reduce this body of knowledge to a network of information that is free from personal experience. In these ways, artists use a variety of materials to create objects that resonate and tell stories about their ideas, which is defined as the real battle of climate action. It is also emphasized that this battle can only be won or lost through such storytelling (Mateescu & Ahmed, 2019)

From another perspective, pioneering organizations have been created that continue climate action sectorally in arts and culture. For example, Julie’s Bicycle was created in 2006 with the dream that concerts or museums would be equipped with renewable energy sources. It is a leading not-for-profit, directing the arts and culture for climate action, nature, and justice crisis. In 2024 already, they advocated for the Global Call to Put Culture at the Heart of the Climate Policy at COP29 and published the Arts Council England Environmental Programme Annual Report 2023-2024. They co-delivered a pilot with 10 local authorities using the Green Events Code of Practice (*Julie’s Bicycle | Culture & Climate Non-Profit, 2024*).

Furthermore, The Land Art Generator, created in recent years, has brought a whole new dimension to climate action through the relationship between land art and energy. It aims to bring together the disciplines of public art, urban planning, creative installation, renewable energy and environmental justice. It regularly organizes competitions to involve the public in clean energy future designs. The design competitions, open to participants of all ages, seek cultural design solutions for clean energy that address the needs of local communities in the face of climate change through collaborative design projects. In addition, the book *Land Art as Climate Action* contains examples of the results of the competitions held in various years (*Land Art Generator Initiative, n.d.*).

3.2 - Climate Action and Landscape: IFLA & ASLA

According to the International Federation of Landscape Architects (IFLA) having globally 77 Member National Associations, reducing emissions, transforming human civilization, and ensuring the sustainability of the natural environment are the three main ways to address the climate crisis following the IPCC report in 2021. As global citizens, more than 70,000 licensed landscape architects are working to keep global warming to 1.5°C. As a worldwide organization, IFLA has formally ratified the Climate Action Commitment including the six key principles (*IFLA Climate Action Commitment, n.d.*) (Table-2).

Key Principles	The Goal of the Principles
Advancing the United Nations Sustainable Development Goals (UN SDGS)	to repair global ecosystems
Attaining Global Net Zero Carbon Emissions by 2040	to reduce operational and embodied carbon emissions by the landscape architect’s work & to promote multi-modal, greener transportation networks
Enhancing Capacity and Resilience of Livable Cities and Communities	to mitigate the urban heat island effect & to decrease the risks of climate-related hazards
Advocating for Climate Justice and Social Wellbeing	to support the equity, equality, security to food, and right to clean water
Learning from Cultural Knowledge Systems	to work with cultural land management knowledge
Galvanizing Climate Leadership	to lead the built environment & to collaborate with other stakeholders

Table 2. The Key Principles of IFLA Climate Action Commitment and their goals (*IFLA Climate Action Commitment, n.d.*).

Following the adoption of IFLA's Climate Action Commitment at the 26th Conference of Parties in Scotland, the 2030's 1.5 degrees COP26 Communique was signed in Glasgow in 2021 (*American Society of Landscape Architects, n.d.*). In COP26's 1.5-degree actions, it was revealed that buildings are responsible for 40 percent of global carbon emissions and even more with the built environment. Therefore, to meet the 1.5 degrees Paris Agreement target, a 50 to 65 % reduction in carbon emissions by 2030 and a zero carbon emission reduction by 2040 are targeted (*COP26 Communique - 1.5oClimate Actions, n.d.*).

3.3 - UN Sustainable Development Goals: 13th Goal Climate Action

The world is significantly behind schedule in achieving the 2030 Agenda, according to the 2024 evaluation of progress. Just 17% of the assessable targets demonstrate enough development to be accomplished by 2030. Thirty percent indicate negligible progress, eighteen percent show moderate progress, and nearly half (48 percent) demonstrate moderate to substantial departures from the expected trajectory (see Figure 2). Regrettably, 17% are regressing below 2015 baseline levels, and 18% are stagnating. This thorough evaluation emphasizes how urgently increased efforts are required to get the SDGs back on track (*The Sustainable*

Development Goals Report 2024, 2024). Figure 2 shows that goals 1,6 and 13 were not sufficiently achieved in the 2024 report. For the 13th goal, climate action, land art has significant potential. There are significant gaps in important development sectors like gender equality (Goal 5), climate action (Goal 13), peace, justice, and strong institutions (Goal 16), with variations in country data coverage showing up in varied ways across the Goals. The timeliness of data is still a problem as well (*THE 17 Goals | Sustainable Development, n.d.*). A Global Indicator Framework has been established at the UN. In order to fulfill the 13th goal, specific indicators have been identified. Thus, these indicators can be translated into measurable parameters of land art for sustainable landscape design (Table 3).

Parameters and indicators were obtained to evaluate the components of land art for sustainable landscape design, taking into account all climate action examples, the goals of landscape action plans with IFLA and ASLA, and especially the 13th goal of the UN SDGs (Figure 3). A1-A6, B1-B5, C1-C6, and D1-D5 are the basic categories defined by the climate actions. After eliminating the parameters that may be valid for all land art cases, a total of 20 indicators are listed. The 10 land art cases obtained from the 1960s to the present day re analyzed.

Progress assessment for the 17 Goals based on assessed targets, by Goal (percentage)

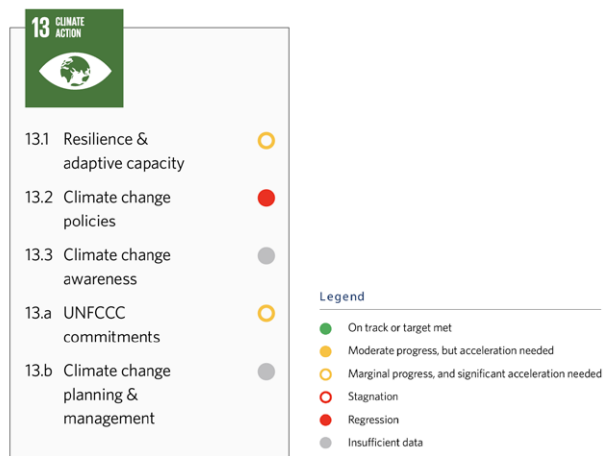
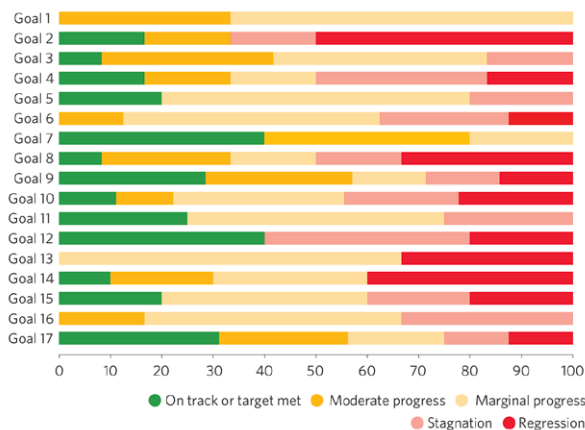


Figure 2. The achievement rate of the targets (*The Sustainable Development Goals Report 2024,* 2024).

Targets	Indicators
13.1 Strengthen resilience and adaptive capacity to climate-related hazards and natural disasters in all countries	13.1.1 Number of deaths, missing persons and directly affected persons attributed to disasters per 100,000 population
	13.1.2 Number of countries that adopt and implement national disaster risk reduction strategies in line with the Sendai Framework for Disaster Risk Reduction 2015–2030
	13.1.3 Proportion of local governments that adopt and implement local disaster risk reduction strategies in line with national disaster risk reduction strategies
13.2 Integrate climate change measures into national policies, strategies and planning	13.2.1 Number of countries with nationally determined contributions, long-term strategies, national adaptation plans and adaptation communications, as reported to the secretariat of the United Nations Framework Convention on Climate Change
	13.2.2 Total greenhouse gas emissions per year
13.3 Improve education, awareness-raising and human and institutional capacity on climate change mitigation, adaptation, impact reduction and early warning	13.3.1 Extent to which (i) global citizenship education and (ii) education for sustainable development are mainstreamed in (a) national education policies; (b) curricula; (c) teacher education; and (d) student assessment
13.a Implement the commitment undertaken by developed country parties to the United Nations Framework Convention on Climate Change to a goal of mobilizing jointly \$100 billion annually by 2020 from all sources to address the needs of developing countries in the context of meaningful mitigation actions and transparency on implementation and fully operationalize the Green Climate Fund through its capitalization as soon as possible	13.a.1 Amounts provided and mobilized in United States dollars per year in relation to the continued existing collective mobilization goal of the \$100 billion commitment through to 2025
13. b Promote mechanisms for raising capacity for effective climate change-related planning and management in least developed countries and small island developing States, including focusing on women, youth and local and marginalized communities	13.b.1 Number of least developed countries and small island developing States with nationally determined contributions, long-term strategies, national adaptation plans and adaptation communications, as reported to the secretariat of the United Nations Framework Convention on Climate Change

Table 3. UN SDGs Global Indicator Framework for 13th Goal (*United Nations Statistics Division, n.d.*)

		Parameters	Indicators	Units
Parameters for quantifying carbon emissions in the arts	A1	Material	type of material	material name
	A2	Art shipment	on site / moving	OS / M
	A3	Goods & services	-	-
	A4	Business travel	artist's travel	Yes (Y) or No (N)
	A5	Energy	Energy producer / energy consumer	EP / EC
	A6	Visitor travel	type of access	Vehicle (V) / Plane (P) / Railway (R)
IFLA Climate Action Goals	B1	Repair global ecosystems	presence of contribution	Yes (Y) or No (N)
	B2	Operational carbon emissions	type of operation	operation name
	B3	Equity - equality - food security - clean water	type of contribution	Ei / Eu / FS / CW
	B4	Cultural and land management knowledge	presence of management	Yes (Y) or No (N)
	B5	Collaborate with other stakeholders	list of stakeholders	stakeholders name
ASLA Climate Action Plan Objectives Selection	C1	Resource guide	presence of contribution	Yes (Y) or No (N)
	C2	Local community	presence of contribution	Yes (Y) or No (N)
	C3	Future communities	presence of contribution	Yes (Y) or No (N)
	C4	Cultural awareness	presence of impact	Yes (Y) or No (N)
	C5	Advocate climate justice	presence of impact	Yes (Y) or No (N)
	C6	Profession's visibility	increase / no impact	I / NI
UN SDGs 13th Goal: Climate Action	D1	Resilience and adaptive capacity	presence of impact	Yes (Y) or No (N)
	D2	Climate change policies	be involved/not	I or No (N)
	D3	Climate change awareness	presence of impact	Yes (Y) or No (N)
	D4	UNFCCC commitments	-	-
	D5	Climate change planning and management	presence of impact	Yes (Y) or No (N)

Figure 3. Land art evaluation criteria table with parameters and units.

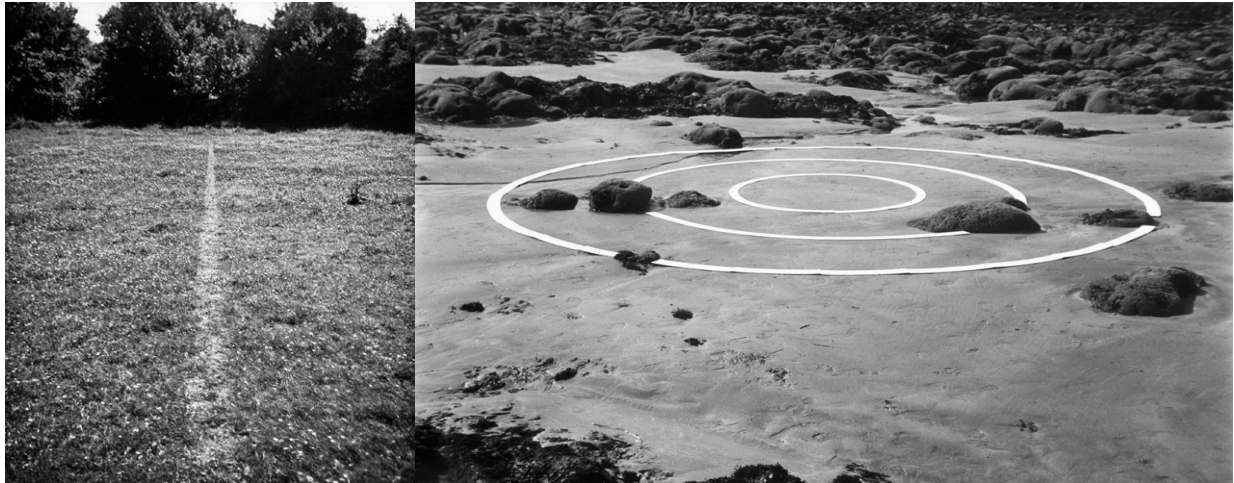


Figure 4. Richard Long's art pieces, 1967 (*Sculptures Gallery*, n.d.)

4. Land Art Cases

4.1 - A Line Made By Walking – Richard Long

Richard Long, who combined elements of ritual and sculpture to create *A Line Made by Walking*, was a groundbreaker in his time. In the 60s, Long was associated with Conceptual Art, Land Art, and the beginnings of Arte Povera. His work is based on walking, blending photography and textual works, sculpture and clay works. Simple shapes and configurations of organic materials are integrated with nature. Realizing that his intuitive work was the beginning of a journey, Long explains that he turned his walks into a line drawn on a map. Initially, Long went into the field without a destination in mind, however by chance, he got off at a rural station and arrived at the site where he practiced his art (see Figure 4). At the time, he describes his close engagement with the reality and space of the landscape as a way of fulfillment. He associates himself with nature, natural and cosmic phenomena, the diversity of space, natural materials, time, movement, and distance (Dacs, 2024). Long's shaping of the spatial experience through certain rules in his walking projects leads to the space gaining meaning through these rules. The idea

that it is the project itself that determines the space perceives space as an experiential process rather than just a physical place (Hogue, 2004).

4.2 - Spiral Jetty – Robert Smithson

Robert Smithson became interested in salt lakes through a book he read. Smithson began to examine the Great Salt Lake in Utah and was impressed when he read about the presence of micro bacteria on the water's surface that gave the water its red color. The artist traveled to lakes and abandoned ports, trying to see the red water. In the end, he chose for his art project the area north of the oil spills, where huge sediments of basalt have formed. He described this area as a spiral that surrounds itself with an enormous roundness, and the spiral jetty emerged from this idea. He describes *Spiral Jetty* as tending to fluctuate depending on where the viewer is and questions the relationship between size and scale. He recorded a movie that depicts these dimensional changes from different perspectives (see Figure 5). In the film, he states that the disparate elements form a unity and lead one to a sense of cosmic detachment (*The Spiral Jetty* | Holt/Smithson Foundation, n.d.).



Figure 5. Spiral Jetty, Robert Smithson, 1970 (*The Spiral Jetty* | Holt/Smithson Foundation, n.d.).



Figure 6. Sun Tunnels, Nancy Holt, 1973-1976 (*Sun Tunnels* | Holt/Smithson Foundation, n.d.) and *Sun Tunnels* [film], Nancy Holt, 1973-1976 (*Sun Tunnels* [film] | Holt/Smithson Foundation, n.d.).

4.3 - Sun Tunnels – Nancy Holt

Working with earth, land, and conceptual art movements, Nancy Holt has been an innovator and pioneer in site-specific installation. As an innovator of the moving image, Holt used the new media of the time and explored systems, place, and perception. She has questioned the place of human beings in the world. She has produced work in a variety of forms. For example, drawings, earthworks, public sculpture commissions, film, and video (*Sun Tunnels | Holt/Smithson Foundation, n.d.*).

The Sun Tunnels are located in the valley of Utah's Great Basin Desert (see Figure 6). Its massive dimensions stretch along the horizon and can be seen from afar. It consists of four concrete structures. These structures are aligned to the summer and winter equinoxes. Their diagonal placement allows them to frame the sun as it rises and sets. Small holes in the concrete structure create projections of constellations in the tunnels. With this work, the artist aims to bring the cosmos down to earth and to the scale of human experience (*Sun Tunnels | Holt/Smithson Foundation, n.d.*). Beardsley (1982), while evaluating Holt's Sun Tunnels, argued that although Earth Art is modernist and innovative, it bears traces of 18th and 19th-century aesthetic values. It is stated that the artists consciously or unconsciously used traditional aesthetics in the process of rediscovering the relationship between nature and human beings.

4.4 - Pratt Farm – James Pierce

Pratt Farm is a private park built by James Pierce between 1970 and 1982 (see Figure 7). The park features sculptures made mostly from piled earth and arranged rocks. Called a history garden, the park contains representations ranging from prehistoric forms such as tombs or burial mounds to more recent forms. It includes different sections such as a large sculpture of Earth Woman and a grass labyrinth. The labyrinth is based on 17th-century topiary art. In 1982, when Pierce left the estate, the management of the garden was left to the farm owners. In 2010, after Pierce's death, the new owners began clearing the land and planting new crops, making Pratt Farm a land art that remains in history (*Pratt Farm | the Center for Land Use Interpretation, n.d.*).

Pratt Farm also has a picturesque quality, inspired by 18th-century garden design in England, and combining natural and historical elements. It is emphasized that Pierce's work combines historical contexts and visual effects Beardsley, 1982).

4.5 - The Lighting Field – Walter De Maria

Born in 1935 in California and trained at Berkeley, De Maria was a visionary in the field of land art, which involved using bulldozers and other tools to dig and form paintings in remote locations, many of which were found in the American West (Dean, 2003).



Figure 7. Pratt Farm, James Pierce, 1970-1982 (*Pratt Farm | the Center for Land Use Interpretation, n.d.*).



Figure 8. The Lightning Field, Walter De Maria, 1977 (*Dia Art Foundation, n.d.*).

In his work *The Lightning Field*, consisting of 400 steel columns stretching one mile long and one kilometre wide in New Mexico, Walter De Maria aims to show humanity's inadequacy in the face of nature's vast scale with his work that attracts lightning (see Figure 8). The order and geometry of the steel poles reinforce the sense of infinity, while the work attempts to combine the randomness of nature with man's search for order in nature (Beardsley, 1982). Constructed in 1977 within a grid of one mile and one kilometer, the work consists of 400 polished stainless-steel poles. The poles, 2 inches thick and 20 feet high, are spaced 220 feet apart (Dia Art Foundation, 2024). The chief curator emeritus of painting and sculpture at the Museum of Modern Art, John Elderfield, in his tour of *The Lightning Field* in 2021, likened the finding and loss of symmetry and the shifts in order between scale, distance, and space to the changes in light throughout the day (Elderfield, 2021).

An endowment created by the Ray A. Graham III and Lannan Foundation, which gave a challenge grant in 1996, helps fund the upkeep and operation of *The Lightning Field*. Dia's Board of Trustees, the State of New Mexico, Helen Winkler Fosdick, De Maria's assistant, and Gucci have contributed funds to ensure the installation's undeveloped grasslands are permanently preserved. The entire structure required reinforcement by 2012. Miuccia Prada and Larry Gagosian, whose gallery

represents De Maria, worked together to spearhead the restoration campaign in order to raise the estimated \$400,000 required to maintain *Lightning Field*. Early in 2013, construction was scheduled to start on the *Lightning Field*, and in June, the sculpture reopened (Vogel, 2012). Therefore, it can be said that the funding needed for the protection of the sites of artworks or the creation of artworks is provided through various collaborations.

4.6 - Ice Texts - David Buckland

David Buckland founded and currently leads the Cape Farewell project in 2001, and it has unexpectedly grown to be an international organization. Two significant films, *Burning Ice* for Sundance and *Art From The Arctic* for the BBC, both produced by Buckland, focused on the work of artists and climate scientists. The idea that art may critically examine the future with some degree of accuracy has been examined and studied, and it has proven to be helpful in addressing the problem of climate change (David Buckland. *Cape Farewell*, 2024). In addition to addressing the climate crisis, more than 300 artists have produced operas, movies, artwork, pop music, and novels that envision a vibrant and sustainable cultural future. The Nevada Museum of Art in the United States is taking possession of the Cape Farewell Archive (Art - David Buckland Art, n.d.). In collaboration with CLIMARTE, an organization that



Figure 9. Ice Texts, David Buckland, 2005-2009 (Art - David Buckland Art, n.d.).

uses the creative arts to draw attention to the effects of climate change, the European Union in Australia is showcasing David Buckland's provocative photographic exhibition, "Ice Texts." In light of the immense challenges posed by environmental change, "Ice Texts" (see Figure 9) highlights the temporary nature of human statements and promotes discussion about how humans affect the climate (Almanac, 2015).

4.7 - High Water Line - Eve Mosher

High Water Line was created by Eve Mosher to make more visible the vulnerabilities of flooding and storm surges, one of the most important impacts of climate change. By drawing a line with blue chalk in a neighborhood or urban area, she creates a public performance that

shows these vulnerabilities (see Figure 10). Eve Mosher designed the High Water Line project in 2007 and in 2011 she collaborated with Heide Quante to create version 2.0. In this way, it was aimed to take ownership of the project through community engagement in other parts of the world. After completing their projects in various cities, Mosher and Quante published the Guide to Creative Community Engagement (see Figure 11) to encourage people to engage in climate projects. The guide introduces the High Water Line project, which uses public performance and art to raise public awareness. It includes a roadmap on how to stimulate creativity through public performance (*High Line Water* | Eve Mosher, n.d.).



Figure 12. The Ice Books: Ice Receding, Basia Irland, 2007 (*Basia Irland - Ice Books Description*, n.d.).

4.8 - Ice Books: Ice Receding – Basia Irland

Basia Irland created her first Ice Book in 2007. These works are created by freezing river water and then carving it into the shape of a book (Figure 12). Inside these ice books, an insert of local seeds is placed. This insert is usually an ecological language or a riverbank text. Finally, the book is placed back into the stream. The seeds are released in the current as the ice melts. Contributors to the release of the ice book into the river vary depending on the location. For example, on the Nisqually River in Washington, musicians, Nisqually Tribal Members, Evergreen State College students and professors, salmon restoration experts, WaHeLut Indian School fifth graders, and Forest Rangers have participated in ice book launches. In New Mexico, college students, artists, acequia majordomos, professors, ranchers, hydrologists, Pueblo members, and hundreds of concerned watershed citizens participated. This work of art emphasized the need for joint efforts and scientific

knowledge. Each riverbank is being worked on together with ecologists, biologists, and botanists. Restoration of an ecosystem can reduce floods and drought by helping to sequester carbon. It can allow other plants to pollinate, disperse seeds, reduce erosion, regenerate soil and act as a filter for pollutants. It provides shelter for riparian organisms, including humans (*Basia Irland - Ice Books Description*, n.d.).

4.9 - Ice Watch – Olufur Eliasson & Minik Rosing

“Today we have access to reliable data that shed light on what will happen and what can be done. Let’s appreciate this unique opportunity – we, the world, must and can act now. Let’s transform climate knowledge into climate action.”

Olafur Eliasson, artist, and Minik Rosing, geologist.



Figure 13. The Ice Watch, Olafur Eliasson & Minik Rosing, 2014 (*Studio Olafur Eliasson, n.d.*).

The Ice Watch served as a tangible reminder that the ice is disappearing (Figure 13). The sea level is increasing. The temperature is increasing. There has been climate change. On the occasion of the release of the UN IPCC's Fifth Assessment Report on Climate Change, twelve massive blocks of ice from the Greenland ice sheet were taken from a fjord outside of Nuuk and transported to Copenhagen, where they were put on display in the shape of a clock in the Town Hall Square from October 26 to 29, 2014. Upon completion of the three-day event, the remaining ice pieces were donated to Copenhagen-area schools (*Studio Olafur Eliasson, n.d.*).

To restart the conversation on climate change, which is now being dominated by the media and politicians, citizen participation is urgently needed. Governments dictating how and when to confront climate change is a deadlock that must be broken since it is obviously too little, too late. The public is made up of groups of people rather than a homogenous mass of people. Faith, love, hope for a brighter future, minimizing risk, inspiration,

and a sense of belonging are just a few of the many factors that influence people's decisions. Governments, politicians, scientists, non-governmental organizations, and the media do not control this discussion. This language should be learned to speak with ease because it belongs to all of humankind. Art can be a way for humans to convey the love and terror of the world around them, as well as the attempts to anticipate and capture the colors, patterns, and movement that is observed. The majority of people are frightened by climate change and paralyzed by the uncertainty around the best course of action. In the end, art is a ray of hope and inspiration that is needed to bring about change (*Studio Olafur Eliasson, n.d.*).

4.10 - Withdrawn – Luke Jerram

Visitors to Bristol's Leigh Woods were surprised to see a flotilla of defunct fishing boats parked deep into the forest in 2015. The sound of the wind among the trees is evocative of the sound of waves, creating a lovely, strange, and poetic scene in the woods. It appears as



Figure 14. Withdrawn, Luke Jerram, 2015 (*Withdrawn* | Luke Jerram, n.d.).

though the tide is turning the boats or that they are all traveling in unison. It was a big question mark how they got there, miles from the sea or whether a shifting shoreline or a retreating tidal wave left them behind or overfishing led to the collapse of fish populations and the business as a whole. Discussions about climate change, harsh weather, declining fish stocks, and human impact on the marine environment were sparked by this interesting and captivating installation. Luke Jerram, a UK artist, created an installation piece titled “Withdrawn” (see Figure 14). The Trust New Art initiative of the National Trust commissioned the project, which was completed as part of Bristol 2015 in collaboration with the Forestry Commission England’s Forest Art Works program. The purpose of the artwork was to be discovered and explored by the general population in the forest. Throughout the summer, a number of activities were held at the installation. The artist purchased the vintage boats from Gumtree and Ebay for a few hundred pounds, deactivated them, and prepared them for display. In order to accommodate performances on board, the decks were strengthened and engines and fuel tanks were removed. To emphasize the boats’ straightforward sculptural features, the rigging was streamlined and stripped down (*Withdrawn* | Luke Jerram, n.d.).

5. Results and Discussion

In the impact of land art as climate action, it is important to compare the examples that emerged especially in the 1960s with the examples that emerged in the years

after the 2000s, when climate change gained agenda. Therefore, 5 examples reflecting the 1960-1970s and 5 examples reflecting the 2000s were selected and analyzed from land art examples worldwide. As given in the land art evaluation criteria table with parameters and units, 10 land art cases are listed in terms of their year, location, and response to climate change (Table 4). As a result of each case analyzed according to the evaluation criteria, as a general evaluation, the following were reached:

Location: Land Art prototypes emerged in the 1970s, especially in the United States. In the 2000s, while there was an increase in the number of northern countries, there were also examples such as Ice Books or High Water Line that aimed to spread to different countries in different years. Thus, it aims to reach more vulnerable areas.

Response to Climate: Although responses to climate change generally did not get very specific in the 70s, in the 21st century, arts that respond to important issues in climate change such as sea level rise, watershed restoration, and ice melt are being developed.

Material: Organic materials were used in most of the land art cases. Especially in the early examples, the harmony of the organic material with the site was found to be important. In contemporary cases, the material was sometimes tried to be reduced to the simplest, such as chalk, and sometimes contemporary technologies such as projection were utilized.

Art & Artist	Year Location	Response to	A1 Material	A2	A4	A5	A6	B1	B2 Operations	B3	B4	B5 Stakeholders	C1	C2	C3	C5	C6	D1	D2	Components
A Line Made By Walking <i>Richard Long</i>	1967 Ireland	-	organic materials, rock	OS	N	-	R	-	-	-	-		-	-	-	-	+	+	-	individual representation photography exhibition
Spiral Jetty <i>Robert Smithson</i>	1970 Great Salt Lake, Utah, USA.	Salt lakes	the color red, mud, precipitated salt crystals, rocks, water	OS	Y	O	V	+	grading & logistics	CW	+	the artist contractor the Ace Gallery-filming Holt/Smithson Foundation and Dia Art Foundation / Licensed by Artists Rights Society, New York	+	+		+	+	+	-	scientific data on-site observation philosophy - scale design - sketch construction experience filming geopolitics - map
Sun Tunnels <i>Nancy Holt</i>	1973 - 1976 Great Basin Desert, Utah, USA.	-	concrete, steel, earth	M		O	V	-	logistics	-	-	"locator" Holt/Smithson Foundation	-	-	-	-	+	-	-	preparatory drawing production logistics recording: photograph & filming
Pratt Farm <i>James Pierce</i>	1970 - 1982 Middleborough Massachusetts	-	soil and rocks	OS	N	O	V	-	grading	-	-	the owners of the farm	-	-	-	-	O	+	-	private ownership construction
The Lightning Field <i>Walter De Maria</i>	1977 Catron County, New Mexico	the importance of land in modern society	400 stainless steel poles with solid, pointed tips, arranged in a rectangular 1 mile x 1 kilometer grid array the land the light	OS		O	V	-	pile driving	-	-	the Dia Art Foundation Ray A. Graham III and Lannan Foundation Dia's Board of Trustees, the State of New Mexico, De Maria's assistant Helen Winkler Fosdick, and Gucci. Larry Gagosian and Miuccia Prada	-	-	+	-	+	+	-	frame - landscape construction funding experience
Ice Texts <i>David Buckland</i>	2005 - 2009 The Arctic	ice melt	digital projection	M	Y	EC	S	-	projection	E	+	Cape Farewell Project Movies Climarte	+	-	+	+	+	-	-	shipping projection recording photo & video

<p>High Water Line Eve Mosher</p>	<p>2007 NY 2012 Miami 2014 Bristol 2014 Philadelphia 2015 Delray Beach</p>	<p>Sea level rise Flood Storm surge</p>	<p>blue chalk and field marker</p>	M	N	-	O	-	-	-	+	<p>people - citizens translators science language community outreach coordinators permits coordinator workshop coordinators & instructors volunteers coordinator logistics coordinator photographer/ videographer community leaders schools & universities media spokespeople</p> <p>Creative Common Attribution - Non-Commercial 4.0 International Project</p>	-	+	+	+	+	+	-	<p>scientific data - resources creating a team licensing creative community engagement selection of the space-sensitive zones social media timetable permissions (governmental and community) storytelling to build trust translating science into art media plan material management: amount & storage maps</p>
<p>Ice Books: Ice Receding Basia Irland</p>	<p>2007 Colorado 2007 North Carolina 2008 England 2008 Belgium 2008 France 2008 Venice, Italy 2008 Spain 2008 Washington 2009 New Mexico 2009 Missouri 2010 Wes Virginia 2010 Idaho 2010 Iran 2011 Georgia 2012 Canada 2012 Ohio 2013 Wyoming 2015 Netherlands 2017 Canada 2017 Leon, Spain</p>	<p>watershed restoration</p>	<p>ice local native seeds river</p>	M	Y	O	-	+	-	CW	+	<p>students schools</p> <p>the University of Saskatchewan</p> <p>the exhibition, HYBRIS, at the Museo de Arte Contemporáneo de Castilla y León, Spain.</p> <p>the Albuquerque Museum</p> <p>divers photographers</p>	+	+	+	+	-	+	-	<p>local research placing photograph exhibition</p>
<p>Ice Watch Olafur Eliasson and Minik Rosing</p>	<p>2014 Copenhagen</p>	<p>ice melting climate change fact</p>	<p>ice</p>	M	Y	O	-	+	replacement	-	+	<p>public schools</p>	+	+	+	+	+	-	-	<p>harvesting logistics installing dialogue</p>
<p>Withdrawn Luke Jerram</p>	<p>2015 Bristol</p>	<p>sea level</p>	<p>wooden boat</p>	M	N	O	-	-	replacement	E	-	<p>forest inhabitants</p>	-	+	+	+	-	-	-	<p>repairing replacement logistics placement recording</p>

A2: onsite / moving: OS / M, A4: business travel: Yes or No, A5: energy producer /energy consumer / only in construction: EP/EC/O, A6: visitor travel: V vehicle R railway P plane S ship, B1: ecosystem contribution: Yes or No, B2: operations, B3: equity - equality - food security - clean water, B4: management: Yes or No, B5: stakeholders, C1: resource guide: Yes or No, C2: local community: Yes or No, C3: future community: Yes or No, C5: advocate climate change: Yes or No, C6: profession's visibility: increase or no impact, D1: resilience and adaptive capacity: Yes or No, D2: climate change policies: involved or no.

Table 4. The evaluation of land art cases.

Art shipment: Art shipment is evaluated in terms of whether art is produced on-site or mobile and moved. On-site examples can be observed mostly in the first cases, while in artworks such as sun tunnels, it can also be observed that pre-produced structures are moved to the site. In the 21st century, art tools that can be applied to more places are preferred.

Business travel: Business travel usually consists of research trips related to art and the field in which artists work. It may also include scientific field trips.

Energy: The cases analyzed are generally not examples of energy consumption, which can only be mentioned in the construction phases. However, examining examples of land art that produces its own energy can also fill an important gap in future research.

Visitor travel: Often not exhibited in an art gallery, land art is an art form that requires on-site observation. It has a network that is often spread through the media. On-site observation can take place in situations such as a visit to De Maria's work. It is more likely to be an art structure that is experienced by local people or exhibited openly in an urban square, accessible to everyone. Visitor travel is not likely to create a large carbon emission at this point.

Repair global ecosystems: The land art cases that emerged in the 1960s and 70s generally do not have an ecosystem restoration mission. Land art itself does not undertake this mission. However, they emphasize by drawing attention to ecosystem pollutants, which supports these systems. This is how the situation is revealed in many of the land art cases. However, some cases can be repaired while emphasizing ecosystem health: Ice Books.

Operational carbon emissions: Even at Spital Jetty, which aims to be in harmony with nature by using organic materials for on-site production, logistics and grading can cause significant carbon emissions. However, after the construction phase, there are usually no serious impressive operations in land art. Recording and displaying the art can also be a serious operational

challenge. Logistics and replacement operational activities are exposed in the pioneer case.

Equity - equality - food security - clean water: It is possible to say that land art advocates climate equality and the right to clean water in various cases. For example, while Spiral Jetty discusses the water being full of micro-bacteria through various industrial activities, Ice Books emphasizes that the riverside habitat will be revitalized with clean water.

Cultural and land management knowledge: Land art cases often use cultural management tools. Land art cases that interact with the local community particularly incorporate management issues into the art. For instance, High Water Line's guidebook even mentions the permits needed to perform the art or it provides a roadmap on how to plan the performance of the art on a month-by-month basis.

Collaborate with other stakeholders: Working together with various stakeholders is one of the strongest areas of land art. From locators to constructors, from galleries to filmmakers, and from locals to students, many stakeholders are involved in the production, representation, and exhibition.

Resource guide: There is no particular resource guide in the land art cases. Partially, it can be said that land art that touches on topics such as ice melt or river restoration emphasizes resource.

Local community: The local community is one of the strongest features of land art cases. Many examples collaborate with local people and shape their production accordingly. Ice Books is one of the best examples of such collaboration.

Future Communities: The involvement of future communities in land art can often be interpreted as the already existing involvement of the local community. At the same time, many artists conduct workshops with schools and children and form their art accordingly. It can also be assumed that future communities can be influenced by future messages.

Profession's visibility: The profession's visibility can be understood as an increase in the public visibility of landscape architecture. It is possible to say that this has been partially achieved with cases that make good use of various media tools.

Resilience and adaptive capacity: Art's tectonic approach to climate change was assessed in relation to both material use and sustainability of resilience and adaptive capacity. It can be said that it is generally high, however, some cases do not take this into account.

Climate change policies: In no case, it was found that art examples turned into climate change policy.

Components: Land art components can be defined as all the elements involved in the artwork from its design to its construction and then to its presentation to the visitor. Up to the design stage, scientific data comes to the fore. For the accuracy and research of scientific data, many artists spend a long time collaborating with various scientists. Sometimes this is local research, sometimes it is on-site observation. Construction is usually a common component. Then, the most prominent component is the recording of the artifact. Photographing or filming are media elements that are heavily utilized and planned. Emphasis is placed on the experience and dialog that develops through recording.

6. Conclusion

Climate change is affecting more people and landscapes every day. It is a fact that more and more scientific evidence is now available to demonstrate the increasing effects of global warming. However, there are difficulties in taking action and developing social responses to climate change. While most people seem to be in denial about the reality of climate change, the majority of people are lagging behind in taking action due to the difficult challenges in their comfort zone.

Art is emerging as an important field in strengthening social awareness. The most important point in mitigating climate change lies in the transformation of scientific data into a social responsibility. Art is the

most important tool that can transform this information into social awareness through human experience. In recent years, a new art movement has emerged in the fight against climate change as climate change art. This type of art aims to spread the effects of climate change to society. An analysis of contemporary art practices reveals a new world in which net zero carbon emissions are examined in art. Land art, which emerged as a new art form in the 1960s, is seen as a new movement that tries to integrate nature and human beings. Today, various variations of land art address climate change. However, how effective it is in the context of landscape and climate action is a question mark. Within the scope of this research, it is aimed to investigate contemporary and traditional land art projects comparatively and to identify the components of land art, that emerged with environmental concerns, that can be integrated into sustainable landscape design.

In the mixed method research, literature review and case study methods were used. Firstly, the relationship between climate change and land art is analyzed on the basis of landscape architecture. Secondly, how land art can work in relation to landscape as climate action is revealed. Then, on a comparative matrix, 10 land art cases were analyzed to find out which climate-related challenges they can respond to and through which components, such as material or stakeholder. By comparing 5 cases from the 1960s-70s, when land art emerged, and 5 cases from the 2000s, when climate change was at its peak, 19 parameters were compared.

It has been determined that while land art was concentrated in the US in the 1970s, in the 2000s it has been in an effort to spread to more countries and especially to more vulnerable areas. While in the 70s, artworks were created with environmental concerns rather than a serious climate concern, in the 21st century, artworks that respond to the direct effects of climate change such as sea level rise and watershed restoration come to the fore. While in earlier examples, organic material was used with on-site production, in recent years, in addition to organic material, portable and diffusible materials and digital technologies have become prominent. Art shipment has been observed

as a very important parameter in terms of on-site production or movable works. In the first works, where on-site production was predominant, it was possible for portable mobile systems to come into play as contemporary examples approached. At this point, logistics emerged as an important area. Business travel was limited to research trips or scientific field trips in all cases and it has not been possible to say that it creates a large carbon footprint. Being an energy producer or consumer could not be evaluated much through the selected cases. The study of energy-producing land art is seen as an important potential for future research. It is possible to argue that visitor travel to the artworks is also provided by vehicle or railway. However, the fact that most artworks are brought together with the visitor after they are recorded can also change the type of travel. Similarly, it may not be possible to talk about a visitor's travel footprint for artworks exhibited in public squares.

A limited number of land art cases have been found to contribute to ecosystem repair. Emphasis is placed on the causes of damage rather than on repair. Consequently, it creates an indirect impact. Operation is seen as the parameter that may have the largest carbon footprint in land art. Especially in the early examples, when considering the artworks that are transported from the trucks entering the site for grading the land to the site afterward, the footprint remains partial but constitutes the largest share. Although there are examples of land art that exemplify concepts such as clean water and equity, the cases offer more responses in terms of raising awareness.

Since land art is often a localized work, it presents impressive connections and planning governance in the context of cultural land management. One of the most important features of land art that can be included in landscape design is the diversity of its stakeholders. From schools to galleries, from filmmakers to local people, the involvement of a wide range of stakeholders in production and exhibition makes the cases more relevant to the community. The resource guide was not identified as a priority parameter in the cases analyzed. Local communities and future communities emerge

as a collaboration that is especially important in some land art cases. From a forest ecosystem to the largest urban square, the inclusion of the community in art is of great importance. The recording and dissemination of the artworks with the media has been an element that increases the profession's visibility. While resilience and adaptive capacity can be said to be quite high for land art produced with organic materials, it can be said that resilience is also considered in systems where new technologies are included. In the land art cases examined, it was observed that cases aiming for awareness could not be included in a climate policy. All these parameters were evaluated by examining the components of the land art cases. The most important elements supporting the parameters in the components are scientific data and recording.

As a result, comparatively examining modern and traditional land art projects the research investigates to identify the elements of land art that have arisen in response to environmental concerns and can be incorporated into sustainable landscape design.

Conflict of Interests and ethics

The author(s) declare no conflict of interests. The author(s) also declare full adherence to all journal research ethics policies, namely involving the participation of human subjects anonymity and/ or consent to publish.

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