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Collaboration between science and art through a special international symposium for ecosystem health and sustainability

Abstract

The collaborations between ecosystem restoration and art practices was epitomized by the eco-artist Jackie Brookner who said: “it is not a matter of the scientists providing the hard-core research and artists the soft outreach; rather, the dynamics engendered in the space between disciplines is full of information necessary to solve complex problems at the systemic level”. This paper reviews and summaries the goals, activities, and lessons learned from a special symposium, which was held at the 12th INTECOL (International Congress of Ecology) conference in Beijing, China, August 21 through 25, 2017, where about 3000 people attended from 70 countries. It showcased collaborations between art and science on ecological literacy and ecosystem sustainability, ecosystem restoration, and ecological science communication through the works of US-based, eco-artists and ecologists/ecological engineers. Examples demonstrated how the incorporation of art and collaborating with artists in ecosystem restoration enabled the integration of cultural, social, historical, and geographic contexts and facilitated the much-needed engagement and participation of local communities that are often left out.

Keywords

ecosystem restoration, eco-art, ecological science communication, INTECOL, STEAM

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Cover Page Footnote

I deeply thank the late Jackie Brookner, Patricia Johanson, Basia Irland, Aviva Rahmani, Lillian Ball, Stacy Levy and Brendan McAndrew for the inspiration of their work as well as for the participation in the symposium. Thank you, Faith Williams Kim, for reviewing the earlier draft of this paper. I greatly appreciate R. Eugene Turner for not only participating in the symposium as a speaker, but also reviewing the paper with valuable comments. The symposium described in this paper was a project titled “Symposium on Interdisciplinary Collaboration Among Ecological Engineering, EcoScience, and Eco-Art to Enhance Ecological Restoration Research” that was fully funded by National Science Foundation (Award Number 1713756; PI- Changwoo Ahn).

Collaboration Between Science and Art Through a Special International Symposium for Ecosystem Health and Sustainability

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Introduction

Effective communication is a necessary ingredient to facilitate collaboration across academic disciplines to restore complex ecological and cultural systems. However, planning and implementation of ecosystem restoration projects often pay little attention to this which may prevent us from achieving the most desirable outcome. For any type of ecosystem restoration projects to succeed, we should be able to engage local communities to get involved to move forward, which may demand great communication skills. Effective communication is pivotal to building the stewardship capacity of the communities involved, as well as understanding the complex linkages between ecology and culture to restore ecosystems and their services for humanity.

In transdisciplinary research and practice, what makes a process “transdisciplinary” is not just multiple disciplines working together, but the engagement of stakeholders beyond the disciplines and communities (Clark et al., 2020). Moreover, engaging artists’ perspectives and ways of expression may bring a new perspective that also informs and illuminates the work of scientists (Burnard et al. 2021). The arts-science integration in creation and dissemination of knowledge is critical especially in sustainability work (Heras et al., 2021) where clear communication is vital for perspective shifts that will engage people in positive actions for the future. Ecological restoration is one of the exemplary fields where art-science collaboration can play an important role.

Ecological restoration should be elevated beyond the technical to include the social, cultural, and/or experiential considerations to be truly successful (Watts, 2010). Adding art to ecological science may facilitate communication among stakeholders for both planning restoration projects and evaluating the outcomes of those projects. We have seen numerous ecological restoration projects that were not well connected to sound ecological principles due to the lack of communication often end up as failures (Perring et al., 2015). Creating the rationale and effective discourse in decision-making for successful ecological restoration may require “art” as a critical element of that process. We must encourage, and strategically position, scientists to work directly and more actively with artists on ecosystem restoration projects. The role of artists may include, yet not be limited to, offering communities a cultural and visual context for engaging scientific data and principles that can assist with eventually modifying behaviors (Abbott and Rutherford, 2005; Watts, 2010).

Collaborating with artists for ecosystem restoration may greatly improve the practice of ecosystem restoration and enhance the outcomes of ecosystem restoration and its communication. As the late Jackie Brookner, the artist whose work epitomized the collaboration between ecosystem restoration and art practices once said, “it is not a matter of the scientists providing the hard-core research and artists the soft outreach; rather, the dynamics engendered in the space between disciplines is full of information necessary to solve complex problems at the *systemic* level” (SER newsletter, 2015).

The symposium in INTEOCL conference in 2017

The symposium was organized as part of the 12th International Congress of Ecology (INTECOL) Conference in Beijing, China on August 21-25, 2017. The theme of the Congress was “Ecology and Civilization in a Changing World”, which focused on harmonious and sustainable development among people, nature, and society in the context of global change. The goals of the symposium were to share the outcomes and lessons of art-ecology collaborative projects relevant to ecosystem restoration and to facilitate cultural and scholarly exchange and dialogue between the USA and China on their approaches and experiences in the field of environmental sustainability across the national and geographic boundaries.

This invited symposium was one of the very first attempts to bring together world-class eco-artists and ecologists from the USA. All the participants for the symposium have worked specifically on ecosystem restoration and/or environmental sustainability projects for decades throughout their entire career and shared their experience and wisdom with the international audience. The symposium also presented an incredible opportunity for both the participants and the attendees of the conference with cross-cultural, interdisciplinary connections and thus further collaboration opportunities between them. This type of scholarly and cultural exchanges is non-existent or rare at best and may strengthen scientific research and practices in ecosystem restoration, watershed management, climate change mitigation and adaptation, biodiversity, and stormwater management to name a few. The learning outcomes of the symposium is a transformational nexus of art and ecosystem science to enhance ecological science communication and education as the key part of environmental sustainability.

Putting together eco-artists and ecologists for the symposium

A total of nine presentations were arranged for the symposium with two ecosystem ecologists, six eco-artists, and one graduate student majoring in ecological engineering and ecosystem sustainability. All the artists invited to speak for the symposium are women (six out of a total of nine speakers), who are ready to share their experiences of working across the boundaries to restore ecosystems and communicate the approaches and share stories of working with ecologists/scientists over their life-long careers. A wide range of environmental- and ecological topics were delivered during the symposium by these speakers. I had previously directed a campus-wide lecture series, *EcoScience + Art* (visit www.changwoahn.com for more), at George Mason University (GMU) for about five years (2013-2018) where I worked individually with each one of the speakers to incorporate art into the communications of ecosystem science and environmental sustainability literacy (Ahn, 2015; Ahn, 2016). Some of the outcomes of the lecture series that amounted to *the Rain Project* (see Ahn, 2016; Skorton and Bair, 2018) were also included in the presentation for the symposium. The speakers whom I had invited to the lecture series over the years were assembled together for this international symposium I organized. I had submitted a symposium proposal to National Science Foundation (NSF) and obtained funding from *Environmental Sustainability Division* of NSF to support all the participants for their trips to attend and present at the 12th International Congress of Ecology (INTECOL) Conference in Beijing China.

Table 1: List of speakers, institutions/affiliations, and presentation titles.

Name	Field	Institution/Affiliation	Titles of presentation
ECOLOGISTS			
Changwoo Ahn	Professor of wetland ecosystem ecology and ecosystem sustainability	George Mason University, VA	Innovating interdisciplinary higher education in environmental sustainability for better science communication and ecological literacy
R. Eugene Turner	Ecosystem ecologist, Professor of Oceanography and Coastal Sciences School of the Coast and Environment	Louisiana State University, LA	Sustainability: the Tool and the Toolmaker
U.S. ECO-ARTISTS			
Patricia Johanson	Eco-artist	Patriciajohanson.com, NY	Art, Ecology, and Infrastructure
Aviva Rahmani, Ph.D.	Eco-artist, Ph.D.	https://www.avivarahmani.com , NY	Art, Law, Ecosystem Resilience and the Blued Trees Symphony
Basia Irland	Eco-artist, Professor Emerita,	Department of Art and Art History, University of New Mexico, NM	Reading the River: The Ecological Activist Art
Lillian Ball	Eco-artist	Ball Studio, NY	Waterwash: Interweaving Culture and Science in Wetland Habitats
Stacy Levy	Eco-artist	Levy Studio, PA	Art as a Verb: Large-Scale Artworks that Solve Site Issues by Eco-Artist
ECOLOGIST & ECO-ARTIST			
Changwoo Ahn & Stacy Levy	Ecologist & Eco-artist	GMU & Levy Studio, VA and PA	Conversation on Systems Thinking between an Ecologist and an Eco-Artist: a Reflection on Urban Rain by <u>Jackie Brookner</u> (1945-2015)
GRADUATE STUDENT in ECOSYSTEM SUSTAINABILITY			
Brendan McAndrew	Graduate student	George Mason University, VA	Developing an ecosystem model of a floating wetland – a system approach

A summary of eco-artist speakers and their work presented for the symposium

Patricia Johanson (<https://patriciajohanson.com/>)

Beginning in the 1960's, Patricia Johanson's work has focused on combining art, ecology and functional infrastructure into public landscapes that can be used and enjoyed by the public. Her projects in Dallas, Texas, Petaluma, California, Salt Lake City, Utah and Scranton, Pennsylvania incorporate municipal flood basins, sewers, water-treatment systems, flood control structures and restored ecological habitats into landscapes that are framed and made accessible by sculpture. From mine-scarred land to typical highway structures, Johanson creates multi-functional designs where life can flourish.

The late **Jackie Brookner** (<http://jackiebrookner.com/>)

Brookner collaborated internationally with ecologists, engineers, design professionals, communities, and policy makers on water remediation/public art projects for wetlands, rivers, parks, and stormwater runoff. Her projects in Fargo, ND (in process), Salo, Finland (2009), San Jose, CA (2008), Cincinnati, OH (2009), West Palm Beach, FL (2005) and near Dresden, Germany (2002) are living water filtration systems that restore habitat, reclaim polluted water and create multifunctional public spaces. Her large-scale participatory remediation art projects are designed to help people reconnect with the places in which they live and to activate collective creative agency as people work together to develop viable strategies where regenerative cultures and ecologies can meet.

Basia Irland (<https://www.basairland.com/>)

Basia Irland is an author, poet, sculptor, installation artist, and activist who creates international water projects. Irland offers a creative understanding of water while examining how communities of people, plants, and animals rely on this vital element.

Aviva Rahmani, Ph.D (<https://www.avivarahmani.com/>)

Her most recent project, the *Blued Trees Symphony*, works with nature, to effect climate change policy. What is special about this process, is how knowledge systems about paint, sound, the judicial process, and ecology, are integrated into a synesthetic aesthetic to halt natural gas pipeline expansions. Each length of installation is a 1/3 mile measure of music made of "tree-notes," painted with a non-toxic casein of ultramarine blue and buttermilk, to make a vertical sine wave on each tree-note. The distribution is aerially visualized as objects that correspond to musical lines in space. Additionally, individual trees are being painted as a Greek Chorus. Cumulatively, all the tree-notes comprise a larger symphony, copyrighted for protection, extending across the globe.

Lillian Ball (<https://www.lillianball.com/>)

Lillian Ball is an ecological artist and environmental activist working primarily with water quality and erosion issues. Ball's project, WATERWASH ABC, is an innovative collaborative green infrastructure solution to runoff pollution in the Bronx River that involved local youth to build wooden boats and do environmental work on the river, collaborating with the artist and planting over 9000 native plants. WATERWASH ABC cleans commercial parking lot runoff before it enters the river, opens private

property to public use, and was funded by the NY State Attorney General's Office with fines from polluters.

Stacy Levy (<https://www.stacylevy.com/>)

Levy works closely with building architects, landscape architects, engineers, horticulturalists, and soil scientists to create artworks that allow natural systems like the infiltration of rainwater, to function and thrive. Through a lyrical approach to natural science, Levy blends an understanding of sustainable design and ecological concepts and harnesses the ephemeral changes of weather and light with the lasting presence of sculpture. From rivers to runoff, Levy has explored the many facets of water: urban watersheds, storm water, hydrologic patterns, and water treatment. Levy has completed numerous rainwater pieces including a watershed rain terrace for Penn State University's new Arboretum, and a rain garden for Springside School with the Philadelphia Water Department and the Pennsylvania Horticultural Society. Levy's work is a manifestation of how art can translate ecology and create solutions for site issues such as urban rainwater, water pollution and stream bank erosion.

Outcomes of the symposium and thoughts for the next step

The symposium offered the international audience with U.S. experiences on ecological research and ecosystem restoration practices both in art and ecosystem science, both separately and collaboratively. The symposium was well attended with standing room only. The presentations were extremely well received by the audience with many questions and a discussion following the symposium (Figures 1 and 2). It especially provided US-based eco-artists who have practiced interdisciplinary artwork all their lives with a unique opportunity to communicate and interact with Chinese counterparts at the conference. The symposium provided a venue for ecologists/ecological engineers to share their knowledge and experience with eco-artists at the very personal level and, importantly, opened up the possibilities of continuing the efforts for ecosystem restoration practices. Since it was, and still is, rare to see the word "art" in science conferences the symposium attracted a great deal of attention by the audience, especially as scheduled on the first day of the conference.

As interdisciplinary collaboration at the level designed and aimed by the symposium is still rare to this day, we, be a scientist, an engineer, or an artist, can fully appreciate learning each other's vision and understanding of a variety of environmental sustainability issues locally as well as globally, which was probably the best accomplishment in that we have become able to understand each other's language better and communicate one another, which provided so much hope for future collaborations. The experience has led many participants to further promote their work through workshops, publication, and designing collaborative projects, including a book² project that involved all participants of the symposium along with many other members of International Eco-Art Network (<https://ecoartweb.wixsite.com/ecoartnetwork/resources>).

The understanding engendered through the integration of the arts in sharing scientific research is critical especially for work in ecological sustainability. Ecological sustainability is one of the most pressing and complex issues we face as a planet. Many disciplines of science are involved, often in inter- and multi-disciplinary teams. That is an advancement. But, even more important is that this research does not remain in academia and academic silos – the knowledge must be shared broadly with multiple stakeholders. And cognitive, declarative knowledge is not enough to engage communities, politicians,

funders, policy makers, urban developers etc. into action. Art also ignites imagination, vision, and emotions that can make a difference between knowing facts and seeking action.



Figure 1. The images of ecological art work presented by speakers at the symposium (all images can be found in the websites of the speakers).

I obtained a great deal of professional development through organizing and directing this rather new interdisciplinary symposium, which contributes to widening and deepening the scope of my scholarship and teaching as well. *The Rain Project* (see Ahn 2016) and its outcome presented at the symposium has recently been included in National Academy's report titled " *The Integration of the Humanities and Arts with Sciences, Engineering, and Medicine in Higher Education- Branches from the Same Tree*" (Skorton and Bear, 2018).

All participants for the symposium greatly benefited from the new international connections that they established during the conference, which helped them exchange and share their ideas, approaches, and experiences of land and water management for ecosystem sustainability with the conference attendees from all over the world, including the expected large crowd attending from China for its venue being Beijing. The symposium facilitated the development of interpersonal dialogue, mutual learning, and scholarship from each other's disciplines and cultures that can reveal uniquely critical intuitive insights on complex environmental problems and thus enhance our future communication and collaboration on environmental sustainability globally.

The experience garnered through the symposium allows all of us to think more critically about how to work together to incorporate cultural dimension of ecosystem restoration practices to both establish international collaboration and integrate our learning outcomes in a global context to find solutions for issues like climate change. I look forward to further opportunities to communicate and work with eco-artists in a way that promotes the validity of ecological science research and its accessibility to environmental policy-making processes in the future. Mutual respect, genuine curiosity, and eagerness to learn from each other would be an absolute pre-requisite for much needed collaboration between ecological scientists and eco-artists.



A picture of key speakers together taken right after the symposium on the collaboration of art and ecosystem science during the 12th INTECOL Conference, 2017, Beijing, China. From left to right: Stacy Levy, Gene Turner, Aviva Rahmani, Changwoo Ahn, Lillian Ball, Basia Irland, and Patricia Johanson.

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