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Beyond the Blue Marble: Artistic research on space and ecology

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ABSTRACT

This paper discusses the relation of space and ecology through examples of artistic research on the closed ecological system experiment Biosphere 2 and the history of space settlements. While the idea of artificial ecological systems in space dates back to the first visions of space exploration, the best known link between ecology and space is probably the Whole Earth photos of the Apollo program. Following recent reconceptualizations of Ecology beyond the nature-culture divide I argue that this popular icon of ecology and space by now has become a limitation to both space exploration and a new ecological understanding in the Anthropocene. By interpreting Biosphere 2 as a model of our world that is not limited to biological relations but also includes socio-political aspects, culture, economy and technology, my performative research supports the idea of "Ecology without Nature" as proposed by Timothy Morton and others. Furthermore, through an artistic exploration of the local history and legacy of 1970s' space settlement enthusiasm in the San Francisco Bay Area and its ties to the later *digital frontier* and *Green Capitalism*, the paper discusses the 1990s as a pivotal transformational period for space and ecology. While so-called "globalizations" have often been illustrated by the Whole Earth image, associated developments have essentially revealed vast dimensions of space and time that have unsettled our very concept of world and are characteristic issues of the Anthropocene. At the same time, this "end of the world" could be employed to relate the Anthropocene to space exploration and rethink ecology as a theoretical framework transcending planet Earth.

1. Introduction

Common conceptions of ecology and "outer space" make my investigations of their relations, even in the form of artistic research, often seem an unlikely combination to a general public. "Isn't space dead and empty, and ecology about nature and living systems?" Only recently their interconnections came into the public's attention again, thanks to the success of Ridley Scott's 2015 film *The Martian* and its ever-resourceful protagonist, astronaut botanist Mark Watney [1]. As an important subset of relations between the seemingly incompatible fields of space and ecology, the idea of growing plants in space has a long history that also predates that other famous spacefaring botanist from Hollywood, Spielberg's *E.T. – The Extraterrestrial* [2].

At the very beginning of human conceptualizations of space travel, Russian pioneer Konstantin Tsiolkovsky envisioned extraterrestrial greenhouses to support human life in space [3]. The very same idea continued to prominently feature in Science Fiction narratives like the 1972 movie *Silent Running* [4] and in designs for space settlements like Gerard K. O'Neill's work [5]. Controlled growing of plants and ecological recycling of air and water were also tested in real-life experiments of testing closed ecological life support systems for space exploration, like the Soviet BIOS-3 experiment [6] or Biosphere 2 in Arizona [7].

On a more peculiar level of means of artistic production, the greenhouse-motif is also linked to the very first Science Fiction movie about space-traveling, Georges Méliès' *Le Voyage dans la Lune* (1902) [8]. It was shot inside a glass-house, one of the first film studios ever built. Through the studio's construction Méliès made use of the sun for lighting his fantastic scenarios [9].

Yet the most prominent link between space and ecology was brought to us when humans traveled to the moon for real during the Apollo missions. The astronauts' various photographs of the Earth, from Apollo 8's *Earthrise* (1968) to the *Blue Marble* of Apollo 17 (1972), are an influential pictorial legacy of the classical Space Age. As a more or less unplanned byproduct of the Space Race, the Whole Earth photo spurred the public's imagination, especially the US-counter-culture of the 1960 s. The stories of Stewart Brand's campaign *Why Haven't We Seen A Photograph of the Whole Earth Yet?* and his *Whole Earth Catalog*, with their links to the rise of the Internet in the 1990s, are well explored in both academia and art [10,11]. But most importantly, the picture of our planet instantly became an icon for the new ecological movement of the 1960s and 70s.

Based on two interrelated artistic research projects I want to

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show that the relation between space and ecology can be interpreted on a more comprehensive level. I will also argue that the paradigmatic image of this relation, the photo of the Whole Earth, has – as much as we all have come to love it – perhaps actually become an impediment for both ecological understanding and space exploration.

2. Biosphere 2

Since 2007 I have artistically investigated Biosphere 2, an experiment that has been much more controversial than the acclaimed photo of our blue planet [12]. During its first mission from 1991 to 1993, eight people lived inside this giant greenhouse in the Sonoran desert of Arizona (Fig. 1). Based on Russian geologist Vladimir Vernadsky's concept of the biosphere, the 1.27 ha hermetically sealed closed ecological system housed over 3800 species of plants and animals in eight main biomes of the Earth's biosphere, including its own ocean and rainforest. The system recycled the atmosphere and water and the so-called Biospherians grew their own food.

Unprecedented in scale and scope, the experiment was designed both to test future self-sustaining living in space as well as to explore global ecological relationships. After initial praise it was soon the target of sensationalist media reports and its scientific value being questioned by parts of the scientific community. Discussing these controversies and reflecting them in a broader historical and scientific context would go beyond the scope of this article, but has been done in great detail by other authors [12,13] as well as being addressed by several actual crew members and involved scientists [14–16].

Concerning my own work, I'm particularly interested in the wider social, political and cultural context of Biosphere 2. I understand the closed system not only as a "miniature" of Earth's biological-ecological relations, but as a more extensive model of our world and its transformations over the past decades [17]. Biosphere 2's founders have a background in the 1960s' counter-culture and theater scene of San Francisco and were highly influenced by Buckminster Fuller's idea of synergy [12]. This historical background is especially intriguing in relation to the actual contemporary context of the 1990s, specifically a general dismissal of 1960's counter-culture and its alternative lifestyles, and the era's various transformations that have shaped and are still shaping our present reality. In short, I see Biosphere 2 as a miniature world that links various utopian and alternative ideas of the 1960s and 70s, from counter-culture to space enthusiasm, with many of today's issues often associated with the epoch of the Anthropocene.

Fig. 1. Biosphere 2, photograph from 2012. Courtesy R. Mayer, O. Gemballa and Bildrecht.

2.1. The Ninth Biospherian

My artistic investigations are often based on an approach of "performative research", employing concepts of performativity for research processes [17,18]. In the case of Biosphere 2, I investigate the experiment and its history through stepping into the role of a translator that translates an imaginary novel into various media like installations, sculptures, videos, performances and texts [17]. My invention of the fictitious novel *The Ninth Biospherian* takes its premise from on an actual anecdote from the first crew of eight Biospherians. Facing individual weight loss during their mission (up to 20% per person), they wondered what would happen to this loss within the closed system and came up with the story of a ninth crew member that could have formed inside. The anecdote has been affirmed in personal communication by crew member Mark Nelson, based on his mission diary. My work employs this story, packaged as a proclaimed Science Fiction narrative tracing the whereabouts of this phantom crew member, to investigate broader implications and contexts of the experiment. The figure of the *Ninth Biospherian* becomes not only a Leitmotif of loss, most generally speaking of "futures", but foremost of the emergence of new and unexpected formations withdrawn from traditional understanding and depictions. Specifically, the phantom Biospherian "embodies" the interconnected systems of biological and cultural/technological elements as a meshwork of ungraspable relations, echoing other Biospherians' accounts describing Biosphere 2 itself as the "ninth crew member". Spread out across Biosphere 2 as matters of loss, encompassing organic molecules as much as immaterial fragments, it figuratively speaks of ecological relations as the *space in between*. In this sense, the *Ninth Biospherian* can be read as an artistic device to render aspects of a new understanding of ecology.

2.2. Biosphere 2 as "Ecology without Nature"

As a giant greenhouse, the most intriguing visual feature of Biosphere 2 to me has always been the intrinsic interweaving of technical and biological elements. Even if the facility, now run by the University of Arizona as a greenhouse, is today no longer a closed system, it still offers endless vistas of overlappings of space-frame architecture, sensors, pipes and motors with organic structures of leaves and branches and remaining smaller animals (Fig. 2). Biosphere 2's blending of technological and biological elements was frequently discussed by the media and a wider public: Is this an artificial Garden of Eden? Can humans play god? Is this some kind of Frankenstein ecosystem [12]?

Leaving these popular concerns about human hubris aside, I think Biosphere 2 is a perfect example of the collapse of the nature-culture divide, a dichotomy that is still widespread in Western

Fig. 2. Video still from *And turns and turns and I turn pages* (…), 2012. Courtesy R. Mayer and Bildrecht.