



Empowering pre-primary and primary school teachers' in using and combining Eco-Art for Eco awareness, psycho-social tools and non-formal teaching methods



SEEDS

**Empowering pre-primary and primary school teachers' in using
and combining Eco-Art for Eco awareness, psycho-social tools
and non-formal teaching methods**

MODULE 2

Eco - Art



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the European Union**

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TOPIC 2.1: Understanding the Role of Art in Addressing Environmental Issues and Fostering Sustainability



Figure 1. Ariana Burgess, *Turtle Peace Labyrinth*, recycled concrete debris, living plant material, 2003-2004. Retrieved from: <https://www.teaneckcreek.org/ecoart-gallery>

SUBTOPIC 2.1.1: Introduction to Environmental Art

Environmental art is an interdisciplinary movement that combines aesthetic practice with ecological awareness. It includes both Land Art and Eco-Art, which reflect evolving dialogues between artistic expression and environmental consciousness (Kastner & Wallis, 1998; Gablik, 1991). Land Art, which emerged in the 1960s and 70s, is characterized by large-scale interventions in natural landscapes, often without an explicit ecological intent. Artists such as Robert Smithson and Nancy Holt created monumental earthworks that engage with time, space, and geography, but these projects frequently raise ethical questions about land disruption and resource use (Kwon, 2002; Tiberghien, 1995).

In contrast, Eco-Art is grounded in sustainability and often involves collaboration with scientists, activists, and communities. It uses art to advocate for ecological restoration and environmental justice. For example, artists Helen and Newton Harrison integrate ecological data into their art-making process to raise awareness of issues such as watershed protection and climate change (Gablik, 1991). This distinction between Land Art and Eco-Art fosters critical conversations about the responsibilities of artists in the Anthropocene.



Figure 2. Nils Udo, *The Nest*, earth, stones, silver birch, grass, Lineberg Heath, Germany, 1978. Retrieved from: https://www.instagram.com/p/C_zOwnWx2kD/?utm

In educational settings, environmental art offers students hands-on opportunities to explore the intersection of art, science, and ethics. A classroom project might involve students creating ephemeral sculptures from natural materials found on school grounds, encouraging them to consider the impermanence of nature and their impact on it. Educators may incorporate reflective journaling, where students analyze how their artwork communicates environmental values. Additionally, screening films such as *Rivers and Tides* (Goldsworthy, 2001), which documents the work of Andy Goldsworthy, can spark discussions about material, transience, and environmental perception. Such integrated activities foster critical thinking and environmental literacy, positioning art as both inquiry and advocacy.

SUBTOPIC 2.1.2: Cultural and Social Dimensions



Figure 3. Agnes Denes, *Wheatfield , A Confrontation*, 1982, Retrieved from: https://www.architecturaldigest.com/story/agnes-denes-prophetic-wheatfield-remains-as-relevant-as-ever?utm_source

Environmental art transcends aesthetics to address social, cultural, and political dimensions of sustainability. It often draws upon Indigenous knowledge systems, local narratives, and grassroots activism to reshape public understanding of ecology. For instance, Agnes Denes’s *Wheatfield – A Confrontation* (1982) transformed a landfill in downtown Manhattan into a field of wheat, confronting viewers with questions about land use, food security, and urban development. Similarly, Cannupa Hanska Luger’s work foregrounds Indigenous sovereignty and environmental stewardship, challenging colonial land policies through installation and performance (Luger, 2019).

These projects illustrate how environmental art serves as a catalyst for community engagement and environmental justice. Maya Lin’s multimedia initiative *What Is Missing?* creates a digital memorial for extinct species, using data and storytelling to educate the public on biodiversity loss (Lin, 2009). Mel Chin’s *Revival Field*, developed in collaboration with scientists, uses plants to detoxify soil contaminated by industrial waste, blending visual aesthetics with tangible ecological restoration (Chin, 1990).

In educational contexts, environmental art linked to sustainability can foster ecological literacy and participatory problem-solving. Classroom practices might involve projects where students



map local ecosystems, design installations from renewable or recycled materials, or visualize data on issues such as water use and climate change (Anderson & Guyas, 2012). Such activities encourage learners to approach sustainability not only as a scientific concern but also as a cultural and creative endeavor (Kagan, 2011). By uniting ecological science with artistic exploration, students develop critical awareness of human–environment relationships and cultivate the imaginative skills necessary for envisioning more sustainable futures (Hilgersom, 2010).

SUBTOPIC 2.1.3: Art and Sustainability



Figure 4. Aurora Robson, *Everything All At Once, Forever*, plastic debris (primarily PET), aluminum rivets, and tinted polycrylic with mica powder, 2010. Retrieved from: <https://www.materialdriven.com/blog/2017/3/21/aurora-robsons-cascading-transformation-of-the-plastic-waste-stream>

Sustainable art prioritizes ecological responsibility in both content and process. It emphasizes the use of recycled, biodegradable, or ethically sourced materials and adopts production methods that minimize carbon footprint. The approach encourages a reevaluation of consumerism, permanence, and material value in the art world. Olafur Eliasson’s *Little Sun* (2012), a portable solar-powered light, merges functionality and artistry to address global energy inequality. His design not only reduces reliance on fossil fuels but also empowers communities in off-grid regions through accessible renewable energy (Eliasson, 2012).

Mel Chin's *Revival Field* continues to stand as a seminal example of how art can integrate scientific methods such as phytoremediation to remediate polluted environments, turning formerly toxic land into sites of regeneration (Chin, 1990). These projects exemplify how sustainability in art extends beyond symbolism, offering practical solutions to environmental problems.

In educational contexts, such works inspire students to explore how cultural heritage and ecological awareness intersect. A secondary school curriculum might include community-based art projects where students interview local residents about environmental changes and translate their stories into visual narratives (Inwood, 2008; Graham, 2007). Another approach involves examining environmental injustice in specific neighborhoods and producing activist posters or murals that advocate for clean air, water, or green space (Blandy & Hoffman, 1993; Felshin, 1995). Through such activities, students learn to see art as a platform for marginalized voices and a medium for civic participation, aligning artistic practice with social and environmental justice goals (Darts, 2004; Gablik, 1991).

Integrating sustainability into art education not only enhances creative skills but also cultivates environmental stewardship. Students learn that art is not merely a product to be displayed but a process that can embody values of care, responsibility, and regeneration.

For further reading:

[Olafur Eliasson introduces Little Sun](#)

[Trash + love: Aurora Robson at TEDxPeachtree](#)



TOPIC 2.2: Developing New Perspectives on Ecological Relationships Through Artistic Expression

This topic explores how artistic expression fosters new ways of understanding ecological systems. Ecological art positions humans as active participants in interconnected natural processes rather than passive observers (Capra, 1996; Demos, 2016). By integrating aesthetic practices, cultural narratives, and critical inquiry, artists encourage audiences to perceive interdependence, vulnerability, and resilience, shaping more sustainable relationships between people and the environment (Kagan, 2011; Lippard, 1997).

SUBTOPIC 2.2.1 Ecological Awareness in Art

Ecological awareness in art refers to the creation and interpretation of artworks that engage with environmental concerns and reflect a conscious understanding of the interconnectedness between humans and the natural world. This form of art often addresses issues such as climate change, biodiversity loss, sustainability, and the human impact on ecosystems.

A helpful framework for understanding this artistic approach is systems thinking, which views the world as a network of interdependent systems rather than isolated parts. Fritjof Capra (1996), in *The Web of Life*, explains that living systems—whether ecological, social, or economic—are interconnected and constantly influencing one another. When applied to art, this perspective encourages artists to explore the relationships between nature, society, and creative expression, promoting a holistic view of the environment.

Artists influenced by ecological thought often use natural or biodegradable materials, create site-specific installations, or design works that evolve with natural processes. This movement, known as eco-art, emerged in the late 20th century as part of broader environmental and cultural shifts. According to T. J. Demos (2016), in *Decolonizing Nature: Contemporary Art and the Politics of Ecology*, eco-art functions not only as a form of aesthetic expression but also as a form of activism, challenging dominant narratives about nature and development.





Figure 5. Andy Goldsworthy, *Floodstones Crain*, Chalk Hill, Pennsylvania, 1991-2003. Retrieved from: <https://www.theartstory.org/artist/goldsworthy-andy/>

For example, Andy Goldsworthy is renowned for his ephemeral sculptures made from leaves, stones, and ice, which are left to naturally decay, symbolizing the cycles of life and the temporality of human impact on the earth (Goldsworthy, 2000). Similarly, Robert Smithson's *Spiral Jetty* (1970) is a seminal piece of land art that interacts with the changing levels of the Great Salt Lake, encouraging viewers to contemplate geological time and human intervention in the landscape (Boettger, 2002).

These works invite experiential learning—a concept emphasized by Kagan (2011) in *Art and Sustainability*—where viewers engage with art not just visually, but physically and emotionally, deepening their understanding of ecological systems through direct experience. Such artistic engagement fosters empathy for the environment and can serve as a powerful tool for environmental education and public awareness.

In this way, ecological art does more than depict environmental issues—it actively participates in ecological discourse, offering alternative ways of seeing and relating to the world. By merging creativity with environmental ethics, it plays a crucial role in cultivating sustainable thinking and encouraging action.

SUBTOPIC 2.2.2: The Artist's Role as an Observer and Participant

In the context of ecological art, the artist often assumes a dual role—that of both observer and participant—to engage with environmental issues in a reflective and active manner. These roles are deeply interconnected, allowing the artist to critically analyze ecological challenges while simultaneously contributing to real-world change through creative and collaborative practices.

As observers, artists are acutely sensitive to their surroundings. They pay attention to patterns, disruptions, and relationships within ecosystems, translating these insights into visual, conceptual, or experiential forms that raise public awareness. This role is grounded in traits such as curiosity, critical thinking, and a capacity to communicate complex environmental themes in compelling and accessible ways. Through this lens, artists bring attention to ecological degradation, climate change, and the human impact on the natural world. For example, photographer Edward Burtynsky's *Manufactured Landscapes* (2003) documents industrial sites on a monumental scale, making visible the consequences of mass production and environmental exploitation (Burtynsky, 2003). Similarly, conceptual artist Agnes Denes uses land and sculptural forms to reflect on the intersection of nature, society, and sustainability, as seen in *The Living Pyramid* (2015), a large-scale public installation that highlights the cyclical nature of ecosystems (Denes, 2015).



Figure 6. Edward Burtynsky, *Nickel Tailings #34, Sudbury, Ontario, Dye-coupler print, 1996* Retrieved from: <https://www.edwardburtynsky.com/projects/photographs/tailings>

In contrast, the artist as a participant engages directly with environmental processes and communities. This role is rooted in activism, collaboration, and a commitment to ecological and social transformation. Participating artists often work with scientists, local residents, and grassroots movements to co-create projects with tangible ecological impact. One notable example is Mel Chin's *Revival Field* (1991), which used plants with phytoremediation properties to clean contaminated soil, combining scientific inquiry with artistic intervention (Finkelpearl, 2013). Similarly, Natalie Jeremijenko's *Environmental Health Clinic* invites public participation in addressing local environmental health issues, blending art, science, and civic action to empower individuals as agents of ecological change (Jeremijenko, 2008).

Many artists successfully blend the roles of observer and participant, grounding their work in critical observation while also engaging communities and ecosystems in meaningful action. This synthesis strengthens the artist's capacity to not only represent environmental issues but also to intervene in them creatively. Lucy Lippard (1997) emphasizes that such practices "connect aesthetic and ethical dimensions of art and life," making the artist a powerful mediator between reflection and response. A compelling example of this dual approach is Pedro Reyes' *Palas por Pistolas* (2008), a participatory project that transformed confiscated firearms into gardening tools. The work originated from a critical observation of violence and its effects, and evolved into a participatory act of regeneration, symbolizing the potential for social and ecological healing.

This dynamic combination of observation and participation is crucial in a time of escalating ecological crisis. While the role of the observer can uncover hidden environmental issues and shift public consciousness, the role of the participant enables communities to take action and imagine alternatives. Together, these roles allow artists to function as catalysts for environmental awareness and resilience—bridging the gap between seeing and doing, between knowing and transforming. By merging thoughtful observation with meaningful participation, ecological artists inspire a more empathetic, informed, and sustainable relationship between humans and the natural world.



SUBTOPIC 2.2.3: The Role of Place and Context

Place and context are central to ecological art, particularly in the realm of site-specific art, where the meaning and material of the artwork are directly informed by the location in which it is created. This approach fosters ecological awareness by drawing attention to the environmental, historical, and cultural significance of specific sites, encouraging both artists and viewers to consider their relationship with the land more deeply (Kagan, 2011).

Site-specific art is not merely installed in a location—it is created in dialogue with it, shaped by the site’s ecology, geography, history, and community. These works often use natural materials found in situ and respond to the unique environmental characteristics of the space (Kaprow, 2003). For example, Andy Goldsworthy, a pioneer of ephemeral land art, creates delicate installations from leaves, stones, ice, and other organic materials. His works are intentionally impermanent, designed to degrade naturally over time. A piece like *Rain Shadows* (1998), where Goldsworthy lies on the ground during rainfall to leave a temporary dry imprint of his body, emphasizes the transitory nature of life and the deep connection between the human body and landscape (Goldsworthy, 1998).



Figure 7. Robert Smithson, *Spiral Jetty*, 1970. Retrieved from: https://en.wikipedia.org/wiki/Spiral_Jetty

Another iconic example is Robert Smithson’s *Spiral Jetty* (1970), a massive earthwork on the shore of Utah’s Great Salt Lake. The sculpture interacts with changing water levels and salt content, constantly evolving in appearance. This work draws attention to geological processes

and the passage of time, highlighting how environmental art can make natural systems visible and tangible (Smithson, 1979).

Place-based narratives—stories embedded in a particular landscape—also play a crucial role in ecological art. Artists often draw upon local histories, cultural practices, and community knowledge to inform their work (Lippard, 1997). For instance, Maya Lin's *What is Missing?* project is a multi-site and digital memorial to biodiversity loss. It combines ecological data, local histories, and personal stories to create a narrative of endangered species and disappearing habitats, reinforcing the idea that ecological loss is deeply connected to specific places and the communities that inhabit them (Lin, 2009).

Site-specific and place-based art can also serve as a tool for education and community engagement. By working within a particular ecosystem or collaborating with local people, artists foster environmental stewardship (Kester, 2004). For example, Eve Mosher's *HighWaterLine* project in New York and later in other cities involved drawing chalk lines through urban neighborhoods to mark projected sea level rise. This public art intervention turned climate science into a local conversation, rooted in place, encouraging residents to visualize and prepare for future environmental change (Mosher, 2007).

In educational settings, these types of artworks help students move beyond abstract concepts of nature or sustainability, inviting them to engage with their own surroundings in meaningful ways. When students participate in or respond to site-specific art, they are prompted to consider the unique ecological dynamics of their region, deepening their environmental literacy and sense of responsibility (Barton & McCulloch, 2015).

In sum, place and context enrich ecological art by grounding it in lived experience and real-world ecosystems. Whether through land-based materials, local histories, or community engagement, site-specific art makes visible the connections between people and place, offering powerful pathways to ecological awareness and action (Kagan, 2011; Lippard, 1997).



SUBTOPIC 2.2.4: Art and Emotional Engagement

Art integration in education, often overlooked as secondary, plays a crucial role in fostering emotional engagement, creativity, empathy, and critical thinking. It enables students to connect deeply with material by linking cognitive and emotional components, which enhances attention, memory, and understanding (Sousa & Pilecki, 2013). Studies have shown that arts-integrated instruction improves student motivation and comprehension by engaging multiple learning modalities and emotional pathways (Deasy, 2002).

Art serves as a therapeutic outlet, reducing stress and aiding self-expression, while also promoting emotional intelligence by encouraging students to articulate their emotions and appreciate diverse perspectives (Winner, Goldstein, & Vincent-Lancrin, 2013). For example, *Guernica* by Pablo Picasso, painted in response to the bombing of Guernica during the Spanish Civil War, captures the horror of war and stands as a timeless anti-war symbol. Similarly, the installation *Sea of Shoes* by Ai Weiwei, which displayed thousands of abandoned refugee shoes on the shore of Lesbos, tells a powerful story of escape, loss, and survival—reminding viewers of the human costs of conflict and displacement.



Figure.8 Ai Weiwei, *The Sea of Shoes*, Photo: Bobby Doherty/*New York Magazine*, 2006. Retrieved from: <https://www.vulture.com/2016/11/ai-weiwei-laundromat.html>

Despite challenges like limited funding and rigid curricula, prioritizing art as a core element of education can transform passive learning into active empathy and nurture well-rounded, compassionate individuals. Collaboration among educators, policymakers, and cultural organizations is essential to fully realize art's potential in creating impactful and holistic learning experiences (Rabkin & Redmond, 2006).

TOPIC 2.3: Interdependence of ecological systems (physical, biological, cultural, political, and historical aspects).

Ecological systems are networks of interconnected physical, biological, and cultural elements, where changes in one part ripple through the whole. Systems thinking helps reveal these relationships, showing how natural processes and human actions, such as farming, energy use, or species introduction, affect climate, biodiversity, and resources. Cross-disciplinary approaches like Eco-Art and traditional ecological knowledge bridge science, culture, and history, offering holistic insights and inspiring sustainable action. Together, these perspectives reveal that ecological health depends on recognizing patterns, relationships, and feedback across natural and human systems.

SUBTOPIC 2.3.1: Systems Thinking in Ecology

With the goal of ecological systems thinking, the first essential step is to understand the concept of a system. A system is a collection of interconnected, interactive, and interdependent elements (Gibson, 2023). For ease of description, we will briefly use the example of a river system. A river consists of various interconnected components such as water, stones, the riverbed, as well as the plants growing along its banks, and the animals living around and within the river, including fish, birds, and mammals. Additionally, solar radiation, microorganisms, and human activities are included. All these elements interact with one another.





Figure 9. A "virgin river" in the middle of Gamaran forest, Lubuk Alung District, Padang Pariaman Regency. **Note.** From *A river in the middle of Gamaran forest, Lubuk Alung District, Padang Pariaman Regency, Bukit Barisan I National Nature Reserve Area* by J. Rahmi, 2018, Wikimedia Commons(https://commons.wikimedia.org/wiki/File:Rivers_in_gamaran_salibutan_forest.jpg).

Systems are characterized by various elements, interactions, and controls, and most importantly, they have a purpose. The presence of all the components is necessary, as the absence of even one element disrupts interactions or the control of the system, leading to continuous consequences (Gibson, 2023).

A notable example in Europe is the reintroduction of wolves in Germany after their extinction in the 19th century, which has demonstrated positive ecological outcomes. Their presence increases predatory pressure on herbivorous animals, such as deer and wild boar, reducing their populations. This allows plants to recover from overgrazing, enhancing biodiversity and improving ecosystems by restoring balance in the food chains (Linnell, J. D. C. et al., 2008).

The way we understand the relationships between elements and how one affects the other leads us to systems thinking. By adopting this mindset, we discover how changes in one element, interactions, or controls affect the functioning of the system (see Figure 1). Ecological systems are dynamic and ever-changing. Systems thinking helps us understand their dynamics and predict future changes, highlighting the patterns and structure behind the events (Gibson, 2023).





Figure 10. *Ecological systems thinking in rangeland environments.* **Note.** From *Ecological Systems Thinking*, by Y. Gibson, 2023. Copyright by Oregon State University. <https://open.oregonstate.edu/rangelandecosystems/chapter/systems/>

Section 1: System Components

The components of a system are the elements that interact, such as plants, animals, water, microorganisms, nitrogen, etc. They can be classified as abiotic or biotic, with some acting as regulatory factors. Each component has its own structure, function, and purpose. Abiotic components include wind, solar radiation, water, and soil, while biotic components include animals, plants, and microorganisms (Gibson, 2023).

Section 2: Interactions

Interactions in a system involve any events involving two or more components. For example, the interaction between solar radiation, water, and carbon dioxide is the process of photosynthesis. The interaction between a rabbit (*Lepus californicus*) and a wolf (*Canis latrans*) is that of predator and prey. Thousands of interactions occur in every ecological system, each with its own chain of events, functions, and purposes (Gibson, 2023).

Section 3: Regulatory Factors

Regulatory factors in a system are components that influence the interactions between other components. They can be considered as inputs. For example, solar radiation is an abiotic component that affects photosynthesis, while water is a regulatory factor in many processes.

Examining the distribution of coyotes and foxes, water and solar radiation influence the carrying capacity of rabbits and, indirectly, these animals (Gibson, 2023).

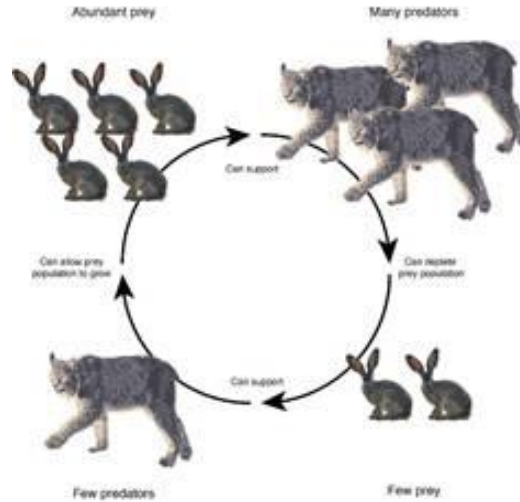


Figure 11. Interactions between biotic and abiotic components in ecological systems. **Note.** From *Ecological Systems Thinking*, by Y. Gibson, 2023. Copyright by Oregon State University. <https://open.oregonstate.edu/rangelandecosystems/chapter/systems/>

Section 4: Feedbacks

Feedbacks in a system are outputs that return, causing either a reinforcing (positive) (see Figure 2) or stabilizing (negative) (see Figure 3) impact. Positive feedbacks enhance changes, such as the burning of fossil fuels intensifying the greenhouse effect. Negative feedbacks stabilize the system, such as the population of rabbits increasing and decreasing depending on the wolf population. Feedbacks can have short-term or long-term effects (Gibson, 2023).

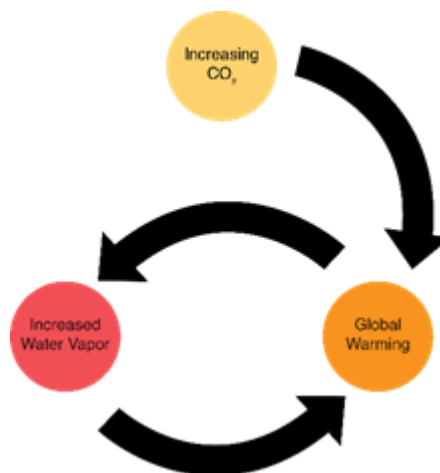


Figure 12. Illustration of feedback loops in ecological systems. **Note.** From *Ecological Systems Thinking*, by Y. Gibson, 2023. Copyright by Oregon State University. <https://open.oregonstate.edu/rangelandecosystems/chapter/systems/>

Section 5: System Patterns and Structure

Patterns and structure in a system help understand its broader functions and processes. Understanding interactions requires focusing on specific components, while understanding patterns and structure requires a holistic approach to the system.

System Patterns

System patterns are recurring events, such as the growth of C4 plants or the migration of deer.

System Structure

System structure refers to the arrangement of its components, such as the distribution of plant communities and ecological niches.

SUBTOPIC 2.3.2: Human Impact on Ecological Systems

Human activity affects the environment, leading to changes in biophysical systems, biodiversity, and natural resources. The term is often associated with pollution and emissions resulting from human actions, but it broadly encompasses all significant impacts humans have on the environment.

Technology is one of the main contributors to environmental change, as it often interferes with natural processes that have evolved for optimal balance. Laws of nature, such as the conservation of mass and energy, dictate that technological interventions inevitably have consequences. Furthermore, creating order in human economies increases disorder in the environment, leading to negative impacts like increased entropy and environmental degradation (Biology LibreTexts, 2021).

Ecological systems could not remain unaffected by agriculture. The environmental impact of agriculture depends on the production methods used by farmers, with two types of indicators: means-based (e.g., groundwater quality) and effect-based (e.g., nitrate loss). Agriculture impacts soil, water, air, and biodiversity, contributing to serious issues like climate change, deforestation, and soil degradation (Biology LibreTexts, 2021).



Adding to the agricultural impact is irrigation, as its quantity and usage affect soil and water quality. Changes in hydrological conditions cause reduced downstream river flow, increased evaporation, groundwater renewal, rising water tables, and increased drainage flow. These effects result from the operation of irrigation systems (Biology LibreTexts, 2021).

Furthermore, an interesting study by Lal and Stewart estimated that global agricultural land loss due to degradation and abandonment amounts to 12 million hectares per year. Scherr reported that GLASOD estimated soil degradation caused the loss of 6 million hectares annually since the 1940s. These losses are due to erosion, salinization, nutrient loss, and other factors, particularly severe in dry areas (Biology LibreTexts, 2021).

Next, human intervention in ecological systems is evident in energy harvesting and consumption, which have diverse environmental impacts due to the use of fossil fuels, exacerbating global warming and climate change. The search for renewable energy alternatives can help reduce this impact. The growing commercialization of renewable energy sources and new technologies contribute to better environmental and energy practices through methods of ecology and industrial ecology (Biology LibreTexts, 2021).

With the increased movement of plants and animals for trade, local flora and fauna have also been significantly affected. The introduction of plants and animals to new areas has caused permanent changes to local environments. A notable example is the biodiversity of islands, which has been impacted by the introduction of animals such as rats, cats, and goats. Additionally, these introductions have led to genetic changes in native fauna due to interbreeding with domestic animals (Biology LibreTexts, 2021).

Finally, transport systems have a significant environmental impact, consuming the majority of petroleum and causing air pollution and global warming through CO₂ emissions. Road transport is the largest contributor to these emissions. Despite environmental regulations, the increasing number of vehicles exacerbates the situation (Biology LibreTexts, 2021).





Figure 13. Black smoke emissions from a vehicle's exhaust. **Note.** From *Black smoke emissions from a vehicle's exhaust are a key contributing factor to air pollution and climate change in Kamonyi District road, Rwanda* by E. Kwizera, 2019, Wikimedia Common

https://commons.wikimedia.org/wiki/File:Black_smoke_emissions_from_a_vehicle%E2%80%99s_exhaust_are_a_key_contributing_factor_to_air_pollution_and_climate_change_in_Kamonyi_District_road,_Rwanda.jpg

Human impact on the environment is multifaceted, affecting biodiversity, climate, and natural resources. Agriculture, irrigation, transport, and the introduction of new species contribute to significant environmental changes. Transitioning to renewable energy sources, electrification, and sustainable resource management are critical to reducing these impacts (Biology LibreTexts, 2021).

SUBTOPIC 2.3.3: Cross-Disciplinary Perspectives

Eco-Art serves as a powerful tool for integrating scientific, cultural, and historical knowledge, reflecting the complexity of ecological systems. Through the synthesis of these perspectives, artistic practices can enhance the understanding of environmental challenges and inspire action for sustainability. This interdisciplinary approach allows individuals to engage with ecological issues through multiple lenses, creating a holistic and immersive learning experience (Ha, 2023).





Figure 14. *The art world's environmental impact and sustainability challenges.* **Note.** From *The art world's big planetary problem*, by T. Ha, 2023. Copyright by The Japan Times.

<https://www.japantimes.co.jp/environment/2023/12/31/sustainability/art-reckoning-sustainability/>

Science plays a significant role in shaping artistic interpretations of environmental issues. By utilizing Eco-Art, scientific concepts such as biodiversity, climate change, and the interdependence of ecological systems are visually represented, making these concepts accessible to a global audience. Through their art, artists seek to deepen and present to the world the major human impacts on ecological systems, such as deforestation, species extinction, and more, by visualizing these concepts (Gibson, 2023).



Figure 15. Deforested area in the municipality of Goldisthal, Thuringia. **Note.** From Deforested area 170 meters above the Goldisthal lower reservoir, part of Germany's largest pumped-storage power plant by Radomianin, 2023, Wikimedia Commons (https://commons.wikimedia.org/wiki/File:Deforested_area,_Goldisthal,_2023-05-20.jpg)

An intriguing perspective involves drawing information about environmental management through cultural traditions. This viewpoint is easily understood by citing examples of people around the world who use elements and materials from nature with respect, in the creation of fabrics. Delving into the culture of these peoples, we observe that narrative stories are passed down through generations with the aim of communicating the respect for surrounding ecosystems from the elders to the younger generations (Black et al., 2023).

Furthermore, within this existing field, artistic works such as 'street art' and graffiti can be highlighted. In their unique way, many of these aim to promote ecological awareness, either through visual art or by conveying direct or indirect messages on walls.

At this point, it is worth noting the historical context of ecological art. From Renaissance works to contemporary history, there is a clear need to reflect on the relationship between humans and nature.



In conclusion, when discussing Interdisciplinary Approaches to Eco-Art, it is important to recall the existence of the Land Art movement during the 1960s and 1970s, which, with its distinctiveness, significantly marked a shift in ecological artistic expression. The artists of this movement were inspired by incorporating natural materials such as earth, stones, wood, and plants, with the aim of inspiring viewers to reflect on their relationship with nature.

By integrating scientific knowledge, cultural heritage, and historical perspectives, Eco-Art provides an interdisciplinary framework for understanding and addressing environmental issues. This approach fosters systems thinking, empowering individuals to recognize the complexity of ecological systems and take meaningful action. Through art, science, and culture, we can develop new ways to connect with nature and inspire sustainable change.

TOPIC 2.4: Restoration and remediation of damaged environments

This topic examines how eco-art contributes to the restoration and remediation of damaged environments. By merging creativity with ecological science, artists develop projects that not only heal degraded ecosystems but also raise awareness of human responsibility for environmental care (Cucuzzella, Chupin, & Hammond, 2020; Reef Ecologic, n.d.; World Economic Forum, 2021). From habitat regeneration to collaborative and functional approaches, this section highlights how eco-art serves as both a practical and symbolic tool for repairing the relationship between people and nature (Ecoart Scotland, 2016; Habitat Recovery Project, n.d.; Toumbourou et al., 2024).

SUBTOPIC 2.4.1: Art as Environmental Healing

Eco-art plays a vital role in restoring ecosystems by blending creativity with environmental conservation to offer innovative solutions for environmental degradation. Projects like underwater sculpture parks, such as those by Jason deCaires Taylor, create artificial reefs that support marine biodiversity, regenerate damaged ecosystems, and promote fish populations (Reef Ecologic, n.d.). These sculptures transform into living ecosystems, enhancing biodiversity. Similarly, rewilding projects, which combine art and environmental science,



focus on restoring and reintroducing native species to their habitats, contributing to the rejuvenation of ecosystems (World Economic Forum, 2021).

Phytoremediation, which uses plants to detoxify polluted soil and water, is another example of how eco-art contributes to environmental healing. Artists collaborate with ecological experts to design installations incorporating plants with detoxifying properties, helping to purify degraded landscapes and improve soil health (Ecoart Scotland, 2016). Additionally, eco-art fosters habitat creation through initiatives like bird-friendly architecture, pollinator gardens, and green roofs, all of which contribute to biodiversity and offer sustainable solutions for urban areas (Habitat Recovery Project, n.d.).



Figure 16. Example of phytoremediation, Mel Chin, Revival Field, Pig's Eye Landfill, Minnesota, USDA, 1991-ongoing. Retrieved from: <https://melchin.org/oeuvre/revival-field/>

Incorporating eco-art into education not only connects students to real-world environmental challenges but also empowers them to take an active role in ecological restoration. By participating in hands-on eco-art projects, students gain a deeper understanding of environmental issues, such as habitat loss and pollution, and how they can creatively address these problems. Additionally, eco-art projects in education help bridge the gap between science, art, and sustainability, encouraging students to think critically about the interconnection between the natural world and human activity.

Suggested Activity: "Eco-Art Habitat Creation"

Objective: Create an eco-art installation that fosters habitat restoration or pollution remediation.

Materials: Natural materials (twigs, leaves, soil, biodegradable objects), native plants, seeds, and other sustainable materials.

Steps:

1. Discuss the role of eco-art: Begin by discussing how eco-art contributes to environmental restoration and how it merges creativity with ecological action. Share examples of projects like coral reef sculptures or rewilding efforts.
2. Choose a location: Select a local site that could benefit from habitat restoration or pollution detoxification. This could be a community garden, park, or school grounds.
3. Design and create the project: Encourage students to design and build an eco-art project that directly contributes to habitat restoration or environmental healing. They might create a small garden, a birdhouse, or install native plants for phytoremediation.
4. Reflection: After the project is completed, have students reflect on how their eco-art installation contributes to restoring the local environment. They can consider how their work helps improve biodiversity, addresses pollution, or creates a habitat for local wildlife.

SUBTOPIC 2.4.2: Collaborative Restoration Practices

Collaboration is essential for successful ecological restoration, as it highlights the need to integrate different forms of knowledge. Participating groups are called to work together to address complex and interconnected problems. The active involvement of local communities, Indigenous groups (where present), non-governmental organizations, governmental institutions, citizens, scientists, and other stakeholders enhances the sustainability, transparency, and fairness of restoration interventions. Interdisciplinary collaboration facilitates the identification of critical system components and local values, significantly strengthening the effectiveness of restoration efforts in ecological and social-ecological systems, while respecting local culture.



This collaborative approach is exemplified in large-scale initiatives, such as the *Ten-point action plan for restoring the vitality of the global ecosystem during the UN Decade on Ecosystem Restoration (2021–2030)* (Figure 1). The figure highlights the strategic actions and the interplay among diverse stakeholders, emphasizing how coordinated efforts can address ecological degradation while generating social and economic co-benefits, including job creation, climate mitigation, and biodiversity conservation. Visualizing these strategies helps to clarify the multi-level collaboration required for effective restoration and illustrates the global scope of these efforts.



Figure 17. *Ten-point action plan for restoring the vitality of the global ecosystem during the UN-DEC (2021–2030).* While these strategies are broadly aimed to create a global movement and solidarity for restoring degraded ecosystem for regaining ecological complexities, there are also co-benefits associated with land restoration such as creating new job avenues, and fighting against climate change, biodiversity loss, and climate-induced disasters (www.deacdeonrestoration.org). Therefore, the timely adoption of these strategies will have far reaching implications on global ecosystem restoration and also for the timely realization of the UN-SDGs. Retrieved from: <https://www.mdpi.com/2073-445X/10/2/201>



Balancing Structure, Equity, and Adaptability

Effective collaboration requires balancing openness to new ideas with structured guidance. Careful selection of collaborators who share a common vision and the establishment of a clear focus enhance progress and consistency. Facilitators must promote participatory and flexible processes, incorporating diverse ideas from all involved. Recognition of all members, fair distribution of tasks and resources, and institutional support are crucial. The integration of specialized knowledge and efficient communication fosters trust and contributes to sustainable ecological restoration (Toumbourou et al., 2024).

Foster Trust and Inclusivity Through Safe Spaces for Interaction

Trust is a foundation for effective collaboration and requires time, continuous communication, supportive environments for idea exchange, and relationship-building. Mutual respect, humility, goodwill, and appreciation of diverse forms of knowledge strengthen cooperation. The development of iterative plans involving continuous reflection and adaptability encourages evolving thinking and the generation of new, inclusive knowledge. Ongoing review of the collaboration—taking into account social well-being and ecosystem trade-offs—is critical (Toumbourou et al., 2024).

Scrutinize and Redress Power Inequalities

Recognizing and addressing power inequalities is essential for building fair and inclusive collaboration. Power affects every stage—from the selection of collaborators to the recognition of outcomes. Open invitations for participation, rather than reliance on closed networks, enhance equitable access. Equal influence requires genuine power sharing and challenging existing dynamics. Redistribution of resources, culturally appropriate information, and the use of non-traditional communication channels such as radio and social media support the engagement of local communities in collaboration (Toumbourou et al., 2024).



Engaging Stakeholders Across Scales and Diverse Groups—with Emphasis on Local Communities

The long-term success of ecological restoration requires partnerships with diverse stakeholders, supporting actions across multiple scales. Collaborators—typically excluding formal institutions at this point—are defined as those actively engaged in the exchange of knowledge, resources, and adaptive solutions. Collaborators must cultivate meaningful relationships with relevant stakeholder groups, ensuring local benefits. Alignment with the priorities of local populations is crucial for the sustainable implementation of restoration (Toumbourou et al., 2024).

Process Elements

Center the Knowledges of Local and Indigenous Women and Men

The integration of knowledge from Indigenous groups or local authorities enhances the effectiveness of ecological restoration, contributing to ecosystem understanding and long-term management. The participation of both men and women from various generations ensures diversity of knowledge. Additionally, intercultural collaborations require respect, reciprocity, and meaningful power sharing (Toumbourou et al., 2024).

Establish a Shared Understanding of the Ecological Context

Shared understanding of social and environmental dimensions is essential for successful restoration in ecological contexts. It requires the involvement of appropriate collaborators from diverse scientific fields and knowledge systems, with an understanding of system structure and interdependencies. Clear use of key terms enables meaningful dialogue and supports collective learning and the generation of new knowledge (Toumbourou et al., 2024).

Develop a Shared Vision for Restoration

Developing a shared vision supports the alignment of interests, clarification of priorities, and harmonization of expectations among collaborators—even when past conflicts exist. A shared vision serves as a foundation for a holistic restoration action plan. Through participatory



processes, local ownership, social legitimacy, and the sustainability of restoration efforts across diverse social-ecological contexts are enhanced (Toumbourou et al., 2024).

Suggested Activity: “Beavers and Ecosystem Management – Town Hall Role-Play Activity” (Science Journal for Kids, 2021)

Objective:

Students will explore how ecosystems and human interests intersect by simulating a town hall meeting to discuss the ecological and social impacts of beavers. They will practice collaboration, critical thinking, and stakeholder negotiation.

Materials:

- Role cards representing different stakeholders:
(e.g., *environmental scientists, landowners, local residents, wildlife biologists, Indigenous representatives, policymakers*)
- Scenario description: a local stream is being altered by beaver activity (e.g., flooding, habitat changes)
- Chart paper or a whiteboard for notes, questions, and summaries

Activity Steps:

1. Introduction (5–10 minutes):

Provide background on the ecological role of beavers and the controversy surrounding their dam-building in populated or managed landscapes.

2. Assign Roles (5 minutes):

Each student or group receives a stakeholder role card outlining their goals, priorities, and concerns.

3. Town Hall Meeting Simulation (20–30 minutes):

Students participate in a mock town hall meeting. Each stakeholder presents their perspective on how to manage the beaver issue (e.g., remove the beavers, protect them, relocate them, modify the stream).



4. Decision-Making (15 minutes):

Groups work together to reach a collaborative solution or management plan that reflects multiple viewpoints and compromises.

5. Debrief & Reflection (10 minutes):

Hold a class discussion or written reflection addressing:

- Which viewpoints clashed and why?
- How were compromises reached?
- What did the simulation teach about real-world environmental decision-making?

SUBTOPIC 2.4.3: Aesthetic and Functional Approaches

Aesthetic Approaches

Ecological aesthetics goes beyond visual appeal by linking beauty to ecological function. A landscape is not considered aesthetically “good” if it damages the environment, regardless of how pleasing it appears. This perspective emphasizes the integration of ecological processes—such as biodiversity support, carbon sequestration, and water purification—into our understanding of beauty (Parsons & Carlson, 2024).

In this context, invasive species that disturb ecosystems are viewed negatively, even if they enhance visual appeal. Ecological aesthetics combines science, philosophy, and cultural traditions, encouraging a deeper, ethical appreciation of nature (Wang & Fan, 2021).

Contemporary Chinese ecological philosophy introduces four guiding principles that reflect this approach: ecological knowledge, the unity of humans and nature, the importance of biodiversity, and environmental ethics. These values support an aesthetic grounded in sustainability and harmony (Chen, 2016; Tu, 2001; Wang & Fan, 2021).





Figure 18. *Urban green space planting activity.* **Note.** From *Urban Green Space: Planting Trees for a Greener Future*, by Tree Trust, May 25, 2022. Copyright 2022 by Tree Trust. <https://treetrust.org/urban-green-space/>

Functional Approach in Eco-Art

The functional approach in eco-art emphasizes environmental and social impact over visual appeal. Artworks are designed not just to be seen, but to perform ecological services: improving air and soil quality, managing water, restoring biodiversity, and educating the public (Cucuzzella, Chupin, & Hammond, 2020).

In urban areas, eco-art may include:

- Sculptures that collect rainwater,
- Public gardens that provide food and shade,
- Installations made from recycled materials,
- Interactive murals that raise awareness about sustainability.

These works often engage citizens directly. Public involvement in art-making promotes ownership, learning, and behavioral change. Eco-art becomes a tool for ecological literacy and collective action.

In conclusion, the Functional Approach in Eco-Art combines creativity with environmental and social responsibility. Through the eco-educational role of art and architecture, ecological awareness is strengthened, paving the way for active, collective change in both urban and natural landscapes (Cucuzzella, Chupin and Hammond, 2020).



Figure 19. *Into the Blue* installation by Shayne Dark at No.9 Eco-Art Exhibition. **Note.** From the 2022 *Eco-Art Exhibition at No.9 Gardens*, by No.9 The Culture of Sustainability, August–September 2022. Copyright 2022 by No.9 The Culture of Sustainability. <https://www.no9.ca/eco-art-exhibition-2022>

Educational Applications

Integrating aesthetic and functional eco-art in education promotes environmental stewardship through creative engagement (Wang & Fan, 2021). Students can:

- Design biodiversity-supporting spaces on school grounds (e.g., green roofs, insect hotels),
- Analyze the environmental impact of public art (Chen, 2016),
- Collaborate with artists and scientists in real-world restoration projects (Tu, 2001).

Such experiences foster interdisciplinary thinking and critical awareness of the link between aesthetics, ecology, and responsibility (Chen, 2016; Wang & Fan, 2021).



Figure 20. Students working on eco-arts projects during the After School – 4 Days program. **Note.** From *After School – 4 Days*, by OrfeArt, n.d. (program offered as four sessions per week) [orfeart.com+10orfeart.com+10orfeart.com+10](https://www.orfeart.com/product/after-school-4-days/). Copyright by OrfeArt. <https://www.orfeart.com/product/after-school-4-days/>

Suggested Activity: “Eco-Art (Primary Years, Grades 3–4)” (Cool.org, n.d.)

Objective:

To help students develop observation skills in nature by identifying colors, shapes, textures, and patterns, and to create a piece of art inspired by their findings.

Materials:

- Natural items (e.g., leaves, stones, twigs) or nature images
- Drawing paper or canvas
- Pencils, markers
- Optional: watercolors, natural dyes, or other art materials

Activity Steps:

1. **Observation & Identification:**
Students explore and describe natural objects using sensory vocabulary (e.g., “smooth,” “rough,” “cool,” “spiky”).
2. **Guided Nature Exploration:**
In small groups, students select natural objects to examine and describe. Encourage detailed observation.



3. Create Eco-Art:

Students complete a worksheet that guides them in recording visual and sensory details of the objects they observed (e.g., color, texture, shape).

4. Worksheet – Visual Descriptions:

Students create a nature-inspired artwork, integrating textures and patterns they observed. They can sketch, paint, or even collage.

5. Presentation & Discussion:

Each student presents their eco-art piece, sharing what inspired their work and how nature influenced their artistic choices.

TOPIC 2.5: Activism through art inspires change and raises awareness.

Art has long been a vehicle for social and environmental advocacy, capable of inspiring change and raising public awareness. By merging creativity with activism, artists can amplify marginalized voices, communicate complex ecological issues, and foster community engagement (Cape Farewell, n.d.; Rodriguez-Labajos, 2022; Sola & Guljajeva, 2024). Through visual, performative, and participatory mediums, art transforms environmental challenges into emotionally resonant experiences that encourage action and solidarity across diverse audiences (Chin, 1991; Eliasson, 2018; JR, 2011).

SUBTOPIC 2.5.1: Art as Advocacy

Art plays a vital role in amplifying marginalized voices and advocating for environmental justice issues. Through creative expression, artists can bring attention to urgent concerns such as climate change, water rights, deforestation, and pollution, particularly for communities that are often overlooked or silenced in mainstream discourse. By using visual storytelling, performances, and interactive installations, activist artists create powerful narratives that engage the public and policymakers alike.

For example, the Cape Farewell project brings together artists and scientists to create works that raise awareness about climate change and sustainability, encouraging dialogue and policy change (Cape Farewell, n.d.). Similarly, artist-led initiatives like Water Protectors movements focus on water rights, especially in indigenous communities, by creating art that protests



pollution and contamination of water sources. These projects not only highlight environmental issues but also advocate for the rights of affected communities to protect their natural resources.



Figure 21. David Buckland *Discounting the Future*, 2007. Retrieved from: https://www.capefarewell.com/cape-farewell-art-climate-change/?utm_source

Case studies of activist artists such as Edgar Heap of Birds (Native American artist) and Amy Balkin (environmental artist) showcase how art can call attention to the destruction of ecosystems and the exploitation of vulnerable populations. Their works engage viewers in critical conversations about the environmental challenges that often disproportionately affect marginalized communities, creating a platform for action and solidarity.

By intersecting environmental concerns with social justice, art becomes a tool for advocacy, making environmental issues more accessible and emotionally resonant for audiences worldwide.

SUBTOPIC 2.5.2: Art as a Medium for Public Engagement

Art is a powerful tool for public engagement, transforming environmental issues into accessible, interactive experiences that encourage grassroots activism and community

dialogue. Through street art, installations, and performances, artists inspire audiences to connect with ecological causes and take action.

Case studies like Mel Chin’s Revival Field and Banksy’s climate-focused street art highlight how art can raise awareness and shift public opinion. Chin’s work, which uses plants for phytoremediation to detoxify polluted soil, not only engages viewers visually but also educates them on environmental restoration (Chin, 1991). Meanwhile, Banksy’s street art challenges viewers to confront pressing environmental issues, such as climate change and resource exploitation, through provocative imagery (Lewisohn, 2008).

Participatory art projects also play a significant role in fostering a sense of ownership and responsibility toward ecological issues. Initiatives like JR’s Inside Out Project, which invites individuals to display their own portraits as a form of activism, and Olafur Eliasson’s Ice Watch, where large blocks of ice were displayed in public spaces to raise awareness about climate change, serve as examples of how art can spark environmental awareness and action (Eliasson, 2018; JR, 2011).



Figure 22. *Olafur Eliasson with Minik Rosing, Ice Watch, 2014. Retrieved from:*
<https://olafureliasson.net/icewatchcopenhagen/>

These participatory art forms help individuals feel personally invested in environmental causes, transforming them from passive observers into active participants in the ecological movement.

SUBTOPIC 2.5.3: Media and Digital Tools for Artistic Activism

Contemporary Eco-Art has undergone a significant transformation in recent years, incorporating digital technologies and media to enhance environmental awareness and encourage social action. Technological advances offer artists the opportunity to experiment with new forms of expression and participation, turning art into a tool for activism with real social and ecological impact.

A noteworthy initiative is the European program STARTS (Science, Technology and the Arts). The aim of STARTS is to promote innovation through the intersection of art, science, and technology—specifically addressing social and environmental challenges by fostering collaboration between artists, scientists, and technologists. This program highlights the role of art in fostering embodied understanding of complex issues such as the climate crisis, sustainable development, and humanity’s existential relationship with nature (European Commission, 2021).

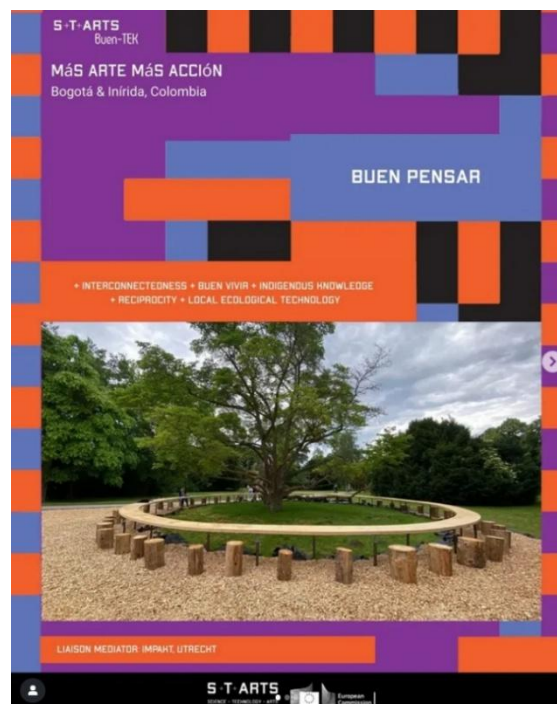


Figure 23. Meet the final 4 South American host institutions of the S+T+ARTS Buen-TEK residencies. **Note.** Photograph from Instagram, by S+T+ARTS – Science and Technology and the Arts (Instagram handle @s+t+arts), May 2025. Copyright 2025 by S+T+ARTS. Retrieved from <https://www.instagram.com/p/DJ6hMOGNdqw/>

Another initiative that focuses on the use of technological and artistic media in environmental contexts is the Urban Gardening Home Toolkit project, developed within the European platform EPALE. This project integrates an artistic approach into the design and practice of urban gardening, while also offering tools and educational materials that support experiential learning and creative expression in relation to the natural environment. Through digital visualizations, interactive maps, and mobile applications, ecological awareness is cultivated through artistic means, turning the urban space into a platform for immersive eco-art and activist intervention (European Union, 2025).

Equally significant is the contribution of contemporary artificial intelligence in Eco-Art, as presented in the scientific study “Rewilding AI: Aesthetics and Agency in Environmental Machine Learning Systems.” The study explores the relationship between artistic creation and environmental machine learning, introducing the concept of rewilding AI. It references projects that use machine learning systems to "perceive" ecological data and translate it into forms of aesthetic experience. For example, artists collaborate with researchers to create installations or digital artworks that dynamically respond to measurements of pollution, biodiversity, or soil quality. This type of functional digital eco-art combines the collection of environmental data with their aesthetic representation, enhancing public understanding of the state of ecosystems (Sola and Guljajeva, 2024).





Figure 24. Cover of the issue *Lernprozesse im Lesen und Schreiben* (Grundschule Deutsch Nr. 77/2023). Note. Photograph from Friedrich Verlag. Retrieved from https://www.friedrich-verlag.de/fileadmin/user_upload/tx_vcfvhefteundartikel/1421361-004/1421361-004_teaser.jpg. Copyright 2023 by Friedrich Verlag Gmb

In addition, the ability to connect artist and viewer through digital tools allows the development of works that not only inform but also call the audience to action. Through social media and online platforms, artists can reach audiences beyond the physical limits of exhibition spaces, cultivating a new type of “digital activist” who is actively engaged in environmental issues. This democratization of eco-art strengthens interactivity, collectivity, and social pressure for change (Rodriguez-Labajos, 2022).

Nevertheless, the use of media and technologies in ecological activism is not without challenges. As noted in the above article, certain forms of artificial intelligence, when adopted with logics of commodification or rationalization, risk neutralizing the political and critical power of art. For this reason, there is a growing emphasis on the need to “repoliticize” technological tools within the context of eco-art, in order to reinforce cultural and environmental responsibility (Rodriguez-Labajos, 2022).



Empowering pre-primary and primary school teachers' in using and combining Eco-Art for Eco awareness, psycho-social tools and non-formal teaching methods

In conclusion, Eco-Art in the 21st century is increasingly being shaped as an interdisciplinary field where art, technology, and activism coexist creatively. Through the support of European initiatives like STARTS, and with contributions from research in areas such as artificial intelligence and sustainability education, the role of digital eco-art is emerging as a catalyst for social awareness and environmental action.



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