Science Through the Lens of Art

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Title: Science Through the Lens of Art.

Abstract approved:

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Major Professor I – Soil Science

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Major Professor II- Art

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Major Professor III– Biochemistry and Biophysics

There is a connection between science and art. This study is specifically looking at the connection between soil science, art, and biochemistry. The traditional display of research in the sciences is in a written form such as a manuscript or journal article. To challenge this traditional presentation of scientific knowledge I conveyed science information to the general public in the form of displayed artwork at my exhibition "Alive and Beneath You" at Oregon State University. An anonymous survey for show attendees was filled out as an evaluation of the exhibition. The survey results indicate that the communication of science as art was a success. More than half of the viewers learned something new about soil. Further, the respondents gave significant support to the finding of alternative methods of presenting scientific information to the general public.
Science Through the Lens of Art

by

Elizabeth Garton

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Director of the MAIS Program

I understand that my thesis will become part of the permanent collection of Oregon State University libraries. My signature below authorizes release of my thesis to any reader upon request.

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INTRODUCTION

Science does not know its debt to imagination. ~Ralph Waldo Emerson

In 2011, I graduated with a double degree in Art and Biochemistry from Eastern Oregon University and went on to graduate school at Oregon State University to pursue a degree in Biochemistry and Biophysics. I thrive better in an atmosphere that includes art and science, and I ended up switching into the Master of Arts in Interdisciplinary Studies (MAIS) program in 2012. When I was first introduced to the MAIS program I was unsure what fields I would pursue. Since I already had some classes in biochemistry, I decided to retain them for my third field, art was my second, and soil science became my first based on my main adviser, Dr. Jay Noller, who is also an artist as well as a scientist.

The two capstones I completed as an undergraduate separately looked at connections between science and art. My capstone manuscript for the biochemistry degree, "Art as a Means of Incorporating Renewable Energy into Society” addressed how art could be used to help make renewable energy more acceptable to the public. For my senior art exhibit, I was in a group show called “Entwined: Rediscovering Moments,” where my focus was looking at human impacts on the environment. The majority of the artwork was fossil-like sculptures of fantastical lost creatures made from found bones and horns in contrast to a central hypothetical “soil core” that provided commentary on the current anthropogenic record depicted by layers of trash hidden by a layer of concrete. While constructing the...
soil column I was taking a class looking at environment and society that became my inspiration for artwork at the time. The overarching idea was that something needed to change, and that society needed to work on becoming more sustainable and to restore the global ecological balance. As an undergraduate, I was more oriented towards activism and calling for others to change rather than using my art to create change.

As I was looking for ideas to put together a proposal for the MAIS program, I was still interested in addressing the connections between art and science. Given that I was choosing soil science as my primary field, I remembered the soil column that I had worked on. This column was primarily created by looking at images of soil profiles and had no pedogenic basis to the layers of the soil other than being aesthetic. I was more focused on the idea of human impacts on the environment. The idea of revisiting the soil column with a different approach was intriguing. Instead of trying to beat the viewers over the head with my ideas, I would focus instead on one of the problems for why the general public doesn't pay more attention to some of the global issues. In my own experience, I found scientific journals to be a daunting read, and as that is one of the primary ways scientists present their information. I thought that could be a good place to start.

*Activation Parameters for Heme–NO Binding in Alcaligenes xylosoxidans Cytochrome c’: The Putative Dinitrosyl Intermediate Forms via a Dissociative Mechanism*

David A. Pixton, Christine A. Petersen, Alicja Franke, Rudi van Eldik, Elizabeth M. Garton, and Colin R. Andrew Journal of the American Chemical Society 2009 131 (13), 4846-4853
The visual problem for publishing scientific information is partly driven by the formatting requirements put forth by the journals. However, I think that some of the issues facing society are ones that need to be presented so that the general public is not only interested in the topic but able to understand key points with less of an educational barrier. I would agree that scientific papers are still useful for dispersing information to other peer researchers that know the jargon being used. However, there needs to be other broader methods for information dispersal to the general public.

I aimed to combine the principles of evaluation used in art and science when I designed my program of study and created a plan for the completion of my degree. Art capstones are typically concluded with an exhibition, portfolio, and a formal discussion with the faculty. In the sciences I have experience with, the completion of a degree is a written thesis or dissertation and an open presentation and defense attended by the committee followed by a discussion with the degree candidate. To incorporate these, I am doing a two-part masters capstone. The first part was creating artwork that was shown in the exhibition “Alive and Beneath You” which was held March 16-April 3rd (2015) in the Art Underground in Fairbanks hall on the Oregon State University Corvallis campus. At the exhibition there was a feedback survey that viewers were invited to participate in. The show was documented with photographs. The incorporation of viewer participation included a viewer art piece, a guest book, and the surveys. The documentation of the show was then put in a written format that is reminiscent of a thesis, but it also will be included in a defense presentation. This document is the thesis for the second part of the capstone.

A standard format for a research manuscript is to have five sections: introduction, methods, results, discussion, and conclusion. Only a portion of the information that I am including in this document fits into the traditional format. Therefore, some of the sections are combined. The art pieces are addressed as their own discreet sections. Each art piece is presented with the photo documentation and the information that accompanied the artwork at the art exhibition, then how the artwork was constructed is addressed followed by analysis of the artwork. Likewise the survey is treated as a separate section with results and discussion.
LITERATURE REVIEW

Anything else you're interested in is not going to happen if you can't breathe the air and drink the water. Don't sit this one out. Do something. ~ Carl Sagan

A call to action. Do something. The global problems facing the world today are requiring multidisciplinary and interdisciplinary approaches. The eyesore argument, as Carlson (2000) calls it in the book *Aesthetics and the Environment: the Appreciation of Nature, Art and Architecture*, posits that considerations are made for both the ecological impacts and the aesthetic impact. Carlson uses the example of trash alongside roads, where people are more likely to take action if it is to improve the aesthetics by whatever approach. It is not a stretch to think that something that is more aesthetically oriented is preferable and that something that is aesthetically displeasing is less likely to receive attention. Carlson (2000) further explains that “The dilemma is that we are divided between two conflicting ways of dealing with something that we initially do not aesthetically enjoy: one is to change the world such that the object of aesthetic displeasure is eliminated; the other is to educate people to change their aesthetic sensibilities such that the object, although itself unchanged, can be experienced as aesthetically pleasing.” A modified version of the first, to not eliminate the displeasing aesthetic but to provide an alternative instead, is the basis for why I chose to use art as my medium of presentation in contrast to the information being presented in journals.

The combination or merging of fields is not new. Soil in particular has a long history of being used in the arts as well as many other fields. However, “Among other efforts to increase soil awareness, concerned artists have been reclaiming the image of soil as a culturally, aesthetically and ecologically invaluable common good. From the early environmental art of the 60s and 70s to more recent artworks on urban and industrial brownfields, soil functions such as growth medium and habitat, archive and contamination filter have become subject matter for artistic expression and public discourse.” as noted by Toland (2010) in “Soil Art: Bridging the Communication Gap.” Artists are taking soil and incorporating it into their artwork, some in the passive sense, that it is just visible but not a key component, whereas some are using it more actively to
raise awareness of issues, like those presented at the Dirt Dialogues at the 20th World Congress of Soil Science in Jeju, Korea 2014. A project that was relevant to using the combination of art and science is a masters thesis done by Samantha Wallis at Massey University in Wellington, New Zealand in 2010 where she was working on her master of fine arts project “Art and the Greater Good: Ecology and the Leisure Economy” which was looking at a space that was occupied by a desolate shed and hosted a site specific artwork installation “Would you go on without me?” where rainwater was collected to water the installations plants. There are also artists using soil actively in their artwork such as Newton and Helen Mayer Harrison (2014), the couple who created “Making Earth” (1970) in association with their Survival series where the artwork had a more educational component. The educational component is a driving force behind my thesis project.

The popularity and public concern for environmental issues is on the rise and is playing a role in activism. Landa and Feller (2010) in their book, Soil and Culture, address the omission of soil education and environmental concerns in society:

While the lack of enthusiasm of artists for Soil is somewhat understandable, earth scientists in general, and soil scientists in particular, deeply regret that the Soil, as a physical entity in nature, is not given greater consideration within the entire education sector – from primary school to the college and university level. It is also regrettable that national and international policies do not systematically consider the soil as a natural resource to be protected . . . Soil is not the chief subject of independent artwork, it is perceived and included as a part of the landscape. (2010, p.4 )

It is a challenge to present science to the general public; it is also a challenge to teach complex environmental issues to a diverse student population. This is an area that requires renovation, from problems with funding for the arts to bored science students. There is an overarching problem in the presentation of science that the information is predominantly dry and jargon heavy. For this project, I am looking at journals for their repelling visual impact on the viewer, and more specifically, at the presentation of soil science as artwork: a directly applicable component to the argument that art is needed and that the presentation of science can be made fun.
There are many programs that recruit youth for science and liven up scientific information to capture their interest. Likewise in art, programs are trying to repair bias against the liberal arts to increase student retention. The creativity that is lost in the process is unquantifiable. Art teaches students how to be creative, how to consider the consequences of what you do, how to think outside the box, and how to think for yourself. Science teaches students to be curious, methodical, inventive, and able to synthesize information. How the information is taught and how it is presented can make a huge difference in how the students understand the concepts. The presentation of artistic ideas can run into the same problem as scientific research: the information is coming from an authoritative voice in the field to an audience that may not have extensive knowledge of the topic. Also the presentations can tend to be dry if the presenter doesn't actively try to liven up the material and make it relevant to the audience. Information that is presented with a “why is it important in the big picture?” is a necessity but can be lost when focused on the small details of a subject, reaction, or environment.

How the information is presented has a dramatic impact on what is retained by the learner. Other avenues that look at presenting information to viewers are art galleries and museums. Directors have a significant task in how they arrange the work on display in the most effective manner and have several things to consider, as noted by Thorsgard (2006):

- Who is the potential audience?
- What is the message that the work says as a whole?
- Is the display appropriate?
- Is the lighting appropriate?
- Does the arrangement make sense?

Another aspect to a display is how the audience is prepared to view that display. Are the viewers given pamphlets that describe the history and relevance, or are they viewing it as a novice that has to get all the information on the spot? Are there panels of information presented next to the display that the viewer can read, or are they left to their own background knowledge to interpret the display? Those are just some of the decisions that need to be made from the side of the presenting body. Also, questioned Thorsgard (2006), then what about the audience? What is expected of them? How can they maximize their
experience? In the article, "Through the Eyes of a Novice Viewer: Learning about Art in the Museum" by Judith Noble Fowler (2002), there is a review of two approaches suggesting how to get the most from a display. The first approach Fowler addresses is the Wink-Phipps (2000) Visual Analysis Guide, which has four main things to look at. First, look at and identify all of the information available; second, look at the artistic choices; third, look at the big picture and cultural context; and finally, look at what are the impressions of the viewer. The second model that Fowler presents is the Museum-Goers Guide, Feldman's (1994) model of critical study, again with four main points: visual factors, formal qualities, interpretations, and judgment. The Wink-Phipps and Feldman guides focus on the viewer going to a place where there are displays. What about when the viewer comes across something outside of that environment? This is one of the times when the role that art plays in schools is pertinent. Schools need art education that prepares students similarly to what the guide suggests so that whenever they encounter something they can analyze it. Why not apply these approaches to scientific information when addressing the general public?

An example of where people would benefit from having a basic method of analysis, is found in an art installation: “The new emphasis placed on the viewer and the literal interaction with the work—the possibility to enter the art and to engage the entire site of the gallery—broke the paradigm of the passive viewer” (Veikos, 2006). The quote goes beyond the gallery; art installations can be anywhere, they could be the sidewalk you walk on or the tree you walk by. A prominent installation artist, Nils-Udo, goes into a given environment and with only materials at hand creates installations that invite the passerby to investigate. The work creates commentary about the environment it is in, drawing attention to things that otherwise would be overlooked, just by simply changing the aesthetics. Nils-Udo describes his work as a “documentation of a dying world experience” and that “we must realize and accept our responsibility for the ecological problems that have been intensifying, and that a step toward this can be achieved through works of art” as Song (2010) indicated in “Art in Nature and Schools:Nils-Udo.”

Nils-Udo brings information to the public in installations which is a form of education. A way of getting the analytical visual information out into the community and
presenting it to students that can then turn around and employ the methods to essentially change the world. There are already organizations trying to bridge the gap that has formed between art and science to increase understanding. The Trinity Catholic School in Leamington Spa, England is a group working on an innovative approach by taking art and science students to form a collaborative joint laboratory installation show using both fields. In “Laboratories' installation” students did experiments while being artists in residence, creating artwork about science, as discussed in “The Contemporary Art of Collaboration” by Horn (2008).

It is encouraging that there are movements for interdisciplinary study and the rejoining of science and art. However, the focus on youth is extremely important, but there is still room to improve the higher education systems and industries that are doing research that falls short when communicating with the rest of the world.

For this project, specifically, the focus is on the education of the viewer and the participant of the exhibition. The artwork is to be evaluated both as an educational tool and as a piece of artwork. To critique and analyze the artwork a list of criteria were pulled from Barnet (2008). Including considerations of:

• the scale of the art piece
• the materials
• the relationship between parts (in this case including surrounding pieces)
• the site (the location was consistent, but again it is the relationship between pieces)
• the title (relevant for presentation of scientific information)

Also included were fairly standard mentions of

• color
• form or design
• texture

The analysis of the educational portion of the show was done by use of a survey that was available on location for viewers to complete after viewing the exhibition.
For the development of a complete mind: Study the science of art.

Study the art of science.  ~ Leonardo Da Vinci

Art Exhibition: *Alive and Beneath You*

The “Alive and Beneath You” exhibition was held in the Art Underground\(^1\) of Fairbanks Hall on Oregon State University campus. The Art Underground is the third gallery space in the building and typically only houses one or two student projects at a time. The primary purpose of the space is as an art student lounge and work area. When projects are displayed in the space it is usually a short term installation when student work is on display for a critique in class and then is taken down. This exhibition was slightly different, the whole room was rearranged and a majority of the furniture was moved into a back room for storage. Three tables, a bookshelf, and the furniture in the constructed room were retained. Also the length of time the artwork was installed, three weeks, was extended for the purpose of increased viewer exposure.\(^2\)

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\(^1\) Seems fitting that the formal name for this gallery matches well with this exhibition.

\(^2\) Special thanks to the art department, staff, and the Fairbanks Hall building manager, Loril Chandler, for helping make it possible.
I went through several designs of how to set up the exhibit. The idea of how the exhibit would be displayed was initiated when the sculptures were started. The overarching idea of the layout was to help tell a story as well as to help organize the information presented. Once I decided on using the 12 soil orders as the vehicle to test the presentation of scientific information, then the focus became about the story and how it was told. One of the ideas was to make it semi-chronological with the oldest soil orders displayed first working up to the youngest at the end of the exhibit with a distinct path through the show. Another idea was to pair the pieces based on intrinsic properties, specifically CIORPT (Climate, Organism, Relief, Parent material, and Time). I ended up following a pairing or association based approach after a couple of key pieces were in place. The layout of the room and overall aesthetic was a consideration as well.

The placement of the Mollisol (the video projection on a constructed paper wall) was the starting point. The light and changing imagery were eye-catching and were placed directly in front of the entrance. I also saw this as the most significant soil order with respect to society. Not only is it the dominant agricultural soil but it had the largest visual connection to people through the photographs. However, by creating the screen of paper and then covering it with journal articles on the entrance side I was visually confronting the viewers with the core issue I am addressing. From there I wanted to place eye-catching pieces in strategic places in the room to help with the flow of viewers through the exhibition. Specifically, the Spodosol (wall mounted and vibrant colors) and Climate Vân (large imposing, vibrant, and interactive). Also, there were space considerations with some of the pieces based on their size and accessibility in relation to the room. Once the restrictive and attention catching pieces were in place, I added the associated pieces. For example, the Mollisol and the Alfisol were paired based on the agricultural and cultural significance. The Oxisol and Ultisol are both soil orders that are of concern for the tropics, they are highly weathered and difficult to repair if damaged. The Aridisol and the Gelisol I paired based on climate as both have dominant climate factors; aridisols are lacking water and gelisols are where it is cold year round. The Inceptisol and the Entisol were paired based on limited profile development. Andisol and the Histosol were paired for having dominant parent materials; histosols with high
organic matter and andisols with strong ties to volcanic activity. Finally, the Spodosol I paired with the Vertisol for have distinctive visual properties; spodosols with a wide variety of profile colors and vertisols with shrink-swell clays.

Those choices were all loose pairings and were the basis of how I decided to arrange the show. The thought behind the pairing of the pieces was to guide the viewer to make connections with the surrounding pieces of artwork. In art, it would be helping with guiding the general public to look at context of the artwork and with the soil science it was questioning viewers to compare and contrast the work to see the trends and the unique properties of the different soil orders and properties. Therefore, as the viewers were looking at the provided information of the 12 soil orders they were also picking up other relevant information like ClORPT, profile horizons, as well as other details that were explained in the accompanying wall panels.

In addition to the artwork at the exhibition, there were several opportunities for viewers to participate; including a guest book, a feedback survey, and an interactive wall which was in the constructed room and was set up for participants to add their own touch to a community constructed piece of artwork.
Alfisol

**Alfisols:** (Nonsense syllable, aluminum [Al] and iron [Fe]) Second major agricultural soil

These soils are similar to the Mollisol soil order in that they are fertile soils used for agriculture. Typically Alfisols originate under hardwood forests and have accumulations of clay.

**World's ice-free land:** 10%

**Fun Fact:** This soil order like the Mollisol is of great concern for sustainable management. One hectare of arable land is lost every 7.67 seconds whereas the world has gained 10-25 more people. ([http://www.tranquileye.com/clock/](http://www.tranquileye.com/clock/))

**Special thanks** to Nina Cassidy and Emerson Vineyards for allowing me access to photogenic locations and sample collecting areas.
Alfisol

Methods of Construction

The original idea for the Alfisol was a sculpture that would be paired with the Mollisol. During the course of being a graduate teaching assistant I was connected with Emerson Vineyards through the SOIL 205 class service learning projects. I started taking photographs periodically and kept a collection of images. The documentation started as a side project to the documentation of the student farm for the Mollisol. As the Mollisol evolved from sculpture to projection, the Alfisol was stagnating and other soil order artworks took priority. Then I found the metal frame at Goodwill and was inspired to use it although I didn't have a clear idea of what I would do with it. The “jellyfish” and eye like appearance came from doodling on a picture of the metal frame. From that doodle, a photo collage started emerging. The collage has a split chronology starting in the lower right corner. From right to left the image goes from the start of the season to the end of the season, across the top the grapes progress to the harvest point, the lower line follows right to left from the harvest to the end product of one of the wines. In the “pupil” area, the center to the whole process, is the soil that the vineyard is grown on. In connection with this central image are the soil peds that are held in the grasp of the metal frame. I collected soil samples from a profile at the vineyards. The samples were air dried and then glued together to make the peds stick together and retain the shape to stay in place in

Figure 3: The soil horizon samples air drying.
the metal frame. The finished piece is the metal frame, which was prepared and painted black, the peds, and the collage which was printed and mounted on foam board.

**Evaluation**

The Alfisol was mounted on the wall to be viewed at about eye level or just below for a standing adult. This put the photographs at an easily viewable height and the soil peds just below where they confront the viewer. The metal work that was re-purposed appears to be able to hold wine bottles upside down which ties in with the progression of soil to wine depicted in the photo collage. The foam board was used under the printed collage to help balance out the side profile of the sculpture. The foam board was touched up to make the profile black and extended the line formed by the metal frame. The use of the metal frame was successful in creating an interesting overall shape and composition. The frame also was more successfully integrated into the overall artwork than some of the other sculptures. There are strong wine related references that tie in with the photographs.

The progression of the images telling the story starting right to left instead of left to right is backwards from traditional reading. The reason for that was primarily driven by the composition of the individual photographs. When joining and blending the images the story started to appear, which informed the story movement in the collage. The progression of the images across the top showing the grape plants growing is aided by the use of color from green to reds and oranges, and the grapes from green to purple. Although the prominent orange leaves were an artifact of a

![](Figure 4: Alfisol detail.)
damaged vine the photo referenced the visual change of colors associated with the change of seasons.

The reference to jellyfish has no direct connection to the soil but it was employed as an eye-catching element, it also ties in with the exhibition theme of soil being alive. There are undertone references through most of my sculptures that reference aquatic and sea creatures through alluring forms. There are many aspects of soil that are alive from soil micro biota to larger terrestrial biota, including humans. Within the soil many of the biota are aquatic therefor the spirally forms referencing sea creatures are also applicable. In soil the forms are just smaller.

The eye reference was used to tie in with the human element of alfisols being one of the primary agricultural soils. It was also drawing connections with the Mollisol projection that was displayed next to the Alfisol. The proximity and the use of photographs was used to help make the connections between the two soil orders.
Andisols: (Jp. -- Ando, dark) Volcanic

These are typically known as the volcanic soil; a soil that was formed in association with volcanic materials, primarily ash. They are typically productive and fertile, however plants have a difficult time accessing the stored nutrients.

World's ice-free land: 1%

Fun Fact: Although known as the volcanic soil, not all are volcanic material based, but they are very common in the Pacific Northwest and the rest of the Ring of Fire due to the high volcanic activity in the past

Special thanks to Kelly Morales for the soil samples.
Andisol

Methods of Construction

There were several versions of the Andisol, the original frame of the Histosol started as the Andisol. It was large and had a cavity on the inside. The original idea was that the cavity would be filled with glass and painted to reference lava. The exterior, which was covered in plaster, was going to reference smoke, ash, pumice and cooled lava flows. The sculpture was partially finished and was running into several technical difficulties. It went on hold while those issues were addressed. Then the decision was made to demolish the breaking plaster and be remade as the Histosol. The next idea for the Andisol was to make gem-like sculptures referencing obsidian and the cracks above active lava tubes that allow viewers a glimpse of the lava flow. This idea morphed into incorporating another aspect of an andisol into the sculpture. The idea was to incorporate that the soils are fertile but the nutrients are hard to access. The obsidian that is used in this version was collected on a field trip that covered Southeastern Oregon. The piece of obsidian specifically looks like a mountain with the flow lines resembling lava flowing down the “mountain”. One side of the obsidian has a weathered rind and the other side is the traditionally shown shiny, black, and glassy surface. Working with the inherent design, I wrapped colored armature wire around the obsidian, one side like the root structure of a tree holding on to the surface and on the other side highlighting the flow pattern. To bring in one of the other classic properties of andisols, an ashy soil with distinct color changes between the horizons was used, where each layer was very ashy. The samples were from Eastern Oregon, and generously donated by Kelly Morales. The basin and the metal stand were found at Habitat for Humanity Restore and were used for display purposes.
Evaluation

The Andisol was displayed as a free-standing floor sculpture which was located in near proximity to Climate Vân, the Histosol, and the Gelisol. The Andisol was not as vibrant or imposing as the sculptures around it. This was one of the weaker points of the exhibition layout as it was easy to overlook this piece. Under ideal conditions this piece would have a solid white background that would help highlight the piece as well as having limited other pieces as distractions.

The size of the metal stand was not large enough to impose and not small enough to put on another base, perhaps a small platform would have helped. This piece incorporated the metal work but was not as integrated as some of them, like the Alfisol, the primary purpose of the metals was for display and continuity with the other pieces. The gem-like quality and the incorporation of the wire worked well together for highlighting key features. The exploration of combining wire, rock, and soil is one that I will revisit in the future.

The design of the soil element was aesthetically arranged following the horizon layers out, where the surface layers were the center and the deeper layers were around the perimeter. The samples were layered on top of each other creating a concave surface that conformed to the bowl and reflected the base of the obsidian hanging above. The correlation between the obsidian and the ashy soil can be inferred with references to volcanic activity, however, the viewer would have to spend time examining the artwork and also be able to recognize ash and obsidian. This makes this artwork less accessible than some of the others. This is a problem given the premise of my masters project. If I were to redo this piece I would add a hands on component with labeled elements like ash that viewers could handle in comparison to the soil samples as well as adding something more vibrant to the artwork.

Figure 7: Andisol soil detail.
Aridisol

**Aridisols:** (L.-- Aridus, dry) Water limited

Arid-dry, noted for being a soil of deserts, the lack of water limits the type and quantity of plants, as well as the weathering of the soil. These are also soils that accumulate salts, silica, carbonates, and gypsum due to the water being used up or leaving the system before reaching the water table.

**World's ice-free land:** 12%

**Fun Fact:** Alfred Nobel (Nobel Prize) made his fortune mining Aridisols for dynamite.
Aridisol

Methods of Construction

The Aridisol is very similar to the original idea, although the process to get it to the end sculpture went through several tests to make the form work. To start with this was going to be made with plaster, gypsum, which is commonly found in arid regions, after issues with cracking in the plaster on the larger pieces due to weight I started experimenting with other materials and eventually found expanding foam to be a media that was conducive to the various sculpture shapes.

The internal structure is a fine gauge wire mesh that also has a larger gauge wire that forms the backbone. The frame is covered in expanding foam then slightly shaved down to shape. The sagebrush has an aluminum foil core that was then wrapped in a variety of wire gauges that then go down on to the “soil profile’ where the larger gauge wire pieces hold it together and the finer gauge wires fan out to make a root pattern. The “leaves” are shaved pieces of foam that are painted and attached. The coating over the foam for the “soil profile” is a combination of spray adhesive with a mixture of soil and sand in a range of colors including an off-white, a light brown, and a grey mix.

In the middle of the spiral is a lighter portion that is referencing the accumulations of salts, gypsum, and carbonates that can be seen in aridisols. Also tying in with the accumulations, the metal frame that displays the sculpture has a center core that is salt covered. The “soil...
profile,” roots and sagebrush are enhanced or highlighted with spray paint. The metal stand was also a Goodwill “find” that was made to match the other stands and then is attached to the sculpture by twisted wire.

**Evaluation**

The Aridisol is the smallest of the 12 soil order sculptures, although it was one of crowd pleasers. However, details of it seem to be lost in the quick viewing. The salt accumulation that is integrated into the metal frame was mostly overlooked. The entwining of the plant, roots, and soil column was well received. The execution of the joining was not as solid as I would like. The spray adhesive stays slightly sticky and the sand was shedding during the exhibition. This partly could have been due to the proximity to the heater and the high head in the space during the exhibition. In the future for similar applications I will explore additional types of adhesives. The adhesive I used has the advantage of being a spray and the ability to get adhesive into inconvenient spots.

The metal stand worked well at holding the sculpture in place and I felt the sculpture worked well with the stand. However, it was one of the sculptures that the use of the stand was questioned. I would have preferred that the sculpture be free hanging, or levitating without tethers but given the complications with that I chose to make the stand visible. Also I am inspired by found elements, in this exhibition many of those items were spirally metal. The idea was that the metal helped tell the story of the pieces, it was the substitute structure, in soil it would be the underlying structure or parent material, for example the Oxisol and Ultisol the metal was weathered and older in contrast to the clean metal supports of the other pieces. In the Aridisol the metal stand is integrated in the sculpture more by use of wrapped wire tethers as

![Figure 12: Detail of the salt accumulation inside the Aridisol stand.](image)
well as having an element, the salt, in the stand itself. The idea behind the salt was both showing the accumulations of salts, and that the salt is a part of the structure of the soils, indicating an integrated part of the soil order.

A component that did not make it into the final version of the sculpture adequately was the visualization of lack of water. Originally this was going to be indicated by the constriction of the roots making it look like the roots were wringing out the soil profile for both nutrients and water. However, creating the look of constriction was not satisfactory visually. Another idea to address this was an empty vessel, a large vessel with a very small amount of water, or the large vessel with minimal water and lots of salt rings. The last one was the closest to being in the final version but the problem became adding too many elements in one piece. I decided the lack of water was hinted at with the vegetation and the salt accumulations.
Entisols: (Fr.--Entier, whole) Limited development

Soils with very limited profile development and are predominantly derived from the parent material. This could be due to erosion of the soil, or unstable landscapes that yield new deposits of soil materials.

World's ice-free land: 16%

Fun Fact: Entisols are one of the most dangerous soil orders, and are the source of quick sands.
Entisol

Methods of Construction

The Entisol was another sculpture that the end result was like the original design. The idea was always to have a living component or at least reference a stunted tree growing on a slope. The simple spiral was also part of the design to indicate the limited depth of the profile. Although entisols can have a component of high turn over with colluvium, debris that shifts from farther up slope, frequently there is some from up slope and some soil that shifts farther down slope. Entisols are typically a young soil due to this and do not exhibit pedogenic features.

The form has a center of metal wire and hardware cloth, for balance there are rocks in the center. Then the frame was coated with expanding foam, multiple applications, with several additive and subtractive work. The foam was cut to form and once the shape was right then the surface was lightly sanded, then spray painted in multiple layers and types. The rock-like crevices texture is the result of the raw expanding foam. The form has a hollow portion to accommodate the live juniper plant. The juniper was chosen based on the overall form of the plant, it was then enhanced with wire wrapped around the branches to shape. The metal stand was from the Habitat for Humanity Restore and was modified to form fit the base of the sculpture.

Evaluation

The stand was used to elevate the sculpture to where the tree part of the sculpture was relatable at head level. The tree was chosen to look stunted and conform to the form.
of the sculpture. The stand was separate from the sculpture, this made transport and positioning easier, however, it was not as aesthetically polished as some of the combinations with the metal frames. The display of this sculpture was difficult to settle on. One of the original ideas was a single supporting rod with internal branched support to maintain the angle. The modified base was going to have the prongs on the inside but as I was working on it I found the look on the outside was referencing a grommet-like setting of stone. The idea of the sculpture was to look like stone so I chose the grommet-like stand. Another aspect of the stand was that it was rather precarious which ties in well with the properties of the soil order.

The rock portion of the profile was accomplished with foam shaping and spray paint. One thing that was interesting about this piece was that the foam continued shrinking and swelling created cracks and a non-uniform surface which aided the appearance of rock and referenced shifting ground. I am not sure why this sculpture in particular was more susceptible to the foam changing. Perhaps it was due to the hollow space inside, the repeated application of water for the tree, thick spray paint, changing temperatures and light or a combination of them. I noticed when I was working on the foam that if it was left exposed to the sun it would darken in color. I also noticed continued surface modification on the Ultisol although not as pronounced and it did not crack the surface. The Ultisol was hand painted with acrylics so the application of spray paint on the Entisol could have been what induced the cracking.

Another issue with this sculpture was the survival of the juniper, although the juniper was kept size restricted like a bonsai prior to being transplanted into the sculpture the juniper eventually died. The conditions during the exhibition, hot, dry, and poor light quality seem to have stressed the plant and then the sculpture went to another display for several days. The combined stress seems to have been too much for the plant to survive. I am continuing to experiment with the use of plants in artwork. I think that getting the plant more established prior to the stress of a new environment would have helped. Overall I felt this piece was a success but there were a couple of elements that could be improved upon.
Gelisols: (L. -- Gelare-to freeze) Frozen

Gelisols can be any soil type but are distinguished by having a permafrost layer near the surface, which indicates that the soil is frozen year round. These soils can also show ice segregation. They are found in polar regions or at high elevations.

World land: 9%

Fun Fact: Gelisols are one of the soils that can undergo cryoturbation, or the churning of the soil due to freeze thaw cycles. Cryoturbation can result in interesting patterns forming on the landscape constructed of larger soil materials, like rings formed from rocks.
Gelisol

Methods of Construction

The Gelisol was the first official piece of the 12 soil orders series. It is made of plaster which gave the cold and white blank slate appearance I was looking for. Gelisols can have the properties of other soil orders but the distinguishing feature for a gelisol is that they have a permafrost, a year round frozen layer. The sides of the Gelisol are references to soil monoliths, which are preserved vertical soil profiles, each having a different pattern. The internal structure is metal hardware cloth then covered in plaster. After issues with structural cracking of other plaster pieces, expanding foam and foam pieces from shaping the other sculptures was used to fill the hollow center. As with all of the other art works this piece has a re-purposed aspect. The plaster is from a local business that makes plaster cast figurines. They ordered in their plaster and were shipped the wrong batch. This batch of the plaster had fiberglass fragments added, which is used in other applications but was causing problems with casting. The shipment was going to be discarded and I rescued some of it. The metal stand unlike many of the other stands was not a found re-purposed item. There were several ideas associated with how to handle the display and stand. This included ideas for ice looking glass as a base, a coating for a pedestal that would look like melting ice, and another version that would have used the center to hold dry ice to make the local environment cold. There were logistical problems with making some of those bases work.

Evaluation

The stand for the Gelisol was the last addition to the piece, I struggled with what to do for the base. I ended up
choosing the base I did for display purposes making it connect to the other soil order pieces and the incorporated twisted metal. This was the least successful in terms of the base fitting with the piece. I do not know what I would use instead for this piece. If I were to redo the piece I would explore an option to digitally design a sculpture using data for 3D printing but making 3D models of profiles and then imposing them on a column. The blank slate is still an important part of the point I am trying to get across in this piece. I think there should be better ties to the permafrost layer. I think dry ice or liquid nitrogen could be used in this but would require other considerations regarding the space. Climate controls would be another aspect to explore, in an environment where the Gelisol would be kept cold, and the Aridisol, Oxisol, and Ultisol would be noticeably warmer. Given the space, the warmer temperatures were partially accomplished by being near the heater, however for the Gelisol there was no where in the space that was noticeably cooler.

For the 3D model idea it would be best if actual profiles of gelisol soils were used so that would require travel to the sites or collaboration with someone to get the data. While this is ideal I did not get significant exposure to this process until the term I was constructing my show which was too late to follow this idea to completion. This option though would have improved one of the short comings of this piece, which is that the profiles are not detailed enough and although all the sides reference profiles they lack specific details.

Another issue with this piece is that it is not as accessible for novice viewers. This piece does not stand alone as well as some of the other sculptures. Without the context in conjunction with the other pieces this piece starts to look like a pedestal for something else or a decorative column.

This piece was the first completed (minus the stand), the progression from this piece to some of the others is pronounced. Originally this was a piece outside of my comfort zone based on previous works, going from organic forms to more a geometric form. Although I returned to the organic forms and explored other aspects of the process, the Gelisol provided a good contrast to the more organic pieces.
Histosol

**Histosols:** (Gr. – Histos, tissue)
Excessive organic matter

High organic matter accumulations dominate this soil order, which is commonly saturated year round. They are formed by the organic matter accumulating faster than it can decay. Histosols are also known as muck, peat, moors, and bogs. These soils are very susceptible to change when part of the environment is altered, such as draining. Histosols are also slow forming due to the specific conditions required for the accumulation of large amounts of organic matter.

World's ice-free land: 1%

**Fun Fact:** Histosols are the source for the peat moss used in gardening which are harvested from peat bogs.
Histosol

Methods of Construction

Originally the idea for the sculpture representing a histosol was vague only focusing on the stages of decomposition. The initial organic matter which is recognizable to the mostly unidentifiable. The frame for this piece is a reincarnation of the first Andisol sculpture. The first Andisol was plaster coated but there were structural problems and it was deconstructed. The plaster was removed then spray foam was added to the wire and rebar frame. The foam fixed the weight induced cracking and the structure acquired a springy quality. The foam is left raw without shaving or cutting. The foam was then spray painted with a mix of colors, browns, black, white, and grey. The next layer was spray adhesive with moss. The moss was sorted before it was put on the sculpture. The more green and intact pieces were placed at the top and then slowly progressed to more brown then less identifiable segments and beginning to mix with peat moss. Then there were touch ups on color with spray paint. The sculpture is hung so that it can swing in response to air movement and gives it a more alive feel.

Figure 19: Plaster being removed from the frame to be replaced by foam.

Figure 20: Tests of layering spray paints.
Evaluation

The Histosol turned out to be an interesting piece. The sculpture responded to air movement and would turn and sway, which was a quality that supported the show's theme of Alive and Beneath You. It was also a prominent sculpture that was initially viewed from the entrance. The foam added a billowy fluffy appearance that aided the lightweight accumulations connection. The Histosol was a success: the progression of decomposition, the accumulation of organic matter, and the movement both implied and responsive of the sculpture.

At the exhibition, I was available to answer questions for the first week and intermittently for the second and third weeks. During the time I was in attendance the viewers showed interest in the movement and surface of this piece. This observation was not quantified but indicated the interest I was looking for in making alluring artwork to get people curious in the artwork and the information that accompanied them. I did notice that since this piece was hanging from a beam with access on all sides, the accompanying information was not as obvious, therefore, I received more questions about this piece.

The questions were good, although I think having the information panel is an important part of the display. A floor panel would be one way to address this but the aesthetics of the panel would be crucial. My idea for the panels was that they be nondescript but have portions that highlighted the information. They were printed on white card stock with black ink. The Histosol was hung above the bare floor, except for in the profile photo which has a white sheet of banner paper under it to show the shape better in the photo. The floor in the Art Underground has an expected art patina with a random mix of paint splotches. This character makes creating an information panel a challenge. The panel would need to be visible enough to not be tripped over and discreet enough to not distract from the artwork.
Inceptisol

**Inceptisols:** (L. – Inceptum, beginning) New or recent

The “new” soil can be anywhere and is noted as only having moderate weathering and development, but more so than Entisols. Typically Inceptisols form rapidly from the parent material and are a young soil.

**World's ice-free land:** 17%

**Fun Fact:** A rule of thumb is that most hill slopes are assumed to be Inceptisols until proven otherwise.
Inceptisol

Methods of Construction

The Inceptisol idea was to have it be an inceptisol soil in progress. In the art piece, soil would be being created. Originally the idea was that the sculpture or installation would be an accumulation of debris in a corner and it would have living plants. The idea behind the vessels that contain it, was that soil can form anywhere. Granted, it would take significantly longer than the length of the exhibition to truly create soil with the complexity that entails. However, to visually make the point for the viewers that soil is living, always forming, and with any new addition of a parent material and a weathering agent, in this case organic material, water, and biota; soil will form. The two vessels were re-purposed items and a metal stand was purchased to fit them for displaying. The litter used was a combination of accumulated organic matter that was near a hops plant in a backyard in South Corvallis. In addition to the hops litter, moss was collected from a gravel area that had slight accumulations of material, then added on top of the hops. The process of decomposition and plant germination continued during the exhibition. There were unexpected plants that appeared which was a nice surprise and added to the transient aspect of inceptisols.

Evaluation

This piece was another one that the stand was more driven by drawing connections with the other sculptures than any specific connection to properties of an inceptisol other than the stand was new which ties in loosely. The sculpture was in the glass vessel with decomposing material, while it was decomposing and growing I was working on how to display it. When I got the stand for the Gelisol I got more than one
size to find the right fit. The shorter stand ended up being used for the Gelisol. This left the taller stand which I ended up finding a basin that would fit in. Then I put the glass vessel inside, symbolically I felt the two degrees of separation would help with the depiction that soil can form anywhere and that it does not necessarily have to be local. It could be aeolian based, by blowing in from somewhere else.

The Inceptisol was changing even during the short time of the exhibition. I found this was a strong connection to the soil order it represented. The Inceptisol and the Entisol were both working with live plants this provided challenges in keeping them alive and looking well in a hot dry basement. Beyond that though the plants were a new process and one that I will continue to explore.
Mollisols: (L.--Mollis, soft) Traditionally used for agriculture

The most fertile and productive soil used for agriculture, they have high organic matter and therefore have a fairly dark soil. Typically Mollisols originate under grasslands on steppes.

World's ice-free land: 7%, USA 25%

Fun Fact: Mollisols became a national concern during the Great Depression (1930's-USA), where the great plains of the USA and Canada suffering from drought became what was termed the “Dust Bowl”. The soil was loosened by tilling and the native deep-rooted grasses were removed exposing the topsoil to the wind. The soil was carried off by the wind (becoming Aeolian parent material when it settled out) leaving the land depleted and barren. The “black blizzards” reduced the visibility to 1 meter as the soil was swept away.

Special thanks to James Cassidy and the Organic Grower's Club for allowing me to conduct photo-documentation of the activities at the student farm.
Mollisol

Methods of Construction

The Mollisol idea originally started out as a sculpture. There would have been a soil profile spiral intertwined with plants, similar to how the Aridisol turned out. The sculpture would have been in a metal cage. The idea behind the caging of the Mollisol was referencing the display and study of subjects in science as well as how endangered species are treated, many ending up in captivity. Mollisols are being lost at an alarming rate, with lowering fertility and loss of land to urban areas. The construction of the sculpture was hindered with finding the right materials and lacking inspiration. The idea was strong but the actual representation seemed to be lacking something. One of the attempts to fill that void was to add a more agricultural element by using images from seed catalogs, where instead of metal the cage would be made of images. This also was lacking something and then stagnated while I worked on other pieces.

Then I was in a documentary photography class for one of the projects, students had to find a group or event to document. The group that I documented during the term was the Oregon State University Organic Growers Club as they worked at the student farm. One of the projects was a book of images that told the story of the club. After the class was over I revised the book, the “Snapshot of a Mollisol” to include images that were outside the scope of the project and I continued to take documentary photographs at the student farm as well as images at other locations, one of which morphed into the documentation for the Alfisol at Emerson Vineyards. The documentation of the farm was capturing the activity that was associated or made possible by the soil. Mollisols are a fertile soil that is one of the dominant agricultural soils. The produce, biota, and the human interactions were the primary focus of the images.
For the documentary photography class there was also a short movie created using the images, this sparked an idea to create a slide show projection of the images. I did this in association with another class as I was working on creating a layout for my exhibition. The test projection was critiqued by an installation sculpture class. The projection was actually in the location that ended up being where I held my exhibition, and the panels that were used to project on were free flowing semi-transparent fabric that was hung from the ceiling. I was going for movement in response to the viewer as well as creating a visual barrier with strong vertical lines referencing the bars of the original cage idea. The panels were hanging in space with gaps between the panels and the wall, floor, and ceiling.

There were three main recommendations from the class critique that I implemented, first to change what the images were projected on, second, add sound and third, to enclose the space into more of a room. In the version for my exhibition the panels were replaced with large panels of banner paper that were hung to create a full wall as well as making the side wall of the “room”. On the inside of the constructed room, where the images were projected, the banner paper was left blank. On the outside of the projection wall the banner paper was covered with predominantly image or graph dense pages from scientific papers, specifically from articles that came from the first year I attended Oregon State University in the Biochemistry and Biophysics PhD.

Figure 25: Test run of the video projection.

Figure 26: The journal article side of the projection screen.
program. This was a personally symbolic aspect to the specific papers, but were more importantly used to represented what the general public is faced with when interacting with the presentation of scientific information and the obstacle for getting information out to the public. This wall was placed directly in line with the entrance to the exhibition. The slide show was partially visible through the layers of journal article pages. The exhibition slide show of images was accompanied by a sound track of indistinct working noise out at the farm, as well the natural sounds like birds chirping, the sounds you would hear if you were visiting the farm.

The created room was arranged so that there was seating and a variety of information and reading material including the “Snapshot of a Mollisol” book, my artist statement, images of past work, a soils field book and some other science journal articles. Also in the room, one of the side walls was covered with banner paper making a space for participatory art and feedback from viewers of the exhibition.

**Evaluation**

This piece in all its renditions was my first adventure into projection art. The use of the biochemistry and biophysics journal articles worked well for the visual impact of scientific information. It also worked well to have the two sided interaction with the screen. Projecting images onto objects was an interesting idea, and is an idea I might revisit. In terms of the images capturing the idea of the mollisol soil, they need to be seen in combination with the other images to make the connection of the story to the location. The images of people and produce were intermixed with soil centric photos however depending on how long people stayed to view the movie they would not necessarily see them. The movie went for about an hour and the only people I noticed getting prolonged exposure to the movie were people that stopped to talk to me, or people that participated in the “Soil Me!” wall.
Oxisol

Oxisols: (Fr.-oxide, oxide) Highly weathered and dominant tropical soil

One of the oldest soil orders and most weathered. Due to physical and chemical weathering, Oxisols are high in iron oxides, aluminum oxides, quartz, and kaolinitic clays (which are low activity and give the soils yellow to red colors.) They typically have low fertility and low cation exchange capacity (CEC) (indicates the capacity to hold onto nutrients). They are a tropical and subtropical soil that can be found under rainforests; however, the vegetation in those areas is self-sustaining, where the decaying vegetation is consumed before it becomes integrated into the soil. If the existing vegetation is removed it will not regrow without significant modification to the soil.

World's ice-free land: 8%

Fun Fact: Kaolin based clays are used in ceramics, specifically porcelain, and mixed for other clay bodies, as well as used in industrial applications of ceramics. Kaolin clays have low shrink-swell properties.
Oxisol

Methods of Construction

This was one of the found object sculptures that ended up different than the original sketch. The rusty pieces of metal were a key component in the Oxisol and the Ultisol. The driving idea behind the sculpture was that it was going to look highly eroded and would have bright color as a dominant factor as well as a rusty iron backbone. The end sculpture had all of those traits but the form changed. An element that I also chose to include in both the Ultisol and the Oxisol was to make them precarious, to reference the situation of those soil orders roles in the tropics. In the tropics when the vegetation is removed the soils are lost and the area is difficult to rehabilitate. The color and erosion were retained in sculpture through the treatment of the surface. The found object of the rusty metal strips inspired the end form. There was a kinetic quality that amplified the precarious nature of the form. The longest metal piece was bent to form the upper spiral but the other pieces were left unmodified. Then expanding foam was sprayed on to the form, then cut, shaved, and rasped to shape. When testing textures with the foam, the raw foam had areas that looked like the boundary between “peds”. This surface was retained in portions of the sculpture and then other areas were roughly treated to make them look eroded. The color for the Oxisol was achieved by highlighting the “peds” and erosion paths with black acrylic paint. After the black layer dried a layer of white glue was...
applied and left to dry. Then several layers of various red, yellow, and orange colors were painted on and rinsed with a spray bottle to help mimic the erosion over the surface of the sculpture. Once the paint was dry and the painters tape removed the sculpture was mounted on a piece of wood and held with metal brackets that were spray painted black to tie in with the other sculptures in the 12 soil orders series.

Evaluation

The Oxisol and the Ultisol were both well received, the texture, the color and the incorporated rusted metal seemed to have reached the viewers in a way the other pieces did not. The metal in both of those pieces was raw and actively aging, where the metal in the other sculptures was smooth and spray painted black. The incorporation of the metal in these pieces was more organic.

The hand painting of this piece was time consuming and very messy, however, the results were successful in achieving a vibrant but varied color mimicking oxisol soil. The precariousness of this piece I felt worked well with the idea of ecologically sensitive soil. The ribbons of metal were problematic in that they had a springy quality, so occasionally they had to be slid back into place, but overall I was very pleased with the end result of this piece.

The form that is lopsided and wobbly was carefully balanced as it was constructed. The spirally shape was referencing ferns as they coil at the ends, it also references seeds as they sprout from the soil. Although this piece does not have a vegetation component like some of the other sculptures. The idea behind leaving the vegetation out of both the Oxisol and the Ultisol was that in the tropics the vegetation is mostly self supporting. The soil needs the vegetation for protection from rapid weathering and erosion, however, the soil does not receive significant additions of organic matter from the vegetation. Biota consume the organic matter before it can accumulate in the soil.
Spodosol

**Spodosols:** (Gr. – Spodos, wood ashes) Variety in profile colors

A soil noted for the variety of colors in the different horizons in the profile. The variation in colors are formed from weathering that causes leaching of organic matter (OM), minerals, and other nutrients as well as non-uniform distribution of soil minerals in the sub soil. Spodosols typically have dark surface layers composed of organic matter rich horizons, “O” and an A horizon, followed by a leached light colored layer, often a whitish to greyish band, which is referred to as a eluviated horizon, or “E” horizon. Below that, the illuviated (accumulated) leached materials from above create a darker layer known as the B horizon. The B horizon can have a variety of properties denoted by subscripts, including being rich in clay (t), humus (h), and sesquioxides (s) which are metal oxides like aluminum and iron oxide. There can be multiple horizons indicated with different combinations of subscripts. Eventually, it will become the C horizon, which is weathered parent material. If the parent material is rock then the uppercase letter “R” is used to indicate unweathered parent material.

**World's ice-free land:** 4%

**Fun Fact:** Ipad - Corning glass works in New England, Germany, and Poland mine the glass from the E horizon in Spodosols.
Spodosol

Methods of Construction

The sculpture for the Spodosol remained very close to original sketch. The main point for the sculpture was the rich colors in the profiles. The form follows the organic shape theme that is in the majority of my other sculptures but with this form I was referencing the distinct layers and the active processes that drive the formation of the various layers.

To create the sculpture a cardboard template was sketched on two layers of cardboard. On the first layer of cardboard expanding foam was sprayed until it filled to the outline and was uniformly deep. To keep the cardboard in place while the new foam was expanding several pieces of shaved foam from other sculptures were glued in place. In hindsight the glued pieces for the top piece of cardboard was unnecessary. Once the base layer of foam was sprayed in, the top piece of cardboard was firmly placed on top to contain the foam and the intent was to keep it uniform. After several days of curing, the cardboard on the top was removed and the foam was shaped, with the foam touched up as

Figure 32: Spodosol preliminary sketch.

Figure 33: Expanding foam with cardboard template.
needed. After the general shape was reached then a layer of paper maché was sculpted onto the foam and allowed to dry. Next it was painted with gesso followed by several layers of spray paint to achieve the soil profile painting. To hang the sculpture a slit was cut in the back and a metal rod was inserted for strength and the ability to accommodate a variety of mounting options.

**Evaluation**

This piece was one of the attention catching and motion directing pieces when designing where the individual pieces would go in the layout of the exhibition. The vibrant colors and placement on the wall helped draw viewers to the back of the space. It was hung on the wall at about eye level. It was put up so that it balanced the space between the book case that was left in place and the low ceiling. The bookcase also served as a display for some of the Study in Profile pieces.

The Spodosol was the most successful sculpture at tying in with the information presented in the panel. The information presented was more conducive to bringing in more information for the viewer to retain. The correlation between the information about the soil horizons that can be seen, made for a clear connection.

The form was successful at being alluring and connecting with the alive aspect through implied movement in spiraling shape. The main critiques of this piece are that the spray paint is not very precise and the surface texture is not very soil like. Standing back from the sculpture these were not extremely noticeable, but if I were to do it again I would likely hand paint it with more emphasis on soil structure. The way it currently is it is more referencing a cliff face of a deep profile viewed at a distance.

Figure 34: *Spodosol* detail.
Ultisol

Ultisols: (L. – Ultimus, last) Significant weathering, colors, and tropical

Similar to Oxisols, they are highly weathered and rich in quartz, clay, kaolinite, and iron oxides (the reddish and orange colors). Ultisols are tropical, humid, or temperate region soils that tend to have a low pH (acidic). The capacity of the soil to hold onto additional or applied nutrients is limited, and therefore nutrients that are applied or added to Ultisols are easily depleted without proper management.

World's ice-free land: 8%

Fun Fact: Oregon's state soil is the Jory soil series, which is an Ultisol. It is easily accessible at the Lewisberg Saddle in the MacDonald-Dunn Forest just outside of Corvallis. Soil series are soils that have unique properties of a given location or set of conditions and are commonly named with geographical references.
**Ultisol**

*Methods of Construction*

Similar to the Oxisol, the Ultisol had the principle ideas of weathering, color, and rusty metal, but the original idea had more pieces of slightly protruding metal that were going to be similar to the Oxisol sculptures' exposed metal backbone. Also like the Oxisol in the exhibition version both share found object rusty metal pieces that inspired the end form. The metal pieces also brought the precarious aspect to the sculptures. The wrapped exposed metal in this piece was unmodified, the part that is inside the foam was bent to shape and then coated with several batches of foam and shaped with a utility knife. Unlike the Oxisol, the surface of the Ultisol is less eroded and predominantly a “ped” structure, size, and color. Once the foam was finished being shaped, then black paint was used to delineate and highlight the “peds”. Once the paint dried white glue was used to coat the foam and help reduce the appearance of uniform foam and make the texture more organic. After the glue dried several coats of acrylic paint were applied to mimic the color of the local Jory soil, the Oregon state soil.

![Figure 36: Ultisol preliminary sketch.](image1)

![Figure 37: Base layer of black paint being applied.](image2)
Evaluation

This was one of my favorite pieces, it also was the crowd favorite in talking with visitors to the exhibition. This piece in particular resonated with viewers, they wanted to touch it, they were drawn in by the color and the spiral joined with the rusty metal. The Ultisol worked well as an art piece and as a vessel for knowledge. It was not the most successful at displaying the knowledge on its own, it needed the context and comparison with the other sculptures, but it was extremely successful in engaging viewers. As mentioned in the Oxisol evaluation the Ultisol shared many characteristics with the Oxisol however this piece grabbed more attention. The Ultisol was displayed on a table just above waist high, it confronted the viewers more than the Oxisol which was on the floor next to the table.

One aspect that I really am pleased with in this piece is the ability of it to work in other orientations, the only other piece that might be able to do that is the Histosol. The changeability was not an integral part of designing these pieces nor is it an important part of the scientific information being presented, but it is a property that I like to have in my sculptures for art sake.

Figure 38: Ultisol other orientation.
Vertisols: (L. – Verto, turn) Shrink-swell clays

Known for having shrink-swell clays that cause frequent cracks in the surface as it dries out, these soils tend to be fairly fertile soils due to the “consuming” of organic matter in the exposed cracks and churning of the surface layers. Also because of the shrink-swell clays, water doesn't tend to just run through the soil, so there is minimal leaching. However, even though the soils have high fertility, the expanding and contracting makes for higher plant mortality due to roots getting sheered off. This soil order is typically non-forested and likely a grassland or savanna, which is best used as range-land for livestock with precautions regarding deep crevices (to prevent injuries). Depending on the climate and parent material, Vertisols have vibrant colors ranging from grey to red, to the more common black.

**World's ice-free land:** 2%

**Fun Fact:** This is a common soil order just off campus near Oak Creek, watch for the drying of the soil and cracks opening up. The cracking in these soils is favored for drought photography.
Vertisol

Methods of Construction

The idea for the Vertisol was inspired by an image I saw in a class depicting a moose skeleton that was in a giant crack in the ground. This was an extreme example but the principle is the same for vertic soils, they consume organic matter.

The original idea was a nautilus like shape that spiraled around and at the largest point had open cracks or wedges and those would get smaller and more closed toward the center. In the cracks would be trapped organic matter. This idea was incorporated into the final version, by still referencing the cracks and consuming organic matter.

In addition to that there are trays below the sculptural foam that depict dyed bentonite clay which was recycled from a SOIL 205 lab. Three of the trays are straight clay with dye and then three are clay mixed with dyed pieces of shredded sponge. Rit® dyes were used to color the clay and sponges, and spray paint was used for the foam as the dye was only minimally absorbed. The sponge was a carry over from an intermediate design that incorporated a fin that ran along the back of the foam sculpture and then would have incorporated a participatory aspect where viewers would add small amounts of water to watch the shrink-swell properties.

The stand was a reclaimed piece from Habitat for Humanity Restore and was used for display and also adding another spiraling axis. Twisting, straining, shrinking, and swelling, all indicate movement to me and I wanted them indicated in the artwork.
Evaluation

This piece was a bit of a surprise during the show. The first surprise was with the clay trays, which were still fairly fresh in the trays and therefore still had hygroscopic water even though cracks had formed in the surface, when they were moved to the show. The sculpture was located under the heater in the Art Underground, the clays continued to shrink as they dried but they formed different cracking patterns. The lightest colored one was the “wettest” when it went into the show and the cracking pattern shriveled and pealed even to the point that it pealed the paint off exposing the metal which then started to rust. This was fascinating and tied in very well with the destructive power of vertisols. The two darker clay trays were very cracked already but the cracks deepened while at the exhibition. The reddest one had the finest pattern with the smallest pieces formed. All of the dyed clays were made the same which made the drastic differences in the crack so interesting. The other surprise was on the sponge side, where the cracking was significantly less except next to the sponges. The mixture of clay was much more watery when it was applied and it created a film on the metal. Since the clay layer was much thinner the large cracks didn't appear as pronounced. The color also responded differently on the sponge side with one ending up with purple undertones.

The straight clay side surpassed expectations, however the sponge side I would explore other options if I were to revisit the piece. The sponge designs were interesting and were referencing the key components related to the soil, but I think they may have come across better if actual organic materials were used, for example taking roots and making some of the designs. One of the purposes of having the design side was to show how the clay interacted with objects.
# Summary: 12 Soil Orders

<table>
<thead>
<tr>
<th>Name</th>
<th>World Ice-Free Land</th>
<th>Fun Fact</th>
<th>Key Point</th>
<th>Materials</th>
<th>Evaluation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Alfisol</td>
<td>10%</td>
<td>Arable land loss 1 ha/7.67 sec</td>
<td>Second major agricultural soil</td>
<td>Metal, soil, photo collage, foam board</td>
<td>Wall mount, story telling, visually interesting, eye-catching</td>
</tr>
<tr>
<td>Andisol</td>
<td>1%</td>
<td>Common Pacific Northwest soil.</td>
<td>Volcanic</td>
<td>Soil, obsidian, wire, metal, glass</td>
<td>Free-standing floor sculpture, not imposing, less accessible</td>
</tr>
<tr>
<td>Aridisol</td>
<td>12%</td>
<td>Alfred Nobel mined for dynamite</td>
<td>Water limited</td>
<td>Soil, sand, foam, metal, wire, salt, spray paint</td>
<td>Smallest, pedestal, details lost in quick viewing, stand questionable, lack of water hinted at</td>
</tr>
<tr>
<td>Entisol</td>
<td>16%</td>
<td>Most dangerous soil, source of quick sand</td>
<td>Limited development</td>
<td>Juniper, foam, soil, metal, spray paint</td>
<td>Free-standing, stand questionable, live plant</td>
</tr>
<tr>
<td>Gelisol</td>
<td>9%* world land</td>
<td>Cryoturbation patterns</td>
<td>Frozen</td>
<td>Plaster, metal, foam</td>
<td>Free-standing, stand questionable, least successful, first completed, more geometric</td>
</tr>
<tr>
<td>Histosol</td>
<td>1%</td>
<td>Source of peat moss</td>
<td>Excessive organic matter</td>
<td>Foam, spray paint, moss, peat moss, wire</td>
<td>Hangs, sways, prominent, successful depiction of decomposition</td>
</tr>
<tr>
<td>Inceptisol</td>
<td>17%</td>
<td>Hill slopes</td>
<td>New or recent</td>
<td>Hops litter, moss, plants, glass, metal</td>
<td>Live plants, successful depiction, free-standing</td>
</tr>
<tr>
<td>Mollisol</td>
<td>7% (25% USA)</td>
<td>Agricultural soil</td>
<td>Great Depression Dust Bowl</td>
<td>Photo projection, white banner paper, journal articles</td>
<td>Projected story telling, visual problem wall, incorporation of Soil Me! wall</td>
</tr>
<tr>
<td>Oxisol</td>
<td>8%</td>
<td>Kaolin based clays</td>
<td>Highly weathered and dominant tropical soil</td>
<td>Foam, metal, wood, white glue, acrylic paint</td>
<td>Crowd pleaser, precarious, vibrant, eye-catching, pedestal</td>
</tr>
<tr>
<td>Spodosol</td>
<td>4%</td>
<td>Ipad glass</td>
<td>Variety of profile colors</td>
<td>Foam, metal, paper mache, spray paint</td>
<td>Eye-catching, wall mount, representative, alluring, best fitting with information panel</td>
</tr>
<tr>
<td>Ultisol</td>
<td>8%</td>
<td>Jory, Oregon state soil</td>
<td>Significant weathering, colors, tropical</td>
<td>Foam, metal, white glue, acrylic paint</td>
<td>Crowd favorite, eye-catching, pedestal, engaging, changeable orientation</td>
</tr>
<tr>
<td>Vertisol</td>
<td>2%</td>
<td>Favored for drought photography</td>
<td>Shrink-swell clays</td>
<td>Clay, dye, metal, wood, foam, organic matter, sponges</td>
<td>Continued to change, potential for interactivity</td>
</tr>
</tbody>
</table>
Climate Vân

Figure 43: *Climate Vân*, 2014, with Jay Noller, Mixed media, 6' x 3' x 3'
**Climate Vân:**
Jay Noller and Elizabeth Garton

Climate Vân is an interactive sculpture that was constructed in response to a call for artists to participate in the Transformation Without Apocalypse Symposium (TWA) by the Spring Creek Project. Hundreds of people were involved in constructing the individual elements of Climate Vân. Participants from the TWA symposium, Oregon Society of Soil Scientists meeting, and all the labs of the SOIL 205 Winter 2014 class, were provided materials for constructing small canvas tiles to paint with soil paint, and various wire with general guidelines of soil biota, various leaf shapes, or wire shapes related to soil. The tiles and the wire pieces were then grouped by type and then used to construct the figures on the inside of the vanes. The metal frame and figures were constructed by Elizabeth Garton. The metal frame was then covered in canvas, which was painted by Jay Noller.

The hypothesis behind Climate Vân is that climate change leads to longitudinal, latitudinal, and elevational shifts in ecological communities. This was represented by the twisting and deformation of the global distribution, as well as the manual spinning of the piece by the viewer. Each of the 6 vanes represents a soil order – climate regime combination. The 6 vanes are Mollisol, Alfisol, Ultisol, Spodosol, Gelisol, and Aridisol. The artists imagined that humanity must bend to this transformed juxtaposition to avoid extinction. Apocalypse arises because we ignore the inherent properties, functions and strengths of the natural soil beneath us, where the greatest majority of terrestrial life resides.

**Owner:** Spring Creek Project

**Special thanks** to Carly Lettero, Charles Goodrich, and Jay Noller for the opportunity to work on this project. Also, a big thank you to all of the participants that made this possible.
**Climate Vân**

*Methods of Construction*

The idea for Climate Vân was a collaborative idea with Jay Noller, who is my soil science adviser as well as a professional artist, his work primarily is with soil painting, both painting with soil and paintings of soil. Jay originally found the call to artists from the Spring Creek Project and suggested doing a group piece of artwork. The deadline was the following Monday so the idea for the project came together very quickly. I drew several sketches of potential sculpture ideas that would have a component for group input. When Jay and I met we merged ideas for the sculpture and sketched out models for the piece. Once we had the idea we created a small simplified model for the proposal.

After we were awarded the project the first part was starting the public participation at the Transformation Without Apocalypse Symposium. There were several events that we collected group constructed materials from, as addressed in the Public and Viewer Participation section. The soil tiles and wire pieces were then sorted. I sorted based on rough categories. For the tiles I grouped them by dominant color or design, then pressed and stored them flat. With the wire pieces I sorted them by general leaf style and the biota or miscellaneous were set aside. After they were sorted I worked on creating the wire and soil tile figures.
I created a light gauge wire template of the outline of the figure, from there I bent the large gauge wire to shape for the wire side. Then working off the idea that the figures were representing the vegetation for the soil orders I matched the wire work leaves to predominant climate regimes corresponding to the soil orders. After that I worked on creating a design for the figures with the wire work. The miscellaneous and biota related wire pieces were utilized in pulling the leaves into a cohesive design. There were two dominant regions inside the body and outside the body. The outside was the scene depicting vegetation in its entirety with leaves, stems, roots, and biota. Inside the bodies were excess leaves creating and alluding to forms inside, such as denoting joints or the waist, also there was a dominant leaf in each figure that was used as the head. The outside portions were wired together and attached to the larger wire frame, while the insides were attached once the figures were put inside the frame. When the vanes were ready the large gauge wire was inserted then secured in place, followed by the various parts of the inside which were secured.

Figure 45: The wire and tile figures ready to go onto the sculpture.
For the tile side I used the template to sketch an outline on cardboard, then I proceeded to work with the soil tiles arranging them in the figure. I used some larger eye-catching tiles as detail pieces, from there I filled in details working on the idea of accentuating form with darker, lighter, or a change in color. After playing with the tiles and creating some figures, I started to assign them to soil orders. I was designing the figures relating the colors used to the soil orders as well as the cultural history of the soils. Aridisols have a history with aboriginal designs, or body painting, and I chose the highly patterned tiles to create the figure. Mollisols are a grassland soil predominant in the great plains, where bison hides were used. I chose the figure with redder hue and was patterned with highlights similar to animal hides. The alfisol figure had similar reasons as the mollisol, only it is more woodland and I was thinking more deer hide references. For the ultisol figure I went with more strong orange highlights referencing the soils vibrant colors. The spodosol also was a soil based decision where the color palate referenced spodosols. Finally the gelisol, which was the most difficult to resolve but I chose to give this figure clothes indicating the cold and referencing the animal coats typically worn in the polar regions. The choice to reference animal skins was strictly for the historical and cultural references.

Another aspect to the figures was that I wanted them to be relatively androgynous with some leaning more feminine and some more masculine. I would have included more diversity in the figures body styles for cultural representation, but for the purpose of the art representing the soils and for the overall flow and form of the sculpture, I elected to keep the figures fairly close in size and proportion. The forms are also highly stylized to work with the undulating form of the frame. Once the vanes were ready I put the tile figures on, one by one trying to match with the wire figures as much as possible. Some of the figures changed slightly in design as they were applied, but retained the overall influences. The tiles were glued on to the painted canvas with PVA glue and repeatedly pressed until they were well adhered.
After the initial group participation events I started creating the metal vanes by bending and welding the steel rods together. Each vane is unique but they are matched to the vanes on either side so that they work around a central column. After the vanes were welded, sanded, and painted and then canvas was wrapped and sewn onto the form. The vanes were then painted with a couple of coats of gesso to prime them for painting. Jay used a variety of acrylic paints on the inside of the vanes and as the base layers. Then for the final layer of paint on the soils he used an assortment of pigments that were extracted from soil through a series of sedimentation separations then mixed with a media of his own making. The painting process was ongoing simultaneously for the vanes and once they were finished on the inside the tile and wire figures were installed. When the insides were completed then the rinds of the vanes were finished being painted with the soils paint and the painted vegetation.

After the vanes were completed, a central stand was created. Part of the original idea was that the sculpture would have a interactive component. The idea was that the sculpture would be turnable by viewers so that they could stand in one place and cycle through all of the soil orders. The stand would have to hold the weight of the vanes, but also be easy to turn, and have a base that would stabilize the sculpture so it wouldn't tip over. The first version of the base was a modified old metal swivel chair base, however that base had technical difficulties and we started over with a new design for the base. The base is made of PVC pipe and wood. There is a seam just below the vanes and inside the seam are Teflon pads to reduce the friction of turning. Also there is lubricant applied between the interior PVC pipe and the external wood hexagon. The vanes are then screwed onto the wood column. The column turns in either direction.

Figure 46: Vane frames in progress and soil pigment.
Evaluation

The original proposal for the Spring Creek Project's Transformation Without Apocalypse (TWA) call for artists, was seeking proposals in response to re-imagining the future for how the world can change without having an apocalypse. Our proposal was looking at how soils will alter in response to climate change. Specifically creating “an interactive sculpture engaging the public in the transdimensional and transhemispheric relationships of a transformed Critical Zone – the thin layer of Earth that supports all terrestrial life” excerpts from our (2014)TWA proposal:

Abstract:

The Climate Vān will be an overview of global soil types that are vulnerable and responding to change, each represented by a whorl. The whorls spiral around each other forming a seed or pod that has multiple panels depicting the human connection to the environment. A crucial part of the sculpture is in the construction of the sculpture by engaging a group of students and community members in the representations of the natural world, creating an environment of learning.

Hypothesis and Intention:

Climate Vān is a work based on our scientific hypothesis that climate change leads to longitudinal, latitudinal and elevational shifts in ecological communities; these communities of life must adapt to soils that were produced in large measure by the community they have displaced. The intention of this work is to demonstrate these elevational, latitudinal and longitudinal shifts by twisting and deforming this global distribution, from as it is in the present day to a new, future alignment. We as artists imagine that humanity must bend to this transformed juxtaposition to avoid extinction. Apocalypse arises because we ignore the inherent properties, functions and strengths of the natural soil beneath us, where the greatest majority of terrestrial life resides. The artwork is transformational because it evokes societal recognition of soil and humanity’s role in maintaining and enhancing soil quality as ecological migrations and successions are occurring.

There were slight changes to the sculptural form as it was constructed but the hypothesis and implementation remained the same. The overall form reduced in the number of vanes (whorls) from the original sketches, the reduction was due to physical constraints of the column and creating enough space between the vanes for the interior to be viewable.
The complexity of this artwork surpassed the others in this show. There were several parts that had to coordinate and many layers of meaning and detail. Also, it was the first collaborative work I did for a competition, as well as the first public artwork on this scale. The collaboration and work with public participation was an educational experience. I plan on implementing the experiential and participatory aspect again in the future. It was amazing to see the results of the collective group pieces, the soil tiles and wire work in particular, I was surprised by all of the talent that was in the general public. What surprised me was talking with people and hearing that they never really use their artistic gifts. Another thing I heard was that people enjoyed the experience and wished they had more opportunities. Creating art from pieces of smaller art was a new process for me. It also added an interesting history to the individual figures as they were made from the work of several people, making it symbolically a representation of a population.

The different levels of meaning included the participation aspect, the figures, the scenes depicted with the wire works, the painted scenes, the vegetation, the shape of the whorls, and the overall shape of the sculpture. For my exhibition I had the wall information panels as fairly small and to the point. This piece would have benefited from having more information presented with it, however I was concerned that putting too much information on the wall would repel viewers from reading the provided information. Given the focus of the show is presenting the information in a viewer friendly format, I elected to make the description of it short.

The idea behind the shape of the whorls was that they would reference a globe that was shifting and twisting as well as being pulled at the poles. The overall shape of the sculpture ended up looking like a seed bomb, which conceptually is the seed of knowledge.

To view a 3D interactive viewable model of Climate Văn:
https://sketchfab.com/models/4d0de8ba591d4407943e0d0c5f211943

Many thanks to Adam Lindsley who created the 3D model and allowing me to use the link. Adam also does some excellent 3D models of soil pits and profiles out in the field, be sure to check them out.
Study in Profile:

Vance Almquist and Elizabeth Garton

These were designed and constructed in response to a request to create some artistic centerpieces for the Crop and Soil Science department. All of the elements were found object, recycled, or reused. They are made with old surplus glassware, and have past students' soil profile classification projects incorporated, and are used to create authentic soil profiles inside each of the glass vessels.

**Owner:** Crop and Soil Science Department

**Special thanks** to Vance Almquist for creating these with me. Also to Jay Noller's students whose profile samples we used.
Study in Profile

Methods of Construction

Vance Almquist worked on these pieces with me. Study in Profile pieces were created in response to a call for help in creating creative centerpieces for a crop and soil science group retirement party. The glassware was predominantly surplus and in storage, which were selected for visual appeal as well as openings that would accommodate the soil pedds. The soils inside the glassware are from actual soil profiles that were collected by soil morphology students for their final projects. The samples were also in storage.

The profile horizons were already separated when we started. From those samples, pedds were selected that would fit through the mouth of the glassware and in the correct order of the horizons, with the deepest layers going in the glassware first, finishing with the surface horizon. Some of the profiles were strictly larger pedds and some were ground into a fine sand like consistency, others were in between.

In addition to the soil some of the Erlenmeyer flasks had test tubes inset so that they could hold vegetation. For the party the majority of the vegetation was wheat since several of the retirees did wheat research. The idea behind the centerpieces was that they would tie in with retirees fields. There were some of the centerpieces that also contained live plants for variety.
The majority of the pieces were various sizes of Erlenmeyer flasks but there were also two round bottomed boiling flasks and one that was a type of separatory funnel. Those three were displayed on ring stands and were shown with large soil peds so that viewers could get a closer look at the structure. These three and a selection of the Erlenmeyer flasks were also included in my capstone exhibition.

_Evaluation_

The Study in Profile pieces were a great addition to the show as they were actual soil profiles from a variety of locations and soil types. It also helped that many had very striking profiles that caught viewers’ attention. The intention of the profile samples that were selected, was to choose for either color changes or structure changes between horizons.

The combination of old lab glassware and soil profiles was a strong combination of art and science. Even though these pieces were a side project to my larger body of work, it was a great collaborative work and resulted in a process that I want to pursue. The connection to my main idea of presenting scientific information is not as obvious, however in reference to academics these pieces would have worked similar to a quiz. The profiles were labeled with their soil order and in relation to the quiz aspect it would be jogging the viewers memory of the other sculptures and what the soil orders meant.
Public and Viewer Participation

The public participation aspect to my project started with Climate Vân and having the public participate in the creation of pieces that would be used to create the figures. From there I ended up bringing art into the classroom again as an end of the term activity. Then at the exhibition I included a participatory aspect because of the positive experiences from the previous public participation opportunities.

Climate Vân

The construction of the elements for making the figures that are on the inside of Climate Vân were made possible through public participation. The “soil tiles” were 1” x1” to 2” x2” and were prepared with gesso before being cut to size. Then the participants were provided with a variety of soil paint made from pigment chips extracted from soil and mixed with water and acrylic media.

For the wire works there was a variety of wire sizes and colors as well as an assortment of tools and reference materials that were available to participants. The wire pieces in general took longer to construct so more were made during the SOIL 205 labs than the other events.

The first batch of the soil tiles and the wire works were done at the Transformation Without Apocalypse symposium which was the first introduction of the Climate Vân project. The station for making artwork and learning about the project was set up all day, however the majority of the participation occurred between the presentations. The tiles and wire work were also set up in a station at the Oregon Society of Soil Scientists conference in February, 2014 in Bend, Oregon.

Next the production moved into the SOIL 205 labs. The last lab of the term was a scheduled short lab and with the permission of the instructor the rest of the time was
devoted to the students exploring the art side of soil science. There was a short presentation that I did for all the labs, there were five sessions (ten sections), dealing with the project and how the soil aspect tied in.

**Soil 205 lab**

The term after I worked on the soil tiles and wire work for the last lab of SOIL 205, I was asked to put something together that was fun and artistic for the last lab. Again I attended all the labs and did a short presentation on soil and art. The activities were group painting with soil paint and the other option was making Dorodango balls, which are soil compacted by hand until there is a hard shell that shines like a billiard ball. The activities were voluntary and therefore the participation was less, but the feedback was very positive. The students really enjoyed the opportunity to work on the artwork and learn how to use soil creatively. Some of the labs created two group art panels and some only did one. From the five sessions there were seven panels and several Dorodango balls that the students made and took home to continue working on.

Special thanks to the SOIL 205 instructors, James Cassidy and Will Austin, for their continued support.

Figure 52: Soil paintings from SOIL 205 labs.

Figure 53: Dorodango station.
After working with Climate Vân and the SOIL 205 labs I wanted to incorporate a participatory aspect to my capstone. I started with the idea that I would put panels of banner paper up and then leave it open to the public. I modified this plan slightly during setup. While my crew and I were cleaning the Art Underground, in preparation for setting up my show, we found a random piece of paper cut out that resembled a neuron or root. I used the found “root” as the starting point for the participation wall, I had my setup crew put it on the wall and then add their own touch and response to start the wall and make it more approachable to the attendees of my exhibition.

I was anticipating that I would get some response, the response I got was more than expected. The space on the wall quickly filled. To address this I added more banner paper on top of the original layer and left the center “root” exposed. On each layer of paper I labeled the horizon and dates. Each layer represented accumulations of viewer participation and response. As the layers were deemed full, not having significant white space to add new work, new paper was put up. It ended up being very connected to the soil symbolically. The response also included feedback in a guest book that I had near the exit next to the surveys.

Special thanks to my installation and clean up crew who made setting up and taking down the show in a day possible.

Figure 54: Soil Me! wall in construction.
Survey

The survey was available to the attendees of my exhibition. At the doorway viewers were faced with a poster that thanked them for coming and invited them to take the survey either by paper or online. The reason for the survey was to get qualitative data feedback.

Survey Results and Discussion

The questions that were asked in the survey were in three main areas, the viewer's demographics, the viewer's related knowledge, and the viewer's experience at the exhibition. The survey was compliant with IRB standards and was processed as an exempt study.
Demographics

Q1: What is your age?

The participants of the survey were dominantly in the 18 to 24 years old age range, which was not a surprise given that the exhibition was on the University campus. According to the Oregon State University Office of Institutional Research enrollment summary for winter term 2015 the population of students on campus that is under 25 is Undergraduate 67%, Graduate 4%, and First Professional 1% for a total of 72% of the on campus students. (OSU-OIR)
Q2: What is your gender?

<table>
<thead>
<tr>
<th>#</th>
<th>Answer</th>
<th>Bar</th>
<th>Response</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Male</td>
<td></td>
<td>9</td>
<td>37.50%</td>
</tr>
<tr>
<td>2</td>
<td>Female</td>
<td></td>
<td>14</td>
<td>58.33%</td>
</tr>
<tr>
<td>3</td>
<td>Prefer not to answer</td>
<td></td>
<td>1</td>
<td>4.17%</td>
</tr>
<tr>
<td>Total</td>
<td></td>
<td></td>
<td>24</td>
<td>100.00%</td>
</tr>
</tbody>
</table>

Figure 57: Gender.

The gender of the participants was over half female (58%). Which is slightly higher than the on campus population with 46% women and 54% men. (OSU-OIR)

Q3: Please indicate your current family structure.

<table>
<thead>
<tr>
<th>#</th>
<th>Answer</th>
<th>Bar</th>
<th>Response</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Single without children</td>
<td></td>
<td>14</td>
<td>58.33%</td>
</tr>
<tr>
<td>2</td>
<td>Single with children</td>
<td></td>
<td>0</td>
<td>0.00%</td>
</tr>
<tr>
<td>3</td>
<td>Married without children</td>
<td></td>
<td>3</td>
<td>12.50%</td>
</tr>
<tr>
<td>4</td>
<td>Married with children</td>
<td></td>
<td>4</td>
<td>16.67%</td>
</tr>
<tr>
<td>5</td>
<td>Life partner without children</td>
<td></td>
<td>2</td>
<td>8.33%</td>
</tr>
<tr>
<td>6</td>
<td>Life partner with children</td>
<td></td>
<td>0</td>
<td>0.00%</td>
</tr>
<tr>
<td>7</td>
<td>Other or prefer not to answer</td>
<td></td>
<td>1</td>
<td>4.17%</td>
</tr>
<tr>
<td>Total</td>
<td></td>
<td></td>
<td>24</td>
<td>100.00%</td>
</tr>
</tbody>
</table>

Figure 58: Family structure.

The majority of the participants did not have children at home (79%) and the majority also defined themselves as single (58%). There was not a comparable data set in the published OSU enrollment document. However, given that the high percentage of the participants were 18-24 years old (42%) this wasn't surprising.
Q4: What Continent are you (primarily) from?

As expected the participants were primarily from North America, with 2 from Europe and 1 from Asia out of 24. Giving 12% international with potential error if the participants were Canadian or Mexican. This was higher than general population for the OSU campus which has 11% international students. (OSU-OIR)

Q5: What is your current University status?

<table>
<thead>
<tr>
<th>#</th>
<th>Answer</th>
<th>Bar</th>
<th>Response</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>University affiliated (Staff, Faculty, Student)</td>
<td></td>
<td>22</td>
<td>91.67%</td>
</tr>
<tr>
<td>2</td>
<td>Work affiliated (not directly tied to the university, like a consultant, service, or delivery person)</td>
<td></td>
<td>0</td>
<td>0.00%</td>
</tr>
<tr>
<td>3</td>
<td>Other; visitor</td>
<td></td>
<td>2</td>
<td>8.33%</td>
</tr>
<tr>
<td></td>
<td><strong>Total</strong></td>
<td></td>
<td><strong>24</strong></td>
<td>100.00%</td>
</tr>
</tbody>
</table>

This question was primarily to see if there were people from the community that would not be part of the general population of the University. Unexpectedly there were 2 people (8%) that attended the exhibition and took the survey.
Q6: What is the highest level of education you have completed?

This graph was one that was unexpected at first, given that there was a high percentage of participants with a 4-year college degree or higher (50% based on 24 participants). Given the population on campus for Winter 2015 was 83% Undergraduate, 16% Graduate, and 2% first professional. (OSU-OIR) However, I would speculate the majority of the attendees of the show that then took the survey were likely connected to me either directly or indirectly, (63% of respondents in Natural Sciences, and Arts and Humanities) having the population shifted more towards the graduate level and higher is not surprising. Since I am a graduate level student and my interactions with undergraduates are mostly through being a teaching assistant for the SOIL 205 class. Based on my time setting in the exhibition there were many people that were not connected to me that I knew of, however they may not have wanted to participate in the survey.

Note: 1 person did not respond.
Q7: Are you planning on returning to school to further your education? (Pursuing a higher degree if a current student)

The purpose of this question was an add-on to Q6. The 4 respondents that said they would not be furthering their education could be tied to the highest degree complete, 4 Masters, and 1 PhD. Where given the prominence of University affiliated participants, they are likely students, instructors/professors, or administrative, it is not surprising that the participants are planning on furthering their education.

![Figure 62: If participant was planning on pursuing further education.](image)

<table>
<thead>
<tr>
<th>#</th>
<th>Answer</th>
<th>Bar</th>
<th>Response</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Yes</td>
<td></td>
<td>16</td>
<td>66.67%</td>
</tr>
<tr>
<td>2</td>
<td>Work related continuing education</td>
<td></td>
<td>1</td>
<td>4.17%</td>
</tr>
<tr>
<td>3</td>
<td>No</td>
<td></td>
<td>4</td>
<td>16.67%</td>
</tr>
<tr>
<td>4</td>
<td>Unsure</td>
<td></td>
<td>3</td>
<td>12.50%</td>
</tr>
<tr>
<td></td>
<td><strong>Total</strong></td>
<td></td>
<td><strong>24</strong></td>
<td><strong>100.00%</strong></td>
</tr>
</tbody>
</table>
Prior knowledge

Q8: What best describes your academic field?

To start off with the primary academic fields of the respondents were in the natural sciences and the arts and humanities (63%). This was expected given the topic of the show, the location, and the departments that I am associated with. It was good to see that there were 37% representative fields from outside the subject matter. These 9 participants represented that target audience for presenting unknown information to. The natural science and arts and humanities participants were more likely only out of their comfort zone in one aspect, either the art or the science.

Figure 63: Academic field.
Q9: Science background.

<table>
<thead>
<tr>
<th>#</th>
<th>Question</th>
<th>Yes</th>
<th>No</th>
<th>Response</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>I have taken one or more introductory level natural science classes</td>
<td>22</td>
<td>1</td>
<td>23</td>
</tr>
<tr>
<td>4</td>
<td>I have taken one or more advanced level natural science classes</td>
<td>15</td>
<td>8</td>
<td>23</td>
</tr>
<tr>
<td>5</td>
<td>I am or have pursued an associates degree (or higher) in natural sciences</td>
<td>11</td>
<td>13</td>
<td>24</td>
</tr>
<tr>
<td>6</td>
<td>I am familiar with scientific writing and regularly read it (peer reviewed)</td>
<td>20</td>
<td>4</td>
<td>24</td>
</tr>
<tr>
<td>7</td>
<td>I have worked on professional scientific writing (journal articles, manuscripts, books, thesis, etc.)</td>
<td>11</td>
<td>13</td>
<td>24</td>
</tr>
<tr>
<td>8</td>
<td>I have worked as a professional in a natural science field</td>
<td>5</td>
<td>19</td>
<td>24</td>
</tr>
<tr>
<td>16</td>
<td>I have other related natural science hands on experience (gardening, farming, etc.) (please specify)</td>
<td>21</td>
<td>3</td>
<td>24</td>
</tr>
</tbody>
</table>

Figure 64: Science background.

The majority of participants (92%) have taken an introductory natural science course, which is not overly surprising given general education course requirements. Two thirds of the participants have taken at least one advanced natural science class. To further that 46% of the participants have or are pursuing a higher degree in a natural science and have worked on scientific writing themselves. 21% are working or have worked as a professional in a natural science field. Also the majority of the participants are familiar with scientific peer reviewed writing (83%) and have other related experience (88%) mostly gardening (9 of 10) and farming (4 of 10).
The introductory courses of the participants primarily were chemistry or biology (17 of 22, 77%) however there was also a prominence of soil science (10 of 22, 45%). With 42% (10 out of 24) of the participants with introductory knowledge and 5 of the 11 (45%) participants who are or have pursued an associates degree are in soil science. The primary advanced classes taken were chemistry or biology related. There could also be overlap in the fields and classes and since these sections were not required to continue and people could select multiple categories the data is not quantitative.

<table>
<thead>
<tr>
<th>#</th>
<th>Question</th>
<th>Soil science related</th>
<th>Chemistry or biology related</th>
<th>Other</th>
<th>Response</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>I have taken one or more introductory level natural science classes</td>
<td>10</td>
<td>17</td>
<td>4</td>
<td>31</td>
</tr>
<tr>
<td>2</td>
<td>I have taken one or more advanced level natural science classes</td>
<td>7</td>
<td>13</td>
<td>3</td>
<td>23</td>
</tr>
<tr>
<td>3</td>
<td>I am or have pursued an associates degree (or higher) in natural sciences</td>
<td>5</td>
<td>5</td>
<td>3</td>
<td>13</td>
</tr>
<tr>
<td>4</td>
<td>I am familiar with scientific writing and regularly read it (peer reviewed)</td>
<td>11</td>
<td>10</td>
<td>11</td>
<td>32</td>
</tr>
<tr>
<td>5</td>
<td>I have worked on professional scientific writing (journal articles, manuscripts, books, thesis, etc.)</td>
<td>5</td>
<td>4</td>
<td>1</td>
<td>10</td>
</tr>
<tr>
<td>6</td>
<td>I have worked as a professional in a natural science field</td>
<td>3</td>
<td>2</td>
<td>1</td>
<td>8</td>
</tr>
<tr>
<td>7</td>
<td>I have other related natural science hands on experience (gardening, farming, etc.) (please specify)</td>
<td>5</td>
<td>3</td>
<td>1</td>
<td>9</td>
</tr>
</tbody>
</table>

Figure 65: Specific science background.
Q10: Are you familiar with the following Soil Science related terms?

<table>
<thead>
<tr>
<th>#</th>
<th>Question</th>
<th>Answer 1</th>
<th>Answer 2</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>The 12 soil orders? (NRCS)</td>
<td>16</td>
<td>8</td>
</tr>
<tr>
<td>2</td>
<td>What CLORPT is and how it is used? (Climate, Organisms, Relief / topology, Parent material, Time)</td>
<td>11</td>
<td>13</td>
</tr>
<tr>
<td>3</td>
<td>Climate Regimes?</td>
<td>16</td>
<td>8</td>
</tr>
<tr>
<td>4</td>
<td>How soils are described? (color, structure, grade, texture, etc.)</td>
<td>18</td>
<td>6</td>
</tr>
</tbody>
</table>

Figure 66: Specific soil science background. Answer 1 = Yes, Answer 2 = No

For the majority of the terms over half of the respondents were familiar with the terms. CLORPT was less known but only slightly. This indicated that about half of the respondents were good indicators of the scientific information being presented was understandable to people not in the field.
Q11: Art background.

<table>
<thead>
<tr>
<th>#</th>
<th>Question</th>
<th>Yes</th>
<th>No</th>
<th>Response</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>I have taken one or more introductory level art classes</td>
<td>16</td>
<td>8</td>
<td>24</td>
</tr>
<tr>
<td>2</td>
<td>I have taken one or more advanced level art classes</td>
<td>5</td>
<td>19</td>
<td>24</td>
</tr>
<tr>
<td>3</td>
<td>I am or have pursued an associates degree (or higher) in art</td>
<td>5</td>
<td>19</td>
<td>24</td>
</tr>
<tr>
<td>4</td>
<td>I have created art, but I am entirely self taught</td>
<td>12</td>
<td>12</td>
<td>24</td>
</tr>
<tr>
<td>5</td>
<td>I have attended a professional or public event involving art</td>
<td>20</td>
<td>4</td>
<td>24</td>
</tr>
<tr>
<td>6</td>
<td>I have worked with art in a professional capacity (like gallery attendant, curator, etc.)</td>
<td>5</td>
<td>19</td>
<td>24</td>
</tr>
<tr>
<td>7</td>
<td>My artwork has been shown in a professional or public setting</td>
<td>8</td>
<td>16</td>
<td>24</td>
</tr>
<tr>
<td>8</td>
<td>I have created art in a professional capacity</td>
<td>6</td>
<td>18</td>
<td>24</td>
</tr>
</tbody>
</table>

The art background question indicated that over half (67%) of the participants had an introductory art class but only 21% had taken advanced level art classes with the same amount having pursued an associates degree or higher in art, and worked with art in a professional capacity. Half of the participants are self taught artists which is interesting since more than half have taken an introductory art class. Perhaps the participants identify as self taught and the introductory class was not in their main medium. It is also possible that they identify as mostly self taught. Of the participants a third have shown their artwork in a professional or public setting.
In addition to the questions, there were check boxes for what media were relevant. Two dimensional artwork was one of the dominant ones for most of the questions with digital artwork being the most dominant type for working with in a professional capacity.
Q12: Are you familiar with the following art related items?

<table>
<thead>
<tr>
<th>#</th>
<th>Question</th>
<th>Answer 1</th>
<th>Answer 2</th>
<th>Response</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>How art is critiqued?</td>
<td>13</td>
<td>11</td>
<td>24</td>
</tr>
<tr>
<td>2</td>
<td>Have you critiqued art before?</td>
<td>10</td>
<td>14</td>
<td>24</td>
</tr>
<tr>
<td>3</td>
<td>Analyzing art? (color, form, texture, context, light, etc.)</td>
<td>16</td>
<td>8</td>
<td>24</td>
</tr>
<tr>
<td>4</td>
<td>Interpreting art? (feeling, evaluating choices, relating, describing)</td>
<td>20</td>
<td>4</td>
<td>24</td>
</tr>
</tbody>
</table>

Figure 69: Specific art knowledge.

The art related knowledge was similar to the science specific knowledge in that about half of the respondents were familiar with the terms and a little less had experience critiquing art. There was a surprising percentage of participants familiar with interpreting art (83%), which was encouraging from the stand point of people viewing and appreciating encountered artwork. This could be misleading, though, as it was an art exhibit and more likely to attract people who want to view art. Additionally, the location was in the art building on campus, so people who might have happened on the show were more likely art initiated.
Experience

Q13: The information presented in the *Alive and Beneath You* art exhibition.

<table>
<thead>
<tr>
<th>#</th>
<th>Question</th>
<th>Answer 1</th>
<th>Answer 2</th>
<th>Answer 3</th>
<th>Response</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Was the information presented easy to find?</td>
<td>23</td>
<td>1</td>
<td>-</td>
<td>24</td>
</tr>
<tr>
<td>2</td>
<td>Did you read the provided information?</td>
<td>23</td>
<td>-</td>
<td>-</td>
<td>23</td>
</tr>
<tr>
<td>3</td>
<td>Did you see a connection between the information provided and the artwork?</td>
<td>23</td>
<td>-</td>
<td>1</td>
<td>24</td>
</tr>
<tr>
<td>4</td>
<td>Was the information provided helpful in understanding the artwork?</td>
<td>22</td>
<td>1</td>
<td>-</td>
<td>24</td>
</tr>
<tr>
<td>5</td>
<td>Did the artwork need the information provided? (no means it was self explanatory)</td>
<td>12</td>
<td>5</td>
<td>7</td>
<td>24</td>
</tr>
</tbody>
</table>

Figure 70: Presented information. Answer 1 = Yes, Answer 2 = No, Answer 3 = Neutral

The information presented was for the majority of the participants easy to find, read, and relate to the pieces. Also the majority felt that the information was helpful in understanding the artwork better, however, the participants were divided on whether the artwork actually needed the provided information with 50% saying yes, 21% saying no and the rest were neutral.
Q14: Your experience with the *Alive and Beneath You* art exhibition.

<table>
<thead>
<tr>
<th>#</th>
<th>Question</th>
<th>Answer 1</th>
<th>Answer 2</th>
<th>Answer 3</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Did you learn anything new about soil from the provided information or artwork?</td>
<td>19</td>
<td>3</td>
<td>2</td>
</tr>
<tr>
<td>2</td>
<td>Was the artwork visually intriguing? (In context of scientific information)</td>
<td>24</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>3</td>
<td>Was the artwork visually interesting without the context of the science?</td>
<td>23</td>
<td>1</td>
<td>-</td>
</tr>
<tr>
<td>4</td>
<td>Do you think that displaying scientific information in formats other than literature is useful for the general public?</td>
<td>23</td>
<td>1</td>
<td>-</td>
</tr>
</tbody>
</table>

Figure 71: Exhibit experience. Answer 1 = Yes, Answer 2 = No, Answer 3 = Neutral

Given that 67% of participants knew soil science terms (except CIORPT at 45%) with 75% with hands on techniques for describing soil and 42% of the participants that had taken introductory soil classes, I was surprised that 79% of the participants indicated they had learned something new about soil. I considered this a huge success with respect to my project. It would have been good if I had included more questions to determine what the viewers learned. This would have also helped protect against miss reading or not completely reading a question and participants eager to be helpful by providing positive feedback. I was very pleased that the participants felt that the artwork visually intriguing and could stand on its own and that they were supportive of other formats being explored for scientific information.

Q15: Any other comments regarding the *Alive and Beneath You* art exhibition.

The majority of people left this blank, there were 4 responses. 3 were complementing the art and the show. The fourth provided constructive feedback that they would have liked to see more about the techniques used in the piece. I addressed this issue in this document providing more information on how the pieces were made and the choice that I made in making them. This comment was also reiterated in the in-person interactions I had with several people at the show.
Survey Summary

The demographics, just based on the highest percentage give the average attendee that participated in the survey as a University affiliated, North American, Female, who is 18-24 years old, single without kids, has a 2-4 year degree and is pursuing or planning on getting a higher degree.

The background of the participants indicated that in general about half of them were familiar with the science terms used and half but not necessarily the same half were familiar with the art terms and expectations. The majority of participants had taken introductory sciences classes and predominantly chemistry and biology or soil science related. Also the majority of the participants were familiar with scientific peer reviewed writing. For the art background two thirds of participants had an introductory course but significantly less had taken advanced courses, so likely some of the classes were tied to general education credits. The prior art experience of the participants revolved around two dimensional artwork slightly more than the other media but not substantially so.

Participant experience indicated that it was well received and people were able to interact with the scientific information in a new way as well as learn something new from the artwork. The consensus was that the information presented with the artworks was helpful, if not necessary for some, for understanding the full meaning of the artworks. Finally there was strong support in favor of finding alternatives to the academic journal presentation of scientific information when targeting an audience that is not experienced with the information.
Survey Conclusions

To start with, I was surprised that the data created some beautiful graphs, but more importantly, even though there were only 24 participants in the survey there were some interesting trends. Originally I was anticipating more people would participate in the survey. However, the show was finals week of winter term through the first week of spring term, so I am sure people were busy and short for time. The surprising thing though was the participation on the “Soil Me!” wall. Given the participation there, it is likely that the attendees of the show chose to participate in the interactive aspects of the show more so than the data collection portion. Which to a certain extent supported the premise of the show, that the viewers would prefer to have a more interactive exchange than one that is visually taxing.

The survey provided great feedback for my project. The exciting data was that the majority of the participants learned something new about soil, and the really exciting part was that about half of the participants knew the soil terms already and had taken an introductory soil science class. The fact that they already new many of the terms and still learned something was a success for my project. In hindsight I should have provided more questions relevant to determining what specifically the viewers learned. I was concerned that making the survey too long would have driven participants away, which I may have done already with the current one. If I were to lengthen it I would include more questions about specific pieces such as the viewers most memorable (favorite) or something they remembered related to a specific soil. I also was trying to avoid a quiz or exam-like feel so I did not include those questions. Another aspect I would address if I were to redo the survey would be clarify that the background information was strictly knowledge prior to the show as I had one participant noted that “they do now” in reference knowing some of the soil terms.
DISCUSSION/CONCLUSION

A nation that destroys its soils destroys itself. ~ Franklin D. Roosevelt

The original call to action “Do something” drove this project forward. A solution or at least a plan of action needs to be found for the problems facing our world. I focused on the narrow topic of how scientific information is presented in academic journals, and how artworks could help reach a broader audience with the information. Idealistically, presenting the knowledge in a new way would motivate viewers to look at the subjects in a new way. Based on the results of the survey, my capstone art exhibit was successful in catching the viewers attention and teaching them something new about soil science through the artworks. The specific information learned was not quantified and would have been useful to know to help determine if the information that the viewers learned was the information that was intended to be learned. Also, the survey indicated an interest in pursuing alternative presentations of scientific information from all but one of the participants. Granted this was a small representation of the total attendance of the show, with 24 people participating in the survey. There was not a recorded number for the full attendance of the show. However, while I was at the exhibition there were significantly more people attending the show than taking the survey.

I recommend exploring show feedback further through more or alternate questions, other exhibitions or presentations, and potentially receive feedback in another form. The survey provided specific insight, but participation was limited. The “Soil Me!” wall was well received and had viewer interest, it was interactive, and had good participation. If I was to revisit this I would have the feedback specific to the pieces and have some form of viewer interaction to get feedback for the individual pieces. The panels of banner paper on the wall worked well. I would need to direct the feedback towards responses of the pieces and would need to provide some instructions but I think it would be a worthy experiment to try during an exhibition. The individual aspect might also receive more feedback as it would be more hands on and have less of test aversion than the paper surveys. The main focus of the survey was addressing evaluating my
exhibition and evaluating the relationship of the science in the artwork, which was successful. However, this is a starting point and would benefit from continued exploration and research.

There is room to improve in the specific implementation, as noted in the discussion of some of the artworks. Some of the pieces were more successful at joining the artworks and scientific information in an educational framework. This also could use more exploration and renditions, honing the process to find the ways the viewers interacted with the artwork and find the ways that got the best response. The Ultisol, Oxisol, Entisol, Spodosol, and Histosol as well as Climate Vân and the Study in Profile pieces were the most successful in capturing viewer attention with the Ultisol being the crowd favorite.

This line of inquiry has implications for public artwork, and academic work alike. A public artwork that is being constructed that I found both inspirational and a move in the right direction, is the Organograph. The Idea started 2006, Organograph is a 75 ft tall proposed public sculpture for San Jose, California, which functions as public art but is also functional in harvesting solar energy. It also works as an education and interactive piece where the sculpture is cycling based on historic and predictive atmospheric CO2 data and has another functional component associated with plants being inserted in a expanding garden. This is an area where the combination of art and science combined are aesthetic, functional, and educational. The rejoining of science and art is reminiscent of the Renaissance and the work of masters such as Da Vinci.

The combination of art and science in my exhibition addressed the way science is presented. It also involved the combination of soil science, art, and biochemistry for my degree in Master of Arts in Interdisciplinary Studies, which addresses the spaces between the fields. The format of evaluating my degree; making the artwork, the exhibition, the survey, the written portion, and the defense is not one I have previously heard of. It addresses the three fields of study in an interdisciplinary fashion in addition to the joining of the fields in the artwork.
     http://www.amorphicrobotworks.org/works/organograph/index.htm
Artist Statement

The “Alive and Beneath You” exhibition is a capstone art project for my Master of Arts in Interdisciplinary Studies (MAIS) program at Oregon State University, where my three fields of study are soil science, art, and biochemistry. I am looking at the presentation of science through the lens of art. There is a problem in science: the presented information is difficult for the general public to access and understand. Previously, my sculptures addressed human actions and the resulting environmental record. Previously, I have done spiraled ceramic or plaster pieces with incorporated objects found on the landscape such as bones or horns. Those sculptures had a tangible appeal stirring visual interest among the viewers, who were then presented a hypothetical future soil column showing human impact in contrast to the abstract spirals. I am still using tangible appeal in my work to draw the viewer in, and while the viewers are studying the form, the science will be observed along with it.

The big picture of the impact of humans on an environment is still a driving motivation behind my work, but now the focus is on education versus strictly raising awareness of the issue. The history of a place still has a role in telling the story, whether it is the processes that promote weathering, or the story that the soil can tell. I aim to capture the excitement and nostalgia of traditional fossils or rock formations, as well as the wonder and intrigue of organic forms influenced by aquatic creatures. Some of my work resembles rock or soil surfaces. Other pieces are more abstract, and focus on presenting the key feature of the given soil. There is also a component of found, recycled, and re-purposed objects in all of the soil order series. The dominant abstract organic forms I have chosen are spirals. The spiral sculptures provide an opportunity for the viewer to bring their curiosity about the texture and form to a situation where tactile and observational sensory information can educate viewers, in this case, about soils and the environment.

This show is specifically looking at the 12 soil orders of the Natural Resources Conservation Service, the United States' primary soil classification entity. Each of the soil order art pieces displays at least one key feature of the soil it represents. Accompanying each of the artworks is a brief explanation of the key features of each soil order. Also included in this exhibition is *Climate Vân* a sculpture that incorporates 6 of the soil orders and addresses climate change in an interactive fashion.
Exhibition Flyer

The Alive and Beneath You exhibition flyer that was distributed by email and in print outs.

Figure 72: Alive and Beneath You exhibit flyer.
Call for Feedback Sign

This was the call for participation and feedback as well as a thank you for coming sign that greeted viewers as they were leaving.

Figure 73: Thank you and call for feedback sign
Survey and Instructions
The survey and cover page that participants were given.

Figure 74: Survey consent cover page.
Q1: What is your age?
- 18 to 24 years
- 25 to 34 years
- 35 to 44 years
- 45 to 54 years
- 55 to 64 years
- 65 years and over

Q2: What is your gender?
- Male
- Female
- Prefer not to answer

Q3: Please indicate your current family structure.
- Single without children
- Single with children
- Married without children
- Married with children
- Life partner without children
- Life partner with children
- Other or prefer not to answer

Q4: What continent are you (primarily) from?
- North America
- South America
- Europe
- Africa
- Asia
- Antarctica
- Australia
What is your current University status?

- University affiliated (Staff, Faculty, Student)
- Work affiliated (not directly tied to the university, like a consultant, service, or delivery person)
- Other, visitor

What is the highest level of education you have completed?

- Less than High School
- High School / GED
- Some College
- 2-year College Degree
- 4-year College Degree
- Master's Degree
- Doctoral Degree
- Professional Degree (JD, MD)

Are you planning on returning to school to further your education (Pursuing a higher degree if a current student)?

- Yes
- Work related continuing education
- No
- Unsure
09 Academic fields are listed in bold for reference in the next question.

<table>
<thead>
<tr>
<th>Academic Fields</th>
<th>Engineering</th>
</tr>
</thead>
<tbody>
<tr>
<td>Natural Science</td>
<td>Computer Science</td>
</tr>
<tr>
<td>Biological Anthropology and Anatomy</td>
<td>Biomedical Engineering</td>
</tr>
<tr>
<td>Biology</td>
<td>Civil Engineering</td>
</tr>
<tr>
<td>Chemistry</td>
<td>Electrical &amp; Computer Engineering</td>
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<tr>
<td>Earth &amp; Ocean Sciences</td>
<td>Mechanical Engineering</td>
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<tr>
<td>Mathematics</td>
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<tr>
<td>Physics</td>
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<tr>
<td>Humanities and Arts</td>
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<tr>
<td>Art History</td>
<td>Social Sciences</td>
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<tr>
<td>Asian and African Languages and Literature</td>
<td>Cultural Anthropology</td>
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<tr>
<td>Classical Civilization/Classical Languages</td>
<td>History</td>
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<tr>
<td>Dance</td>
<td>Linguistics</td>
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<td>English</td>
<td>Psychology</td>
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<td>French Studies</td>
<td>Sociology</td>
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<td>German</td>
<td>Women's Studies</td>
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<td>International Comparative Studies</td>
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<td>Italian Studies</td>
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<tr>
<td>Literature</td>
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<td>Medieval &amp; Renaissance Studies</td>
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<td>Music</td>
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<td>Philosophy</td>
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<td>Religion</td>
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<td>Spanish</td>
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<tr>
<td>Theater Studies</td>
<td></td>
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<tr>
<td>Visual Arts</td>
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</tbody>
</table>

http://public.econ.duke.edu/~yjh3/working_papers/college_major_questionnaire.pdf

020: What best describes your academic field?

- [ ] Natural Sciences
- [ ] Arts and Humanities
- [ ] Business and Economics
- [ ] Engineering
- [ ] Social Sciences
- [ ] Politics and Policies
- [ ] Other academic field (please specify)

Figure 77: Survey page 3.
Figure 78: Survey page 4.
### Art Background

<table>
<thead>
<tr>
<th>Question</th>
<th>Yes</th>
<th>No</th>
<th>2D</th>
<th>3D</th>
<th>Digital</th>
<th>Other</th>
<th>Not Applicable</th>
</tr>
</thead>
<tbody>
<tr>
<td>I have taken one or more introductory level art classes</td>
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<td>I have taken one or more advanced level art classes</td>
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<tr>
<td>I am or have pursued an associates degree (or higher) in art</td>
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<td>I have created art, but I am entirely self-taught</td>
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<td>I have attended a professional or public event involving art</td>
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<td>I have worked with art in a professional capacity (like gallery/attendant, curator, etc)</td>
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<td>My artwork has been shown in a professional or public setting</td>
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<tr>
<td>I have created art in a professional capacity</td>
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</tbody>
</table>

### Are you familiar with the following Art-related Items?

<table>
<thead>
<tr>
<th>Item</th>
<th>Yes</th>
<th>No</th>
</tr>
</thead>
<tbody>
<tr>
<td>How art is critiqued?</td>
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<tr>
<td>Have you critiqued art before?</td>
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<tr>
<td>Analyzing art? (color, form, texture, context, light, etc)</td>
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<td></td>
</tr>
<tr>
<td>Interpreting art? (feeling, evaluating choices, relating, describing)</td>
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<td></td>
</tr>
</tbody>
</table>
016. The information presented in the Alive and Beneath You art exhibition

<table>
<thead>
<tr>
<th>Question</th>
<th>Yes</th>
<th>No</th>
<th>Neutral</th>
</tr>
</thead>
<tbody>
<tr>
<td>Was the information presented easy to find?</td>
<td></td>
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<tr>
<td>Did you read the provided information?</td>
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<tr>
<td>Did you see a connection between the information provided and the artwork?</td>
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<tr>
<td>Was the information provided helpful in understanding the artwork?</td>
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<tr>
<td>Did the artwork need the information provided? (no means it was self explanatory)</td>
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</tbody>
</table>

017. Your experience with the Alive and Beneath You art exhibition

<table>
<thead>
<tr>
<th>Question</th>
<th>Yes</th>
<th>No</th>
<th>Neutral</th>
</tr>
</thead>
<tbody>
<tr>
<td>Did you learn anything new about soil from the provided information or artwork?</td>
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<tr>
<td>Was the artwork visually intriguing? (in context of scientific information)</td>
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<tr>
<td>Was the artwork visually interesting without the context of the science?</td>
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<tr>
<td>Do you think that displaying scientific information in formats other than literature is useful for the general public?</td>
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</tbody>
</table>

019. Any other comments regarding the Alive and Beneath You art exhibition:

<<   >>
Figure 81: Survey back page, thank you for participating.
Other Projects

One of the other projects that I worked on was the Crops Building Renovation. Which would include more site specific art that brought the science being done in the building to attention through the use of art.

Figure 82: Selection of images from proposed OSU Crops Building renovations.