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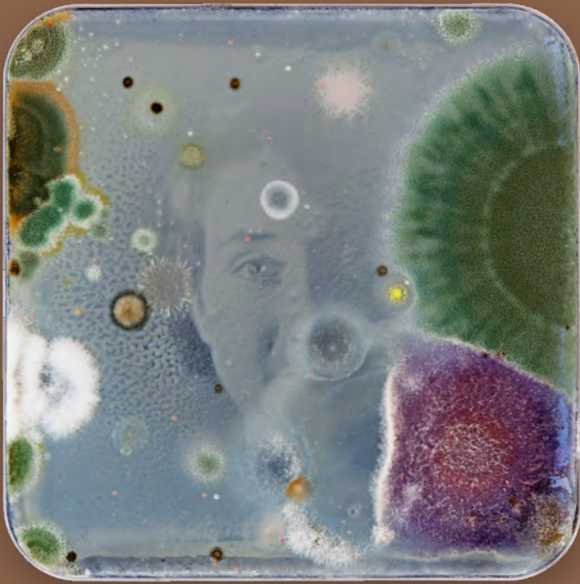
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ART

AS WE



DON'T

KNOW IT

Hybrid Ecology – To See The Forest For The Trees

Laura Beloff

Laura Beloff is an internationally acclaimed artist and researcher across art-technology-science. She has been actively producing artworks and exhibiting worldwide in museums and art events since the 1990's. She is a recipient of various grants, residencies and awards throughout the years. Her research and art practice focus on combination of technological and biological matter with theoretical concerns on insurmountable technologization of the world. Since the Fall 2019 she is an Associate Professor in Aalto University.

This morning I asked my teenage daughter what she thinks of as wilderness. She referred to the track for running and skiing, which runs through the forest near her grandparents' countryside home in Finland. She said that the track and several meters of forest alongside it are not wilderness, but about five to ten meters into the forest would be wilderness for her. She explained that in that part of the forest humans have not made visible, large-scale

transformations such as tracks or roads, and even when walking on a small path formed by frequent human use, humans can feel as though they are "a part of nature", not dominating it. She compared this to nature preservation areas, which she pointed out are regulated by humans: "In preservation areas humans have prohibited themselves to touch nature. It is not real wilderness when there is such a control."¹

Introduction

In this article *forest* is chosen as a case study that is to a large degree perceived with a Finnish and Nordic perspective, and mainly in the context of art. It appears timely to address forest and its meaning today (2018–19) when the Finnish government is pushing for an increase in logging, while simultaneously there is an on-going public debate about the importance of carbon sink, that forests offer and which is an important factor in the challenges brought forth by climate change².

Forest is used in the article for exemplifying technological transformations concerning the natural environment – especially, the present and the future state of natural environment where different actors and aspects are increasingly merged to form new types of organisms and systems in which technological and biological elements have become one. The proposed concept, *hybrid ecology*, is developed within the arts; it refers to artworks and art practices that deal with the environment and biological matter. In these works, natural environment is no

¹ Personal communication between the author and Ada Beloff, September 2018.

² <https://www.luke.fi/sompa/2019/02/05/blogi-miksi-hiilinielut-ovat-yhteiskuntapolitiikkaa-2/>
<https://yle.fi/uutiset/3-10651076>

longer the romantic ideal of ‘nature’ or *wilderness*, but an ecology that is a complex aggregate of biological and technological parts in a world accented with socio-economic interests. The selection of artworks, which are described in the article are considered as antennas of sorts for changing environmental and societal conditions, as well as experiments in *hybrid ecology*.

Additionally to the core focus on forest and its human-made technological transformation, there are two intertwined concepts that play a role in the formation of *hybrid ecology*; *wilderness* or *wildness* is an aspect that is being re-evaluated in today’s world, and *ecology* that is used as a framework and model that connects different actors, processes, conditions, dependencies, things and situations. These concepts form a base for the concept of *hybrid ecology*, which poses questions on our current situation, in which technological and rational thinking dominates the natural environment to an

On forest

Forest has a deep resonance in Finland and other Nordic countries; it is the landscape that is possibly the most representative of Finland, Sweden and Norway. Forest is also widely represented in culture and art throughout the history of these countries. A quick survey reveals a number of interesting artworks that have forest or trees in a center position – many of them are by artists from the Nordic countries. In this article, I reference a selection

increasing degree. The artworks presented in the article do not solely deal with a natural environment per se, but reference a larger paradigm concerning the concept of ecology and the current understanding of the term.

This article is written from the perspective of an art practitioner³ in experimental arts with an interest in investigating the ways in which technology and scientific development impact our understanding of the natural environment, relations to non-humans, and the human-nature relationships which emerge from these influences. This relates closely to the central theme in the author’s artistic practice during the last two decades: the merger of technological and biological matter – initially focusing on the phenomenon in human enhancement, and more recently, on convergence of the natural environment with technology and its technological framing imposed by humans⁴.

of works which in various ways reflect upon and address human impact on the natural environment, especially the focus is on works that are intertwined with contemporary technology.

As the first example, Swedish artist Helga Steppan has turned the lens of a camera to trees in her environment in the project *I can Hear you, can you see me?* (*The Baumbeobachter*). She writes:

³ When stating that this article is written from a perspective of an art practitioner, one can ask what is the point of writing when one considers making art as her primary expertise? – Writing is a way to bring forth the field, the topics and the artists’ perspectives, which are otherwise not much written about. It is also a form of practice, which is not meant to explain the artworks, but to articulate interests and thoughts surrounding the works and creating a context for them. Writing is a mode of intellectual activity parallel to art creation. Both modes can investigate similar or shared topics on a different medium.

⁴ It is worth mentioning that the locus on *forest* resonates with the author’s extensive artistic interests throughout decades towards natural environment, which is evidenced e.g. with the large-scale experimental photography works by the author that were dealing with forest and cultural landscape. Some of them were included in an exhibition at Sara Hildén Art Museum in Tampere, already in 1994, which offered an art historical overview of Finnish forests in art. Exhibition 7.5.–28.8.1994: *Katso metsää – Kuvia ja kokemuksia* and the exhibition catalogue with the same name. <https://www.tampere.fi/ekstrat/sarahilden/arkisto/aikaisemmat/71.html> [accessed 20.4.2019]



Figure 1 *Hear you, can you see me?* (*The Baumbeobachter*), Helga Steppan, 2014. Photo courtesy of the artist.

One strange tree trunk by the side of a road, two, three, four mysterious deciduous trees and a whole forest of very rare and peculiar conifers. All around the traditional English landscape you will find different species of these strange trees, and once you have discovered one, you will soon realise that they are all around you, living in an odd symbiosis with nature.⁵

The trees in her focus are synthetic; they are mobile phone masts that are camouflaged to become part of the natural surroundings. Steppan speculates if these strange trees are simply a natural part of our technological society that reflects the contemporary nature they grow in?
Art historian Rainer Fuchs writes:

The idea of nature as an idyll remote from civilization, as an inviolate counterworld to our own industrial and technological society, arises from a historically determined form of the suppression of history (Fuchs 2017, 225).

An idyll is a good description of typical representations of natural environment in art throughout the 20th century. For example, a large amount of paintings by 20th century artists in the Nordic countries include elements of the natural environment such as trees and forest, and the most of them picture a natural environment what could

be described as idyllic⁶ ⁷. In these paintings from earlier times, trees and forest flourish freely and untamed. One can say, in reference to Fuchs, that these images show a kind of counterworld that opposed the ongoing industrialisation of the time. A comparable contemporary approach is presented in the work *Clear-Cut Preservation* by Mari Keski-Korsu. *Clear-Cut Preservation* is a video recording made continuously between 2010–2017 (one image captured every hour) of a hectare of forest, that was clear-cut in 2010 and afterwards left untouched without any maintenance⁸. In general, forest and the natural environment have been frequent topics in Nordic art in the past and remain relevant today. However, in many recent works the idyll is hiding behind another kind of reality—as is evidenced in the projects by Helga Steppan and Mari Keski-Korsu.

What is a forest? The popular online resource Wikipedia defines it to be simply “a large area dominated by trees.”⁹ Whereas Chazdon et al., introduce more complex and contextualised definitions that take into account different perspectives. According to them, forests can be seen as a source of timber products, an ecosystem composed of trees along with myriad forms of biological diversity, a home for indigenous people, a repository for carbon storage, a source of multiple ecosystem services, or as social-ecological systems (Chazdon et al. 2016, 538–550). Meanwhile, the Natural Resources Institute in

5 <https://cargocollective.com/helgasteppan/Works/I-can-Hear-you-can-you-see-me-The-Baumbeobachter> [accessed 16.9.2018]

6 To mention a few names from the first half of the 20th century: In Finland E. Järnefelt, P. Halonen and E. Thesleff among others; in Norway e.g. E. Munch, and numerous others. In depth research on Finnish national landscapes in painting at the turn of the 20th Century has been done e.g. by Ville Lukkarinen & Annika Waenerberg (Lukkarinen & Waenerberg 2004).

7 Though this article primarily includes examples of artists and works that use or reference digital technology or digital infrastructures, one should mention the Finnish artist Jussi Kivi who has worked extensively with the topic of landscape and forest. Kivi claims that 'wild' or untamed forest is today primarily found in the pages of adventure books. <https://mustarinda.fi/magazine/art-and-ecological-transition/secret-of-the-black-forest> [accessed 29.9.2019]. Kivi's criticism is pointed at the way we have created human infrastructures within the natural environment, such as parking lots, radio masts, asphalt roads, benches, stairs, cooking facilities, etc (Kivi 2010). One could also say that these facilities on one hand provide easy access to 'nature' via these infrastructures, but on the other hand they offer a pre-contemplated and *designed experience* of nature for us.

8 <http://www.artsufartsu.net/clear-cut-preservation-exhibited-in-kohta/> [accessed 20.4.2019]

9 <https://en.wikipedia.org/wiki/Forest> [accessed 20.9.2018]

Finland offers a numerical or statistical perspective to forest e.g. in the following numbers: forests cover 33% of Europe, 12% of which are under protection¹⁰. This can be compared to Finland where forests cover 73% of the land, of which 13% are protected¹¹.

One can claim forest to be a part of the Finnish psyche and an essential aspect of culture. However, forests have also been an important economic factor throughout the recent centuries. Finland has resourced its forests for economic benefits since the 16th century. For a long time, forest provided protection, firewood for heating and food for foraging in the everyday life of people. As a renewable resource, it also opened up possibilities for economic development through the production of goods, such as firewood, tar, and carved wood beams. These were the first articles to be exported to countries outside of Finland. Later, during the era of industrialisation, steam power pushed the sawmill industry into rapid development and forests began to be perceived generally as an industry and a valuable resource (*Metsäalan Ammattilehti* 2012; Kuisma 2006). The cutting down of forests was happening at such a speed, that during the 19th century a fear emerged that Finnish forests would disappear. This fear led to the establishment of an official forest management institution in 1859 by the Russian Czar Alexander II. Since then this establishment, which is today called *Metsähallitus*, has been the principal institution for monitoring, promoting and maintaining Finnish forests. Today the same institution is also responsible for nature conservation tasks (*Metsähallitus* 2015). Throughout the 20th century, the Finnish state developed a strong and versatile industry around wood, forestry and paper-production that continued until the last decades of the 20th century. However, the situation is different

today as around 60% of Finland's paper-production capacity resides outside of the country (*Metsäalan Ammattilehti* 2012).

This short summary of the development of forestry in Finland demonstrates that most adults in Finland today have grown up in the midst of industrial development that has treated forests to a large extent as an economically profitable product – which can be cultivated, organised, modified, sold, and manipulated with an aim for economic profit.

One can easily draw harsh conclusions about these societal and economic developments of the forestry industry, and its impact on the way the natural environment is perceived and treated by us today. But parallel to this, Finns have also developed a strong forest-culture, which has matured with the long-term reciprocal interaction between human and forest. Forest-culture is defined as values, conventions, perceptions, and meanings concerning a forest that are also shared with others. This is claimed to be visible today in multilateral values and uses of forests, both in trade and in recreation and lifestyle (*Museovirasto* 2016). The online national repository for intangible cultural heritage claims that everyone living within Finnish culture has a relationship with forest, which in one way or another connects to one's history, background, environment, lifestyle, or to one's cultural perception about being Finnish or living in Finland (*ibid*).

On one hand, forest is seen as a valuable economic resource, while on the other hand there exists a strong forest-culture. It seems that our relationship with forests and the natural environment fluctuates between a romanticised idyll and active engineering efforts. This fluctuating relationship between the romantic 'natural' and the rational is also visible in artworks when examined in depth. At first

10 <https://www.luke.fi/> [accessed 10.8.2018]

11 <https://www.luke.fi/tietoa-luonnonvaroista/metsa/metsavarat-ja-metsasuunnittelu/suomen-metsat-euroopassa-vuonna-2015/> [accessed 10.8.2018]



Figure 2 The *Tree Mountain* in April 2019, photographed from a human perspective. Laura Beloff, 2019.

glance it seems that the romantic, and sometimes mythical, relationship with forest dominates in art. However deeper investigation reveals contemporary artworks and approaches that present perspectives, in which the natural environment is seen as a resource.

Antti Laitinen's artwork *Forest Square* from 2013 is presented as three colour photographs of a full-grown living forest, an empty square in the middle of a forest where the trees have been cut down, and a grid-like structure of different materials from the cut trees. One should point out that Laitinen's works have a clear relation to some of the earlier traditions of land art and environmental art in his

systematic ordering and reordering of natural materials. Laitinen writes about his work:

I removed a 10 × 10-meter piece of forest and sorted it into its different materials: soil, moss, wood, pines, etc. I then rebuilt this piece of forest and arranged the different materials by colour.¹²

The piece by Laitinen is comparable to Ilkka Halso's digitally constructed series of photographs titled *Naturale*, 2011¹³. In these pictures, the entire natural habitat has been broken down to separate elements of stones, trees, soil, etc. These elements

and modules are neatly ordered on the shelves of a gigantic warehouse, ready to be purchased and re-assembled into new ecosystems. Both of these works, by Laitinen and Halso, can be seen in reference to human desire and attempts to control nature; to re/organize it, to capture it into strict structures and to document or construct it newly with the help of technology.

The historical land art work, *Tree Mountain* by American artist Agnes Denes presents a different type of approach¹⁴. The work consists of a newly constructed landscape, including a forest. This

large-scale art work was constructed in an old sand pit as a part of the restoration process in Ylöjärvi, Finland in 1996. However, according to Denes the actual development for the work begun already in 1982¹⁵. *Tree Mountain* was commissioned by the Finnish Government in 1992 in connection with the Earth Summit in Rio de Janeiro. Denes has written about the work:

The planting of trees holds the land from erosion, enhances oxygen production and provides home for wildlife. This takes time and it is one of the

¹² <https://anttilaitinen.com/forest-square/> [accessed 20.8.2018]

¹³ <http://ilkka.halso.net/> [accessed 20.8.2018]

¹⁴ Agnes Denes is considered as one of the pioneers of Environmental Art, but she is often also referenced in connection to *Land Art* that developed in the 1960's and 70's primarily in USA.

¹⁵ <http://www.agnesdenesstudio.com/works5.html> [accessed 20.9.2018]

reasons why *Tree Mountain* must remain undisturbed for centuries.¹⁶

The work is projected to be protected for 400 years through inheritable documents that the individual planters of each tree pass onto the next generation or transfer to someone else suitable. This group of people are “proud custodians of the trees that bear their names and grow through the centuries to a lush manmade virgin forest.”¹⁷ Today this work can be seen in direct connection to Finland as a country of forest engineering as well, as it exemplifies the mindset that has been evolving alongside the developments in science and technology. *Tree Mountain* deals with living natural organisms, which are situated onto a strict mathematical pattern within the engineered landscape – in a way one can say that computational thinking has been imposed over the landscape as an inherent part of the work. On her website Denes describes this combination: “The trees are made by nature, the mathematical positioning created by the human intellect to form a true alliance of man and nature.”¹⁸ Today, the mathematical pattern formed by the trees around the slopes of the mountain is hardly perceivable when walking among the 2–4 meter high trees. However, the pattern is clearly visible in the

On Ecology

The concept of ecology is today widely used within various fields beyond the natural sciences. Scholar Erich Hörl points out that there seem to be hardly any areas which cannot be considered the object of an ecology (Hörl 2017, 4). Even this article takes

drone footage filmed during the winter 2017 that can be found online¹⁹. Interestingly, the video also reveals how some of the trees have thrived while others have grown much slower. Strata.fi, which is a production and maintenance organization for environmental artworks in Finland, wrote in 2013 on their website that they have finalised the archive of the GPS-coordinates for each tree, which is aimed at helping the custodians of the trees to locate their ‘own’ tree by navigating with the support of their private mobile phones.

The artworks described above reveal some aspects of our relationship and attitudes towards the natural environment and its development. Some of them present multi-layered constructions directed for the human perspective, in which the natural environment presents one component and another component is provided with digital technology. For example, the recently developed GPS-coordinates of the trees in Denes’s *Tree Mountain*, provides a digital access point to the work, while the online drone footage presents a novel perspective for perceiving the work in the 21st century. The work has been updated with the contemporary communication technology and because of that is today forming a different kind of constellation compared to 1996 when the work was eradicated.

the point of departure from a traditional understanding of ecology in its relation to nature or the natural environment – it aims at pointing out that ecology is not a simple nor innocent term. Ecology brings with it a whole field of thinking, debates and

¹⁶ Ibid.

¹⁷ Ibid.

¹⁸ Ibid.

¹⁹ <https://www.youtube.com/watch?v=dTmGfXayIPA> The drone footage by Margus Eimre in Ylöjärvi. [accessed 10.9.2018]



Figure 3 *Robot as a Tourist*, Niki Passath, 2012 – incubation phase after returning home. Photo courtesy of the artist.

disciplinary developments from biology and life sciences to cybernetics, communication and media theories, and philosophy among various other areas. Recent years have also seen a growing interest in the concept of ecology in the arts, as evidenced by numerous publications, art projects, and exhibitions which articulate their focus by using the term ecology. For example, the *techno-ecologies* term used e.g. by Eric Kluitenberg (Kluitenberg 2012, 9–15), *deep ecology* developed by Arne Næss and referenced by David Rothenberg (Rothenberg 2012, 19–23), *emergent ecologies* by Eben Kirksey (Kirksey 2015), *Three Ecologies* by Felix Guattari that has

been widely referenced in theory and art practice (Guattari 2000), and an edited volume by Wiedemann & Zehle that presents *a glossary of networked ecologies* (Wiedemann & Zehle 2012).

Austrian artist Niki Passath’s project *A Robot as a Tourist in the Sub-Arctic and the Consequences of our Travel* began during the 2011 Field_Notes – Cultivating Ground event in Kilpisjärvi, Finland. Passath had brought one of his small-scale robots with him, which he took for walks in nature to enjoy the surrounding environment. Later, after the project was finished, Niki Passath observed that his

robot's appearance had changed, as something was growing on its surface:

Can it be that it has been infected with nature? To me it gave the impression that a big amount of different fungi and maybe bacteria use the robot as their habitat (Passath 2013, 242).

After weeks of care and provided nutrients, small clear traces of moss and lichen began to appear on the robot's surface.

The robot embodies the colours of the sub-Arctic through living organisms. I wonder when the robotic part of this symbiont will disappear and only the living part can be seen (ibid, 245).

The term ecology was originally coined by biologist Ernst Haeckel in 1866 as

the investigation of the total relations of the animal both to the inorganic and to its organic environment [...] in a world, ecology is the study of all those complex interrelations referred to by Darwin as the conditions of the struggle for existence (Egerton 2013).

Whereas according to Hörl, today the concept of ecology has undone the sutures that bound it to nature and also, it is no longer seen in opposition to technics and to the mind. Hörl writes:

Ecology has started to designate the collaboration of a multiplicity of human and nonhuman agents: it is something like the cipher of a new thinking of togetherness and of a great cooperation of entities and forces, which has begun to be significant for contemporary thought [...] (Hörl 2017, 3).

Hörl also argues that it is technological evolution that drives the contemporary re-ecologisation of thinking and of theory. Since the 1950's, the evolving environmental culture of control has been tightly related to cybernetics with the hypothesis of universal controllability and a corresponding ideal of regulation (Hörl 2017, 4–5). Since 2000, we are witnessing an emergence of an environmental culture of control according to Hörl. In his articulation, environment is used in a very wide sense. It includes e.g. sensorial and algorithmic environments, that are embedded with environmental media technologies such as bio-, nano- and geotechnologies (Hörl 2017, 9).

Similarly, as the use of the term ecology has increased, also the use of the term environment has become more frequent. One can make an assumption that these increases in use are to a degree impacted by the environmental challenges that humanity is facing, which are today being addressed by various fields. Art historian Andreas Broeckmann has recently defined the words *environment* and *ecology* in the following way:

“environment” is a given context of a living being in which specific factors exert an influence on the organism and its living conditions, “ecology” is construed as a comprehensive system in which all forces, objects, and beings are seen as interdependent. The environment is organized centrally, around a given focal point, whereas ecology is a relational system that is horizontally organized, a network without a center, and that does not reserve a particular ontological position for human beings (Broeckmann 2016, 224).

In a sense one can say that the ecological paradigm is the dominant framework for perceiving life and lifeworld in the second decade of the 21st century. The concept of ecology encompasses a perception of our current time and situation; it

emphasises the complexity of actions, interactions, processes, conditions, dependencies, connections and relations within a heterogeneous community of organisms and their environment. It points out the fact that we, humans, are existing in a complex ecological system with other organisms, artifacts and modes of understandings.

In this article, the term ecology is used to refer to an understanding that goes beyond a natural environment as a subject matter, and entails an awareness of its present-day use and meaning in many contemporary contexts. The author has previously referenced the term *hybrid ecology*²⁰ to describe artistic investigations focused on complex ecosystems, which emerge from relations, connections and interactions between living and life-like organisms and their environment, which is a mix of natural and technological parts (Beloff 2019, 209–228). The concept resonates with Broeckmann's definition of ecology as a horizontally organised network without a center, but in which one can observe various biological actors together with technological actors and infrastructures.

In short, *hybrid ecology* refers to a situation in which ecology is formed by a diverse community of synthetic, biological and technological organisms interacting with each other and components of their living habitat. This community includes organisms that are: biological and have fully evolved and grown by biological forces in the environment; they may be ‘naturally evolved’, human-constructed or -modified but they are based on biological matter. It may also include fully technological or synthetic organisms, which are made to be autonomous and intelligent. Similarly, the living environment consists of components that are organic or inorganic,

passive or active and artificially constructed or biologically emerged. This environment can be responsive, intelligent, and potentially networked.

Although this article presents *hybrid ecology* mainly in relation to natural environment, forest, and tangible technology, it is important to point out that the concept includes also in-vitro manipulations and modifications of various organisms. Synthetic biology, gene modification, gene editing and other biotechnology methods and developments are as much a part of *hybrid ecology* as are other types of technological applications and engineered innovations. With the use of biotechnological methods, the recognition of human impact on organisms is more challenging as the modifications are often in the level of genes and invisible for our biological perception. Today a large part of the genetically modified, or newly constructed, organisms are never leaving the laboratory regulated by law, e.g. European Union legislation on GMOs (Genetically Modified Organisms)²¹. However, as these organisms exist, they are a part of the human-made ecology and therefore need to be included in the considerations of *hybrid ecology* and posthuman encounters with natural environment.

²⁰ Note: I should mention that thinking about *hybrid ecology* started already several years earlier with my (the author's) art-based interests in the merger of biological organisms and technological matter. One of the milestones on the way was the project *Hybrid Matters* (2015–16) together with the Finnish Bioart Society and partners from Sweden and Norway, which was funded by the Nordic Culture Point. Another milestone is the author's chapter in the *Digital Dynamics in Nordic Contemporary Art* publication edited by Tanya Toft Ag (Beloff 2019).

²¹ <https://www.loc.gov/law/help/restrictions-on-gmos/eu.php> [accessed 20.4.2019]



Figure 4 The rotational tests with fir trees and a cloned Danish Christmas tree in a rotation box – a detail of the installation *The Condition* (2016) by Beloff & Joergensen.

Towards hybrid ecology

Although the concept of *hybrid ecology* is developed within the arts and in reference to artworks, one can also see the convergence of technology and environment in various fields ranging from robotics and synthetic biology to urban planning and data science.

The Geo-Amazonia-chapter of the *Forest Law*²² publication by artist Ursula Biemann and architect Paulo Tavares, shows a data-infused view of the Amazonian forest. It describes and presents data mapping of the fantastic wind-based nutrient supply from the Sahara Desert to Amazonia. This natural phenomenon has been known and studied for decades, but just recently has a detailed digital map of the sand and wind trajectory been produced by scientists. The map is based on ground measurements and computational atmospheric models.

The forest has become a vast informational space: at once a natural laboratory and an Earth-sensing device. Amazonia is equipped with a sophisticated network of environmental surveillance formed by a dozen giant monitoring towers spread throughout the most remote zones of the forest. Datasets on soil, water, and atmosphere gathered on the ground, combined with information provided by radar and satellite imagery, are assembled into “deep cartographies” that reveal Amazonia as a thick and multidimensional terrain formed by various geophysical, biological and social forces (Biemann & Tavares 2014, 92–101).

One can be critical of the reductionist approach typical of science research, which is often embedded into uses of technology as tools. However in the above-described example the reductionist approach evidences natural phenomenon, which actually creates a moment of amazement about the intelligence and deep connectedness of nature on our planet. In this example technological method and digital data provide us with raw facts on a global scale. Our trained rational mind can easily understand these facts, but simultaneously it enables us to connect the presented data of the phenomenon further to an affectionate relationship with the natural environment in a global-scale ecology.

The previously described examples of artworks do not concretely form *hybrid ecology* as the technological additions and digital layers in them are kept mainly separate, and primarily directed for a human perception. Whereas the author considers *hybrid ecology* to be based on actual and mutual interaction between grown, constructed and modified organisms. However, it has become obvious during the course of writing this article, that there exists a shortage of examples of these types of constellations of communities, organisms and components that can be said to have reciprocal exchange which goes beyond human intentions. Based on this, the author claims that today we are *in a transition towards hybrid ecology* through gradual changes impacted by science and technology developments.

The two following art projects offer perspectives on forests which have become infused with

²² The *Forest Law* publication aims at presenting the complexity of the situation concerning the Amazonian forest and its inhabitants. At the heart of the challenges presented in the book, is the very different understanding of the natural environment, such as the forest and its meaning and use, by stakeholders: Western companies, the Court of Justice and the people living in the area. As a positive example, the publication describes e.g. innovative legal elements in the recently (2008) corrected constitution of Ecuador, such as the Rights of Nature. It contends that ecosystems, living forests, mountains, rivers and seas, are legal subjects and therefore they have right to integral respect for their existence, and maintenance and regeneration of their life cycles, functions and evolutionary processes. The Ecuadorian constitution was conceived as a tactical tool attached to historical struggles for human rights and collective land rights. <https://www.geobodies.org/art-and-videos/forest-law> [accessed 22.9.2018]

data-driven structures. In these works, the romantic and idealised notion of the forest is deliberately overwritten by dominant framing with technology. Similarly to the mainstream forestry that has framed forests primarily as a material resource for industry, albeit simultaneously fostering cultural sides of forests through human activity and knowledge production, the following two projects present plausible future visions through the concrete convergence of contemporary technology and the natural environment. *The Condition* project does this through concrete impact on the growing condition of the trees, which is based on a robotic construction and data flows. The *terrao* through allocating decision-making power to the autonomous forest-system that is fully grounded on digital infrastructure.

The author's art installation *The Condition*²³ presents a model of a small monoculture forest of cloned Christmas trees. It echoes the fields in Denmark with monoculture Christmas trees in orderly rows, waiting to be cut down after 8-year-long growth period required for reaching full-size Christmas tree status. Trees in the installation are located in rotating boxes in a strict grid structure, which is networked and receives data from the universe. The data is received from NASA's space weather satellite, and it determines the rotation speed and direction of the boxes. The received data is thousands of numbers that are categorised based on principles of a self-organising map, which uses artificial neural network learning for organising the data (Kohonen 2001). The rotational movement of the boxes places the trees into a one-directional microgravity environment that is a non-terrestrial condition²⁴. This impacts the growth, and also

death, of the trees that are originally grown on normal earthly conditions. The roots of the trees form with the rotation and although the trees are clones some of them die during the long-term experiment whereas others adapt to their new condition. In essence, this experiment is not a kind one; it is a human constellation that speculates on future living conditions, and places non-human species into its framing as a cultural icon. The installation confronts the audience with a range of questions such as: what is your emotional response of seeing these Christmas trees rotating in a robotic system that casts artificially created microgravity on the plants? Or how does the art work differ from 'real life', in which the Christmas tree has become a cultural symbol while also being a living organism that is today cloned and modified to produce increasing economic gain for human society?

The project *terrao*²⁵ proposes another kind of blending between biological and technological that is based on automated digital processes. It suggests a speculative scenario, in which a forest utilises itself for accumulating capital. In the first phase of the project, a piece of land is bought by the project initiators which is then assigned to the forest as a legal entity through a smart contract based on blockchain technology. From that point on, the forest can decide for itself when to sell licenses to log a specified number of trees and when not to. Every six months the program receives pictures of the property and with the help of image-analysis software, the program can compute how much wood can be sold without overly-diminishing the tree population. When a certain sum of money has been earned via selling the logging licenses, the forest will reduce its debts to the project initiators until

it fully owns itself. This technologically augmented forest is not only the owner of itself, but it is an autonomous economic unit that is also able to use the accumulated profit to buy more land and therefore to expand itself.

Although this project is set within a scope of dominantly human framing, infrastructure and value creation, it provides an interesting scenario

Conclusion

Wilderness as a concept is addressed in the very beginning of this article. It is no longer obvious what the term *wilderness* refers to in today's world; what it means to me and what it will mean for others who come after? Perhaps the word *wilderness* is already obsolete? In the introduction of his book *Living Through the End of Nature* Paul Wapner, Professor of Global Environmental Politics, uses the term wildness and states that the premise of his book is that the wildness of nature is "coming undone" (Wapner 2010, 4). According to him humans are not only controlling nature but wholly transforming it, which makes identifying and securing wildness difficult and almost impossible. "Our minds are taming it; our technologies are rendering it usable; our affluence is exploiting it; our power in general is transforming it." (Wapner 2010, 4). Wapner continues by saying that "Wildness, as that dimension of nature that signifies genuine otherness, has been stamped out now that the human signature can be found everywhere" (Wapner 2010, 6).

In this anthropocentric contemporary world, instead of progressive utopias, we have found ourselves in a newly initiated process of learning about the effects of our actions, lifestyle and their limitations in relation to the natural environment. This condition will set the frame for our future visions; it is evident that we need new models and alternative proposals that can guide the development of

in which the natural environment gains rights to its destiny. It presents one plausible vision on the role of technology concerning the natural environment in the future. However, one can ask if there will ever be possibilities of thinking beyond human intentions when all the technological models and structures are designed and conceived by humans?

our minds, attitudes and actions towards plausible futures. The artworks and experiments described in this article work on us and our minds; they bring us closer to the acceptance, or non-acceptance, of *hybrid ecology* as a human-made ecology that consists of biological, technological, grown, synthetic, modified components and newly emerged organisms. *Hybrid ecology* offers a frame of reference to the ever-increasing and unstoppable development of the environmental apparatus that is guided by humans and which has been in action since the invention of cultivation. Our natural environment is no longer the romantic notion of idyll, nor is *wilderness* an equally valued actor parallel to humans. *Hybrid ecology*, which is visible in the described artworks, reveals a sharp cross-section of human intentions and desires that are characterised by technological developments, design and ultimate control.

We are formed by the landscapes we grow up in –. For me it has been the forest – my parents taught me to pick berries and hunt mushrooms, to look at lichen and recognise signs of animals. Forest has grown on me and it has remained in some way enigmatic to me –.

²³ *The Condition* 2016 by Laura Beloff & Jonas Jørgensen. http://www.realitydisfunction.org/?page_id=486 [accessed 5.9.2018]

²⁴ Clinostat is a historical instrument, which used rotation for creation of microgravity environment for plants. It has been claimed to be invented in 1870's by German Botanist Julius Von Sachs (Herranz et al. 2012).

²⁵ <https://plsdlr.gitbooks.io/terrao/content/terrao.html> [accessed 23.9.2018]

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