

Sustainable Printing in the Age of the Anthropocene



Olivia Arau-McSweeney

Table of Contents

Introduction.....	2
Problem Statement.....	4
Contextual Discussion.....	5
Hopeful Worlds and Theories: Finding Positive Outlooks When Addressing the Environment	5
Eco-feminism, Environmental Philosophy, and Environmental Literature in the Anthropocene	6
Intersecting Art Practices with Themes of Ecology, Environmentalism and the Land.....	7
Methodology.....	11
Green Photo Developer: Sustainability in Your Garden	11
Phytogram: Abstraction	13
Flux: Green Developers and the Phytogram Combined	15
Non-Toxic Intaglio Printmaking.....	16
Mokuhanga Water-based Relief Woodblock Print.....	18
Alternative Processes in Practice (Creative Work)	19
Conclusion and Further Research	21
Acknowledgements.....	25
Works Cited.....	26
Imagery Index.....	27

Introduction

I developed my first photograph in a darkroom at my high school. It was taken on a very cheap 120mm film camera and the resulting images were mediocre at best. I believe more than half the images on that first roll were fogged and unusable and of the ones that weren't only two were images I actually liked. At first, I was frustrated by my poor results but as I continued to shoot and develop film, I started enjoying the darkroom process more and more.

Something similar happened the next summer when I first encountered printmaking at an art camp in Vermont. It was a medium that had never really intrigued me so while picking out courses I didn't even consider it. On one of the last days of the camp my friend who had been in a print class invited me to come to an open studio hour, where any student could come and make a simple linoleum or woodblock print. As had happened in the darkroom, my resulting imagery was not particularly memorable, but the process became something exciting to me.

The more I worked in these mediums the more I realized that I was as interested in the act of making through printmaking and photography as I was in the outcome of my work. I loved losing track of time as I slowly created images in the studio. I would spend a few hours almost every day over the course of weeks on a limestone to make a lithograph and, once it was done, I would simply move on to the next project. Or I would stand over the darkroom trays full of chemicals and watch my photograms appear in the developer and after many hours those photographs would just end up in a box. I loved images, but in some instances, I loved image-making more.

Printmaking and darkroom photography usually live in separate spheres within the art world, but I see them as mediums that allow me to watch a blank page transform, seemingly magically, into an image. Both processes unveil the print after going through a set of motions, both engage in the world of editions and multiples.

As I delved deeper into the worlds of print and photography, I became more and more aware of the vent caps and the latex gloves and safety goggles I needed to wear while using the chemistry involved in these processes. I decided to pursue a minor in environmental studies because I have been lucky enough to develop strong connections to the natural environments everywhere I've lived, but more and more my studies became sad and depressing stories about the dangers we face for our health and the health of our planet. I would bring these lessons into the print studio and feel so guilty every time I had to throw a rag soaked in solvents into a trash can or watch developer flow down the drain in the darkroom but I didn't know how to continue doing what I loved without using the very chemistry that concerned me so I decided to replace those toxic components to the processes with more sustainable and less toxic alternatives.

I am not a chemist, so many of the processes I have explored while making this project have puzzled me. I do not know why the first time I used coffee as film developer the roll turned out incredibly over-exposed and why on my second attempt, where as far as I could tell the process was the same and the recipe unchanged, the negative was clear and consistent. But this project evolved only because of the failures and successes, rendering surprising imagery and moving my research in unexpected directions.



Fig.1 Gelatin silver print from the first 35mm film developed using instant coffee. One of the only salvageable images from the overdeveloped roll

Problem Statement:

My goal for this project is to address the need for more sustainable art practices and environmental awareness in the arts by creating a series of prints using alternative forms of printmaking and analog photography. *Sustainable Printing in the Age of the Anthropocene* is a project that aims to address the urgent need for sustainable art practices and environmental awareness in the arts by examining alternative ways of printmaking and photo development that are more sustainable and pose less health risks to the artist or maker.

My interest does not end at the process. Visual art engages in conversations in thoughtful ways, so imagery is my opportunity to create platforms for discussion with those who view my work. Each print I make addresses a different concept that emerges from my research into environmental literature.

From the very beginning, my intention for this project was to learn by making and to educate others about sustainability in the arts. This work is made with different groups of people in mind; other printmakers and photographers who want to incorporate sustainability to their practice. Environmental activists, researchers and teachers who want to incorporate art to their practice, and students (by students I mean anyone who wants to learn more about something, not just students at an institution), who can use this body of work as a resource and adapt it to fit their needs. This project is also made for anyone who is curious about alternative art practices, no matter their abilities in print or photo processes or their knowledge of environmental issues.

Contextual Discussion

Hopeful Worlds and Theories: Finding Positive Outlooks When Addressing the Environment

Anna Tsing says that “if we end the story with decay, we abandon all hope”¹. When I began doing research for this project, I saw the alarming statistics about toxic and harmful products that end up polluting our water systems, air, and bodies and I became motivated to find sustainable solutions as a way to mediate the fear these findings brought in me. The more I read about the ecological issues both relating to art practices and generally affecting our planet the more depressed I became from the research I was doing. My hopes for this work were not to alarm and scare people into taking environmental action, they were to find the little bit of light shining through all the darkness. I decided to approach my research through a hopeful lens. That isn’t to say that research into environmental issues should not be seen as alarming and scary, but rather that a change in perspective can benefit our actions.

This change in perspective begins in our definitions of nature. When asked to close their eyes and picture ‘nature’, most people bring up images of pristine landscapes and seemingly untouched land. But “untouched” does not exist. We live in a geological era defined by the impact of humans on the planet, meaning every part of our world has been changed; the chemistry of the air we breathe, of the oceans, of the soil. So, if nature cannot by definition be that that is “untouched by man”, then what is nature?

Maybe we can look at nature as growth. Nature could simply be a thriving ecosystem, where multiple species coexist in a stable manner, and these kinds of environments can be found everywhere; from the abundance of insects, microbes and plants that live in the abandoned lot

¹ Tsing, Anna. *The Mushroom at the End of the World*.

across the street to the radioecology that came after Hiroshima. Emergent ecology is a way of seeing contamination as an opportunity for growth.²

Eco-feminism, Environmental Philosophy and Environmental Literature in the Anthropocene

The processes I explore are clearly dictated by environmental movements that are looking to adapt our ways of living to fit the current state of the world; the Anthropocene. This immersion into researching non-toxic processes quickly influenced the imagery I was making. Environmental philosophy, environmental literature and eco-feminism uncovered visual cues that mended the gap between process and outcome.

Some theorists address the changes and impacts of the environment with hopefulness; realizing that work needs to be done to keep this planet healthy but resorting to environmental positivity to relay that message. This approach is fundamental in keeping the momentum of the environmental agency. I believe urgency and fear can motivate change but there must be some degree of hope to maintain it. Through the readings of philosopher Arne Næss who coined the term Deep Ecology³ in the 70s and then the reframing of that concept in the 21st century by Nina Witoszek and Martin Lee Mueller⁴, I chose to use the self to as a motif for the first process used in this work. Næss describes a concept within Deep Ecology, the Ecological Self, that requires redefining the self as part of our ecology and not above or separate from it, and through shifting our perspective of the self we can view caring for our planet as caring for ourselves as part of a greater ecology.

² Tsing, Anna. *The Mushroom at the End of the World*.

³ Nelson, Michael P., *Encyclopedia of Environmental Ethics and Philosophy*. p.206

⁴ Mueller, Martin Lee., Witoszek, Nina. *Deep Ecology: Life After Life?* Worldviews 21 (2017). p.209

Intersecting Art Practices with Themes of Ecology, Environmentalism and the Land.

For a few semesters before embarking on this project, I was focusing most of my creative energy on traditional forms of printmaking and digital photography. Making prints required a certain amount of meticulous planning ahead and organization but also allowed me to get lost in the creative process and not feel overwhelmed by the prospects of creating meaningful art. If what I was making did not feel cathartic than the overwhelming feeling of needing to make an end product would distract me from making anything at all. The multiplicity of the print process made failure feel okay. If I made a mistake while registering a print, I could easily fix by re-printing.

I took photographs for a different reason. Almost pulling me in the opposite direction, digital photography allowed me to be in natural environments that excited me outside of the studio. My studio became the spaces I photographed and carrying a camera changed the way I would interact with my surroundings.

In an attempt to merge my desire for seemingly opposing ways of creating, I sought out artists that were able to bring process-based practices outside of the studio, particularly those that worked with the earth. The first body of work that resonated with my desire was Andy Goldsworthy's Elm Series. In this series Goldsworthy continues his usual practice as an environmental artist of creating sculptures by rearranging elements of the land he walks. He uses the leaves of elm trees, a particularly ephemeral material, and immortalizes his natural sculptures using photography.



Fig.2 Color photograph from the Elm series by Andy Goldsworthy

After finding this body of work, my interest shifted, and I began to consider the role of photography in conjunction with materiality and the land. While beginning to ideate for this project I sought out other artists who used photography to interact directly with the land. I discovered the project *Thermophile* by Jon Verney, an artist who used natural sulfuric springs in Wyoming, California and Iceland to redevelop photographs. Verney's ability to begin a photographic process in a traditional way, using a darkroom, and then evolve it into a collaboration with the chemistry of sulfuric springs in vastly different geographical landscapes inspired me to consider my own approaches to traditional art practices and the material qualities of my work. More so, *Thermophile* is a project that used the self-portrait as a starting point for change. The nature of his project chemically altered the photographs when they were taken out into the landscape, but the original self-portrait was a point of control and understanding.



Fig.3 Gelatin silver prints redeveloped in Sulphur springs by Jon Verney

Self-portraiture is often used as a form of reflection; for centuries artists have turned to self-portraiture to examine themselves in relation to the world around them. Self-portraits are also artistic opportunities for self-definition. Think of the many master painters such as Rembrandt, Velazquez or Courbet who depicted themselves as painters; tying their identity to their profession as closely as possible. In my own project, I examined the self in relation to the ecology around me, turning to ecological systems from my home in the Mediterranean. To understand my role in such systems, I visually transformed my relationships to the native and invasive plants by literally drawing myself as a vessel for the growth of the flora around me.



Fig.4 Portrait of the Artist at His Easel, Rembrandt,



Fig.5 Las Meninas by Velazquez with a self-portrait of the artist at the easel

Like Verney, Los Angeles-based artist Matthew Brandt used natural environments in unconventional ways to examine the current health of the water sources around the US and push the boundaries of color photography at the same time. Brandt created this project inspired by early landscape photography of the American West and alternative photography processes invented in the infancy of the medium. In his project *Lakes and Reservoirs* Brandt photographs lakes around the country and then soaks the images in the very water of the place he photographed until the images become chemically altered by the contents of the water.



Fig.6 From the series *Lakes and Reservoirs* by Matthew Brandt

In the print world, artist Patterson Clark also uses nature beyond depicting it in his work. His art practice consists of using invasive plants from his home in Washington DC to make papers and pigments for his Mokuhanga prints. He too turns to the origins of his medium of choice, Mokuhanga printmaking, to inspire his contemporary approach. Mokuhanga printmaking, a process popularized in Japan during the Edo period (1603-1867), evolved out of practicality; early Mokuhanga printmakers used available materials around them that were already being used in their culture. Woodblock cutting tools were sharpened on stones in the same way as samurai swords. Rice, a dietary staple, was made into nori a paste that is essential to the Mokuhanga process, and inks and papers were made from native plants.⁵ Clark's work approaches the eastern print's philosophy of using natural elements that are available through a more modern approach; addressing the environmental concern of invasive plants. Clark juxtaposes imagery of urban spaces with the invasive he uses while retaining the connection to materiality and non-toxic appeal of the origins of the technique.

⁵ Vollmer, April. *Japanese Woodblock Print Workshop: A Modern Guide to the Ancient Art of Mokuhanga*. p.118



Fig.7 *The Weed Wrench, 2* by Patterson Clark, Inks from Amur Honeysuckle, Multiflora Rose, Leatherleaf Mahonia and weed soot printed from a Norway Maple lock onto White Mulberry paper.

Methodology:

Green Photo Developer: Sustainability in Your Garden

In the mid 1800s, at the very beginnings of photography, John Herschel conducted a series of photographic experiments. His most notable ones are those in which he used the natural pigments of flowers to make images by letting them expose in the sun. Herschel combined his knowledge of botany with his knowledge of color theory and light to make images out of the products from his garden.⁶ Contemporary photographers and filmmakers, like Philip Hoffmann and Dr. Scott Williams, have followed Herschel's (and other early photographic inventors) footsteps and have created plant-based and other non-toxic substitutes to photographic processes. And with their research I have been able to make homemade photo developer out of little more than coffee and plants.

⁶ James, Christopher. *The Book of Alternative Photographic Processes*. p. 138

Instant coffee (the cheaper the better) and many fragrant plants have active compounds in them that behave similarly to the developing agents in commercial photographic developers. When these are mixed with ascorbic acid (a.k.a. vitamin C), the second active developing ingredient, they mimic the effects of the compounds, called hydroquinone and pyrogallol, without the toxic aspects of the latter. Lastly sodium carbonate (a.k.a. washing soda) makes the solution alkaline which activates the ingredients for a non-toxic photo developer.⁷



Fig.8 Stage one of making developer out of hydrangeas: boiling them in water to create an extract.

The first time I attempted to make alternative photo developer, I chose to use the most available and well-known process made with instant coffee. I developed images that were noticeably different from the ones made using commercial developer. The negatives were overdeveloped to the point that I initially thought there was no image at all just blackness. After examining the roll more closely and under a light, I saw the photographs and was able to adjust my exposure so that I could print some of them out. The resulting photographs had a greenish tint to them, a grainy quality and some strange markings that looked like water splashes from uneven developer distribution. I am not sure what part of my process yielded these shifts. Sometimes, a

⁷ Reinhold, G. *The Caffenol Cookbook and Bible*. p. 78

final print would be much lower in contrast than a traditionally-developed image, or patches of the print would appear to be washed out. This first experiment's results were low-quality, but they were results nonetheless, so I felt confident in trying other recipes for homemade developers.

I developed some more rolls using roses, hydrangeas and cilantro, basing the recipe on some research done by Hoffman and this time around the images looked much more similar to well-developed roll using commercial products. In another roll developed with just hydrangeas the negatives turned out completely under-developed despite the fact that all the other aspects of developing remained the same. Although not all the rolls gave me perfect results, I had just created images out little more than coffee, flowers, vitamin C, and washing soda. One ingredient I picked from my garden and the other three I pulled off my pantry the day before.



Fig.9 silver gelatin print developed in roses, hydrangeas and cilantro by the artist.

Phytogram: Abstraction

The phytogram is a photographic process invented by Karel Doig. The theory behind this process is the same as the one for plant-based photo developer; when certain fragrant plants are soaked in

vitamin C and washing soda and then placed on emulsion of a negative an image is transferred from the contact if exposed to light.



Fig.10 Silver gelatin print using the phytogram process out of hydrangeas, rose petals and cilantro by the artist

Unlike many traditional photographic processes, I did not need a darkroom to make phytograms, I would just watch a phytogram create its images with your own eyes. After soaking the desired plants, I opened an unexposed roll of film and laid the plants over it, leaving it out to expose in the light. When the negatives slowly darkened around the plants, they were ready to be fixed and washed. What results is a series of semi-recognizable shapes that look like they belong somewhere between the glass slab of a microscope and the imagination of an abstract painter.



Fig. 11 Artist preparing a phytogram using rose petals and hydrangeas.

Flux: Green Developers and the Phytogram Combined

I chose to combine the green photo developer with the phytogram process by bleaching and clearing developed film negatives and then putting them through the phytogram process. As I had done before, I shot and developed film with homemade green developers and then reversed the negatives using a less-toxic alternative to the standard negative reversal process, which –as the name indicates –consists of reversing the negative roll into a positive. Traditionally this process requires developing the film a second time after bleaching it in sodium bisulphate and potassium permanganate, cleaning it in sodium metabisulphite and exposing it to light. Instead of re-developing, after I bleached the film in hydrogen peroxide and lime juice –as non-toxic alternatives– and I applied the soaked plants from the phytogram process.



Fig.12 Detail of a contact print containing a combination of photographs developed in plants with the phytogram process overtop, by the artist.

Until now I had focused my photographic alternatives on one single aspect of the darkroom process but as I became more comfortable with my skills in experimenting in the darkroom I tried to substitute as many parts of this development process as I could. I used a coffee-based film developer recipe invented by Dr. Scott Williams. I also attempted to use salt water as a photo fixer. This usually takes a number of days to work so after having my film in a light-proof container for three days soaking in the salt water I examined it. The fixer did not fully clear the film emulsion,

so I ended up using commercial fixer. The important thing was that the development part of the process had worked. The resulting images lived in world between abstraction and reality; recognizable spaces emerge underneath a layer of soft semi-transparent forms on the surface of each photograph.



Fig.13 *Conservatory I*, alternatively processed silver gelatin print overlaid with a phytogram by the artist.

Non-toxic Intaglio Printmaking:

Intaglio printmaking involves etching and engraving into a metal plate, where the lines created hold ink and the rest of the plate is wiped away. This process usually requires the use of acid resists, acid baths, powders, and solvents, all which can be toxic and create potential health and safety hazards. In the late 20th century printmakers became more concerned with the health effects of the toxins they were being exposed to in the intaglio process and some, most notably Keith

Howard, developed alternatives to traditional etching, such as new acrylic-based grounds and non-toxic alternatives to solvents to remove ink and clean plates.⁸

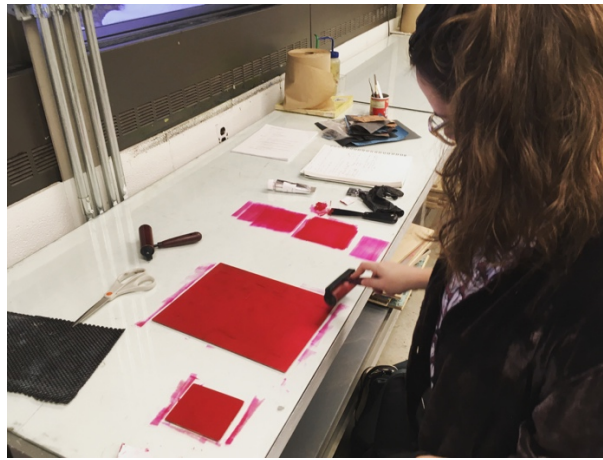


Fig.14 Artist applying an acrylic-based ground known as BIG to her copper plate.

In my own work, I have drawn from these innovations to the intaglio process and used non-toxic or less-toxic versions of acid baths (common practice in most print shops) and acid resist grounds (less common alternative in most shops). I have also substituted traditional forms of aquatint, a technique used to create tone in an etching, with less-toxic solutions. The main problem with traditional aquatint is that it requires using powdered rosin, which if inhaled can be toxic and is a possible carcinogen. In order to avoid rosin, I have made aquatint using confectioner's sugar (which has a similar grit as powdered rosin) and sandpaper (which when run through an etching press over an alternative ground can create a similar texture than the one made by the rosin particles). My concern in the intaglio process isn't solely focused on the health effects of these processes. In my mind, being sustainable is an ongoing process. Because of my continued interest in finding out how I can be more sustainable in my art practice, I decided to make my intaglio imagery by reusing copper etching plates that had already been used and were discarded by other

⁸ Baldwin, James. *BIG Ground* <https://shop.takachpress.com/BIG-Etching-Ground-75ML-p/big-ground.htm>

students. With many different grits of sandpaper and many hours of trial-and-error, I was able to polish the backs of already-etched plates and reuse them to make my work.

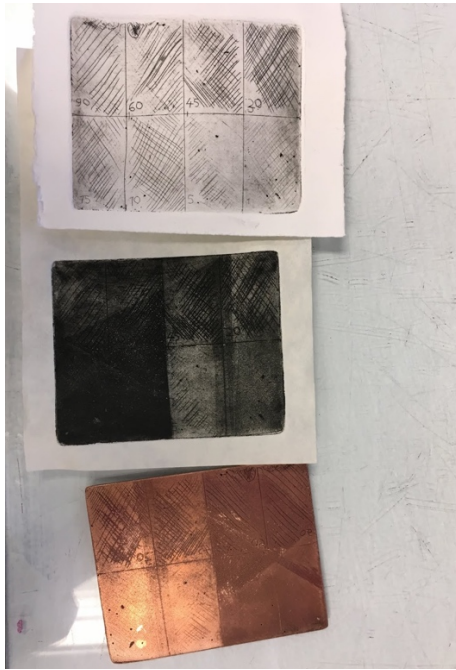


Fig.15 Top: hard ground etch sample, middle: sandpaper aquatint, bottom: copper test plate.



Fig.16 Top: aquatint tests, middle: etching technique tests, bottom: stop-out alternatives sample.

Mokuhanga Water-based Woodblock Print:

Unlike intaglio, a process that found itself moving towards non-toxic practices relatively recently, Mokuhanga –a water-based relief printmaking technique– has been around for centuries. Non-toxic relief printing originated in China but was widely adopted during the Edo-period in Japan some 1,500 years ago.

Mokuhanga, meaning wood (moku) print (hanga), is a water-based form of relief printmaking that does not require wood lacquer, or ink solvents and is therefore very safe to use. The technique uses little more than water, nori paste (made of rice and acting similarly to a glue), and water-based inks to create prints with potential to be intricate and complex. I came across this technique in a class while in my second-to-last semester in undergrad, as I started this project. It

felt like a sign to stumble into a non-toxic technique by pure luck that suited my needs so well. I was able to learn the technique with help of professors, visiting artists, classmates and colleagues in a classroom setting and its rich established history felt like an anchor as I swam in an ocean of new experimental processes that didn't work half the time. Mokuhanga was easy to understand; patience, water, pigment, wood, and paper. Mastering the technique was a different story.



Fig.17 Artist in the process of printing a water-based relief print.

Alternative Processes in Practice (Creative Work):

The first image in this project is made using intaglio printmaking processes that uses a less-toxic substitutions. The print shows four panels with a self-portrait in each one that is slowly being engulfed by flora, both native and invasive to my home on the Mediterranean. The plants grow out the figures mouth and cover the face a little bit more in each panel. In the final panel, the native flora that previously covered most of the figure is wilts while the invasive species thrive. *The Ecological Self in the Age of the Anthropocene*, as this piece is called, places the concepts of Deep Ecology coined by Arne Naess into the Anthropocenic reality we live in today where invasive species adapt to the changing climate and native ones become more and more endangered.



Fig.18 *Redefining the Ecological Self in the Age of the Anthropocene*, intaglio by Olivia Arau-McSweeney

The second image is from *Emergent Ecologies: Landscapes of Pollution* made with the water-based relief process called Mokuhanga. This print depicts emergent ecologies, where alteration in the land leads to species diversity in a view of the landscape from a possible not-so-near future. At first glance, the unusually toned desert scene seems lifeless; a portrayal of hopelessness for the future of our planet, but in reality, these altered landscapes are new ecosystems for species that can survive and even thrive amidst the wreckage of environmental disasters, reframing ecological issues through a hopeful lens. These surreal landscapes tell the story of possible emergent ecologies, where contamination can be opportunity for growth.



Fig. 19 *Emergent Ecologies: Landscapes of Pollution*, Mokuhanga by Olivia Arau-McSweeney

The third and last set of images push the relationship between plants and photography by moving beyond straightforward depictions of natural environments. Using homemade plant-based black and white film developers and the phytogram process these images show both distinguishable depictions of interior and exterior spaces and abstracted shapes made from the contacts of leaves and flowers onto film emulsion. Instead of just photographing nature, the images are made by taking elements from the landscape and making them a part of the photographic process. What results is a series of photographs that perhaps conceal more information than they reveal.

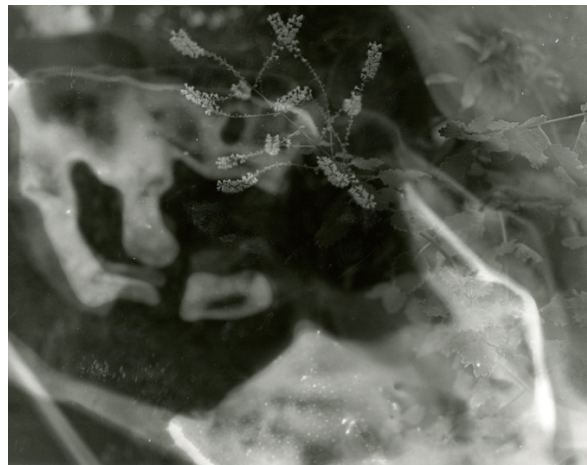


Fig. 20 *Phyto/Photo*, alternatively processed gelatin silver print by Olivia Arau-McSweeney

Conclusion and Further Research:

In the world of photography, relationships between humans and natural environments overall remain in the roles of observer and the observed, dictating a clear hierarchy. As I made these photographs, I wanted to challenge these anthropocentric perspectives while questioning my own ability to understand and responsibly create sustainable work with the environment around me. This project has made me realize that there is a barrier between the photograph and its creation.

In the world of print, a strong connection to process is shared amongst most printmakers. And for me that connection to process meant truly understanding the properties of the materials I was using; copper, wood, water, sugar and thinking about the environmental implications of using these materials. Once the work moves on to the hands of buyers, collectors and viewers outside of the print world, that process and materials used to create imagery can be lost.

These reflections led me to sharing my work in its finalized stage at the Stamps Gallery in a series of books that documented process to go along with a framed print in each of the three processes I had explored. While the framed works –accompanied with a short description on the wall to contextualize them– allowed the viewers to simply enjoy the aesthetics of the prints, the books gave a little insight –mostly through visual ques-- into the steps it took to make this imagery implementing sustainable and non-toxic techniques.



Fig.21 Exhibition view of *Sustainable Printing in the Age of the Anthropocene*

I see the alternative processes in analog photography and printmaking I have explored to be indelibly related, not only in their duplicity and time-consuming process, but they are also all mediums that use materials that remain strongly connected to the earth: plants, wood, and metal.

Chemically, while some processes are more straightforward than others, all these works are transformed through reactions between their materials. I turned to photography and printmaking because the darkroom and print studio bring comfort to my artistic practice. There are clear, specific steps to follow to successfully develop and print a photograph, and there are steps to follow to arrive at a print. This project allowed me to remain in that comfort zone enough to want to keep working but moved me outside of it by forcing me to find uncommon practices in these usually formulaic ways of working.

Now that the work has come to a finalized stage, I look back and realize I only touched the surface of potential in each one of the processes I explored. I could have made three, four or even ten different projects out of this one that focused on one single technique. But my decision to explore sustainable practices in a larger range of print mediums came from my curiosity and sense of urgency in addressing sustainability in as many aspects of my life as I can. It was a way for me dip my toes in a pool or even ocean of sustainable alternative practices and decide if I liked it enough to jump in. Printing in a wide range of mediums made me feel assured that this was a world I wanted to keep exploring and gave me a foundation to now investigate further and in more specific, meticulous ways.

This realization, while overwhelming in the midst of producing the work, now feels like a relief. It simply means there is more work to be done in the world of sustainable art practices. In the digital age it would have been easy to simply substitute printmaking and film with digital illustration and photography as a means of being sustainable. But the roles of my mediums were also to push the boundaries between the physical qualities of material and the content of the work.

My research revealed so many approaches to alternative sustainable art practices. It showed me that our relationship to natural environments in art is often as observers and the environment

remains as passively being observed. I feel that more collaborative approaches to that relationship are largely absent in art. Yet potential for these kinds of collaborations are infinite.

Acknowledgements:

I am deeply indebted to my photography professor Romeo DiLoerto for starting me off on this journey by encouraging me to explore photography in unconventional ways and for giving me my first book on alternative photographic processes.

I thank my IP instructors, David Chung, Stephanie Rowden and Laura Magnusson, and my classmates, for encouraging me, advising me, and sharing their creative vision with me this past year. I am also very grateful to Isaac Wingfield who gave me access to a darkroom and trusted me to experiment in that space, and to Endi Poskovic, Nicholas Dowgwillo and Sally Clegg who generously gave their support and expertise in the many printmaking processes I explored.

I also would not have been able to make this work without the generous support from ArtsEngine and Arts at Michigan, and the Stamps School of Art and Design.

Lastly, I am thankful for the communities that exists in the worlds of experimental photography and non-toxic printmaking for their dedication to education and commitment to openly sharing their findings.

Works Cited:

- Brandt, Matthew. *Lakes & Reservoirs*. Bologna: Damiani. 2014. Print.
- Callicott, Braid. *Encyclopedia of Environmental Ethics and Philosophy*. EnglishView. 2008. Web. 4 November 2018.
- Carson, Rachel. *Silent Spring*. Mariner Books, 1962. Print.
- Doing, Karel. "Phytogram Recipe." *Phytogram.blog* 2016. Web. 15 February 2019.
- Goldsworthy, Andy. *Passage*. Thames & Hudson, 2004. Print
- Hoffmann, Philip. "Process Cinema." *Philiphoffman.ca* Web. 20 August 2018.
- James, Christopher. *The Book of Alternative Photographic Processes*. Delmar Cengage Learning, 2009. Print.
- Marris, Emma. "Nature is Everywhere -We just need to learn to see it." TED. June 2016. Web. December 2018.
- Reinhold, G. *The Caffenol Cookbook and Bible* Community Spirit Publications. 11 October 2012. Web. 17 November 2018.
- "Research" zeamaysprintmaking.com Web. 23 September 2018.
- Tsing, Anna L. *The Mushroom at the End of the World: On the Possibility of Life in Capitalist Ruins*. Princeton University Press, 2015. Print.
- Verney, Jon. (2016). *Thermophile* (MFA Thesis). University of Michigan. Ann Arbor, Michigan.
- Vollimer, April. *Japanese Woodblock Print Workshop: A Modern Guide to the Ancient Art of Mokuhanga*. Watson-Guptill Publications, 2015. Print.
- Witoszek, Nina. Mueller, Lee Martin. *Deep Ecology: Life after Life?* Worldviews brill.com/wo. 1 January 2017. Web. 4 December 2018

Imagery Index:

Fig.1 Gelatin silver print from developed using instant coffee (pg.3)

Fig.2 Color photograph from the Elm series by Andy Goldsworthy (pg.8)

Fig.3 Gelatin silver prints redeveloped in Sulphur springs by Jon Verney (pg.9)

Fig.4 Portrait of the Artist at His Easel, Rembrandt (pg.9)

Fig.5 Las Meninas by Velazquez with a self-portrait of the artist at the easel. (pg.9)

Fig.6 From the series *Lakes and Reservoirs* by Matthew Brandt (pg.10)

Fig.7 *The Weed Wrench, 2* by Patterson Clark (pg.11)

Fig.8 Stage one of making developer out of hydrangeas (pg.12)

Fig.9 Developed in roses, hydrangeas and cilantro (pg.13)

Fig.10 Silver gelatin print using the phytogram (pg. 14)

Fig. 11 Artist preparing a phytogram using rose petals and hydrangeas (pg.15)

Fig.12 Detail of a contact print with combined processes by the artist (pg.15)

Fig.13 *Conservatory I*, alternatively processed silver gelatin print (pg.16)

Fig.14 Artist applying an acrylic-based ground known as BIG to her copper plate (pg.17)

Fig.15 Hard ground and sandpaper aquatint test prints plus plate (pg.18)

Fig:16 Non-toxic intaglio test prints (pg.18)

Fig.17 Artist in the process of printing a water-based relief print. (pg.19)

Fig.18 *Redefining the Ecological Self in the Age of the Anthropocene* (pg. 20)

Fig. 19 *Emergent Ecologies: Landscapes of Pollution*, Mokuhanga (pg.21)

Fig. 20 *Phyto/Photo*, alternatively processed gelatin silver print (pg.21)

Fig.21 Exhibition view of *Sustainable Printing in the Age of the Anthropocene* (pg.23)