

## Topography

Teresa Strohl, 2019 CTI Fellow  
Elon Park Elementary

This curriculum unit is recommended for Art and Science/Grade 3

**Keywords:** Mapmaking, topography, built environment, climate change, landscape artists, Thomas Moran, Albert Bierstadt, Frederic Church, Hudson River School, biome books

**Teaching Standards:** See [Appendix 1](#) for teaching standards addressed in this unit.

**Synopsis:** This unit will integrate National standards NC Essential standards from Visual Arts and Science. This curriculum unit will focus on students observing their surroundings by making maps of their own classroom, school, and city. This unit will give students the tools to observe and make their own small changes to their immediate environment. In the classroom, I will discuss climate change, the effect of climate change on our land, and how students can take part in changing the climate in the future. I will introduce students to three landscape artists/explorers from the Hudson River School movement, Thomas Moran, Frederic Church and Albert Bierstadt. Students will compare & contrast the paintings from these artists to what photos look like today from the same area. Students will paint their own surroundings to create their own landscape similar to what landscape artists of our history did. Some of the other activities in this unit will be “Map It,” in which students will create a series of map paintings, “Observation Journaling,” which illustrates note taking, to make concepts easier to learn. The journals will document the student’s surroundings while observing their own environment. My hope with this unit is that students will cultivate their sense of affection for the environment and mobilize students to change the future.

*I plan to teach this unit during the 2019-2020 school year to 210 students in Art/Science Grade 3. This unit will be shared with other Visual Art Teachers in my district.*

*I give permission for the Charlotte Teachers Institute to publish my curriculum unit and synopsis in print and online. I understand that I will be credited as the author of my work.*

## **Topography**

*Teresa S. Strohl*

### **Background**

Elon Park Elementary is an elementary school located in Charlotte, NC. It is in Mecklenburg school district, which is very diverse with 178 schools. There are 1100 students within the school with a wide range of academic abilities. Elon Park Elementary is a neighborhood school. The school promotes excellence in student achievement and growth. There are 54 classrooms with 100% fully licensed teachers, 85% are highly qualified.

I teach Visual Arts at Elon Park Elementary twice every seven days for 55 minutes. Due to the nature of the topics and the limited time with students, most of my lessons require at least two or more class sessions. This specific unit “topography” will take approximately six weeks to complete. As an art educator, I inspire my students by exposing them to famous artist masterpieces that relate to the themes I am covering. I routinely look for ways to connect my art lessons to the subjects that the students are focusing on in the regular classroom setting.

I am lucky to have a large art room with eight tables and a large drying rack. I have storage for supplies, three sinks and a separate room for the kiln. My students can create an array of 2D and 3D projects. My school website has student work displayed and a blog page for families to post comments about student work. I frequently display student work in the community.

This unit “Topography” will be implemented in the third grade. Because I teach both academically gifted and general education students, it is imperative that I differentiate my lessons to keep the students motivated and challenged in my art room. Art brings forth excitement and enthusiasm of most students and these fourth graders are no exception! I will be teaching these lessons to four separate classes. Producing art taps into the critical mind-set of students as they develop answers to questions, conduct research, develop comprehension skills, make meaningful connections, communicate meaning, show beauty and practice creativity.

### **Rationale**

No matter what unit I am teaching, I want my students to leave my class with a strong understanding of the subject that I am integrating into visual arts. I always strive to intersect two or more topics of interest, keeping my students continuously engaged. Through this curriculum, I aim to incite curiosity about environmental factors. The students today are growing up without hearing the voices of living things. According to Rachel Carson, no child should grow up unaware of the dawn chorus of birds in spring. Exposing students to their environment by turning over rocks and observing what is underneath students will become more sympathetic to the effects of climate change.

Topography is directly influenced by climate change and is an integral part of how we view alterations to our environment. Topography can be defined as the shape and features of the

land or can also be a description of the land surface itself. Changes to the topography of the land are easily noticeable, making it a perfect jumping off point for my students into the topics about environment and place that this curriculum unit discusses.

Topography is influenced by climate change adding man-made buildings to the natural order of the landscape which brings people, pollution, and shifts in land formations. This unit will give students a deeper understanding of topography, whether that is the surface area of their own classroom, outside spaces of their school, or their hometown. To further engage the students and relate discussions to their own lives, I will show the imagery of Charlotte past and present and how the urban environment has changed the landscape. There is a website (<http://timemachine.mcmap.org/#15/35.23682/-80.84504>) called “The Time Machine” that views areas around Charlotte, North Carolina over many years and how the infrastructure (roads, buildings, population) has changed. This site demonstrates that Charlotte has changed and with that comes questions about how the urban space has changed how the land functions. Seeing this, students will realize that the city of Charlotte has not always looked the way it does now. David Sobel, in his book, *Mapmaking with Children*, states, “In the beginning children represent their own comfortable known experiences in their maps then gradually children start to focus on scale, location, direction, and geographic relationships.”<sup>1</sup>

Curiosity and destruction of climate has been discussed and debated for many years, not only in recent history. Ancient Greeks debated over what would happen if you cut forests. Would it bring more rainfall to the area or less rainfall? Humans are changing the landscape from water pollution to ill-fated mining techniques, and a host of other agriculture and construction practices. According to Sanderson most of Earth’s terrestrial surface may be considered “human dominated” or Anthropogenic Landscapes. People living within our landscapes are intentionally responsible for dangerous environmental impacts. Research led by a biogeographer at the University of Maryland Baltimore County named Erle Ellis showed how some of the forests we see today may have been cleared in previous years and now seem like untouched forests, showing that landscape can change and change again over relatively short times<sup>2</sup>.

Moran, Bierstadt and Church were artist explorers in the 1860’s. The landscapes they painted were not “human dominated.” These artists, and many of their contemporaries, explored the natural beauty of the land and brought in a regions’ characteristics and fresh themes to their paintings.<sup>3</sup> They wanted the viewer of their paintings to see the universe in all its glory. Students will analyze Bierstadt’s painting of *Sunset Light, Wind River Range* of the Rocky Mountains dated 1861 compared to what the Range looks like today. Students will also compare a painting by Frederic Church of Niagara Falls, New York dated 1857 to a photograph from today. Students will quickly notice the lack of forest canopy in the Rocky Mountains and how erosion has changed the shallow areas of the Niagara River.

Climate science will be a theme throughout this unit as we analyze Charlotte and artists/explorers Thomas Moran, Bierstadt and Church. This group of landscape artists also known as explorers prompted human interaction with the environment as far back as the 1860’s. These artists painted a view of the land or landscape. I want my students to view the environment in a new way by taking the time to look at spaces close to them and in the distance like the work of Moran, Bierstadt, and Church.

## Objectives

With this unit my students will be able to understand that environments change for many reasons. Modern day climate change refers to the increasing temperature of the world. Carbon dioxide is a greenhouse gas which makes up a small part of our atmosphere but is very important to our existence. Carbon dioxide has been measured by climate scientists since the middle of the 20th century, and the carbon moves between the atmosphere, ocean, land biosphere, and rocks. This movement is called the carbon cycle. Humans have altered the carbon cycle through extracting fossil fuels and deforestation.<sup>4</sup> An example of deforestation is *Sunset Light, Wind River Range of the Rocky Mountains* by Bierstadt compared to a photo of the land today. I will show how climate change has progressed over the years due to human interaction.

I will introduce three landscape artists: Thomas Moran, Albert Bierstadt and Frederic Church. I will show how they documented their local community and compare/contrast it to the current day. These artists were classified as realistic landscape artists from the Hudson River School era in the 1800's. The Hudson River School located in upstate New York, was a club for landscape artists to use and mingle with other artists of that era. Students will observe the differences between Moran, Bierstadt and Church's landscapes of the 1820's and what that same land looks like today. I hope my students will start to wonder about their surroundings and how they have changed.

## Science Behind It

Population growth plays a major role when it comes to our climate. Energy consumption is the most notorious producer of greenhouse gasses, to the point where every first-world country has developed some type of group to deal with the aftermath. Scientists study our environment in order to better understand the way advancing technology affects the world around us. As society continues to develop new technologies and grow, it becomes ever more essential that scientists, and the world at large for that matter, find ways to stymie the negative impact that societal growth has on the world we call home.

Thanks to increased release of greenhouse gasses through advances in technology and the accessibility people at large have to it, ecosystems are constantly disrupted. This is to say nothing about the direct impact that human expansion has on local ecosystems through urban sprawl, mass construction. The drastic changes in temperature are the result of increased greenhouse gasses in the atmosphere which impacts the continued growth of our society. Air quality is one of the more significant impacts that can be easily measured. Though carbon dioxide is essential to the balance of our ecosystems, an over-abundance of CO<sub>2</sub> directly, and negatively affects not only the air we breathe, but also the food we eat.

In order to encapsulate climate change and the way it has affected and continues to affect the world around us, I will guide my students in examining the differences between landscape paintings across history and current photographs. By showing students the drastic difference

between the photographs and paintings of the same landmarks, they will be able to see the impact that climate change has on the environment.<sup>5</sup>

In order to insure that the world we live in remains viable for the foreseeable future and beyond, young people need to learn more about reducing the carbon footprint of the society at large. One way to help drive change is by breaking down long-term carbon emission reduction strategies into manageable “wedges” that stack up over time. Through immediate and actionable strategies like reducing power consumption, carbon capture and storage, and the utilization of alternative energy sources, climate change can be reined in and slowed. Through deliberate actions taken by international organizations, like pushing wind power, reducing deforestation on a global scale, and increasing average fuel economy in nearly 2 billion cars from 30mpg to 60mpg,<sup>6</sup> carbon emissions can be reduced and result in the slowing of climate change.

I will use this curriculum unit to demonstrate to my students the necessity of changing the methods by which we interact with our environment. The viability of our environment in the long-run rests on the shoulders of future generations. Exemplifying this point, climatecentral.org predicts that, by 2100, summers in Charlotte will feel like summers in Pharr, TX -- 96 degrees on average. They even claim that the carbon dioxide we emit today will still be warming the Earth in the year 3000 and beyond. Wow!<sup>7</sup>

## **Artist/Explorers**

### **Thomas Moran, Albert Bierstadt and Frederic Church**

All three landscape artists were central figures in the Hudson River School movement Hudson River School was an art movement that included a group of landscape artist whose vision was similar. The paintings depicted the Hudson River area, Catskills, and Adirondacks in upstate New York, but also captured scenes from all around the United States in areas that are today National Parks, and even around the world. These artists captured the lands natural majestic beauty wherever they went.

Albert Bierstadt immigrated to America with his parents and two brothers from Germany, the family settled in Bedford, Massachusetts. In 1853 Bierstadt went back to Germany to study at the Dusseldorf Art Academy. When he returned to Massachusetts, he became a well-known landscape artist organizing a large exhibit of his American West paintings. This exhibit brought him national attention. In 1872 he married Rosalie Ludlow and built a mansion overlooking the Hudson River. Bierstadt’s painting captured the vast landscape depicting the grandeur of the frontier. The viewer of his paintings enjoyed the firsthand observation of the landscapes adding an almost new dimension to the work. He soon joined a group called the Hudson River School so he could study with a group of artists that worked in the same style.<sup>8</sup>

Frederic Church was born in Hartford, Connecticut he was born into a wealthy family which made it easier to pursue his love of painting. Church soon became a pupil of Thomas Coles who was well known as a landscape painter. He travelled the world which transformed his career projecting him to international fame. Church bought farmland in Hudson, New York and

married his wife Isabel Carnes they had two children, a son and daughter both died of diphtheria in 1865. Later Church and his wife began a new family eventually having four children. Both Bierstadt and Church commonly believed that art should mirror nature that a picture should replicate what an artist sees. <sup>9</sup>

Thomas Moran was born in 1837 in Bolton, Lancashire, England. He immigrated with his family to Philadelphia, PA where he became a wood engraving apprentice. Moran married Mary Nimmo the couple had two daughters and one son. Mary was a landscape artist, so Moran began changing from printmaking to painting landscapes. Soon he and his family travelled to the Hudson River area of New York State and helped begin the Hudson River School movement.

All three of these landscape artists believed in the natural beauty of the landscape. As defined in *Nature and Culture*, a landscape artist's prominent role was an explorer, educator, frontiersman, and minister. <sup>10</sup> Landscape artists saw the attraction of unexplored territory. Landscape artist want to represent or replicate the beauty, some artists create these depictions to study and explore various artistic elements such as light, color/value, balance, and repetition. Some landscape artist use scenery to tell stories, illustrate an idea or focus on the sky as beauty. By tracing the genre of landscape art throughout history enables one to visually recognize how our land has become populated with people, buildings and roads.

These two artists Fredric Church and Albert Bierstadt from our history, painted an area that has been photographed and painted multiple times over the years. I will compare and contrast these historic paintings to recent photographs to prove how the landscape has shifted due to climate change.

<https://artsandculture.google.com/u/1/profile?tab=gl>



Bierstadt's  
painting  
Sunset  
Light, Wind  
River Range  
of the  
Rocky  
Mountains



In the photo (below), the shoreline has eroded over time, and there is more water than in the same view in the painting by Albert Bierstadt, who painted teepees in this shifting landscape. The painting has a vast canopy of forest on the mountain-side, while the photo at the bottom seems to lack vegetation.



Frederic Church's painting of Niagara Falls, New York



The photo of today (below) shows rising water levels compared to what the river looked like in Church's painting. In the painting, there seems to be a vast, wide open frontier. In the photo (below), there are man-made buildings, the stamp of human influence in these ever changing landscapes.<sup>11</sup>

### **Teaching Strategies**

The teaching strategies will vary greatly throughout the lessons to ensure all learning styles are met. There are some strategies that work better than others within certain lessons.

### **Collaboration**

I am not lucky enough to have a formal time to collaborate with my colleagues so organizing, executing, and planning are done after school hours. In my experience the benefits to students outweigh the challenges of planning a collaborative lesson. Students retain much more content when there is an extension into one of the special area classes, especially art. Students are more apt to remember and make connections to the art discussed if they create a tactile project. This unit will use cross disciplinary teaching strategies. Classrooms like this requires planning and cooperation. Creating integrated lessons give the arts greater visibility in the school and community because they create hands-on activities related to the content area. Teachers create more rigorous and meaningful lessons by working together. As teachers, displaying collaboration in their classroom will set an expectation for students to work together and communicate more effectively.



## **Technology**

Technology will be used as a tool to engage student learning. Students respond well to technology because of the overwhelming use of it in our society today. In our district student's grades 3-5 are 1:1 so everyday my students bring their chrome books to art. A great teachable moment! When students produce something on a technological device they seem to absorb it more easily because students today are modern learners. The best teaching strategies are the ones in which students do not realize they are learning.

## **Thinking Maps**

Thinking Maps create concrete images of abstract thoughts. Students visualize their thinking. This is a great tool to describe objects, to compare & contrast images, and to explain correlations within a subject. <sup>12</sup>

## **Art Talk**

Throughout the school year I encourage my students to speak using art vocabulary. I call this Art Talk. I feel strongly that students should use art words to analyze art, interpret art and reflect on their own artwork. As I set this expectation year after year, I see the students use the words correctly, not just in the art room but in their classrooms.

## **Visual Notetaking**

Students will learn about Visual Notetaking which is similar to Cornell Notes. Students will draw pictures of the important take aways from a lesson and include it into their biome notebooks. Each page will build on the next page as students cut away to create their own landscape.

## **Word Wall**

The word wall that is posted in the art room is divided into modes of creative expression such as clay, fiber arts, drawing, painting, and sculpture with art terminology listed under each category. Vocabulary is an important teaching strategy. I start every year with a word wall lesson specific for each grade level. I continually point out the art word that I am concentrating on in the lesson. Students need to be aware that words have different meanings within different content areas. I set this expectation in the art room at the beginning of the year while in my room the students will speak using the protocol of art talk. I will remind them to use their art words. This sets an expectation that the visual arts matter!

## **Differentiated Learning**

Differentiated learning strategies look different in the art room than in general education classrooms. I encourage creative chatter. Having only 55 minutes proves difficult to help all 25 students. I have 3-4 students assigned to each table. Peer assistance is available at every table because when I assign seats I put at least one student who is able to work cooperatively per group. I frequently roam the classroom to assist students with more support. When a student asks for help in the art room, he or she most likely wants you to draw for them; I solve that problem by drawing with the eraser and not the pencil. The eraser technique assists them by giving them confidence in their own artistic abilities.

## **Reflection**

Rubrics are a strategy that I often include in my lessons. A rubric that focuses on a specific skill and places accountability on the student. I find it easy to measure a student's performance through rubrics. I have students glue their rubrics on the back of their art so students and I can easily see their performance over the school year. This year every student has an art journal; on the inside cover of the journal there is a checklist for their artwork. I have the students glue the checklist in their journals as a reminder to be creative, neat, colorful, and complete. Another strategy for reflection is called two stars and one wish and it is conducted after a student completes his/her work. The students answer two questions on the back of their work. The questions are: What two things did you like best about your work? and What is it that you might change about your work? I lead a discussion on the answers that are acceptable to these questions. The expectation in my classroom is while discussing works of art they must cite supporting information about the piece of art. I want students to be aware of how the viewer analyzes art and that it is the opinion of the viewer, there is not a right or wrong answer. My instructional goals for using this strategy are to strengthen public speaking

## **Demonstration**

Throughout this unit I will review previously learned material due to fifty-five minute blocks once a week. One week is a long time between lessons. All activities are modeled first to demonstrate the art technique. I feel the students have greater success at the activity if they see examples. All four lessons in this unit require hands-on participation so there will be an art product after every lesson. This hands-on strategy meets the needs of the tactile and visual learners. If I model the activity step-by-step, the student feels more successful at each step. By transferring knowledge that can be easily replicated, students will understand logical steps; this will use their optimistic left brain.

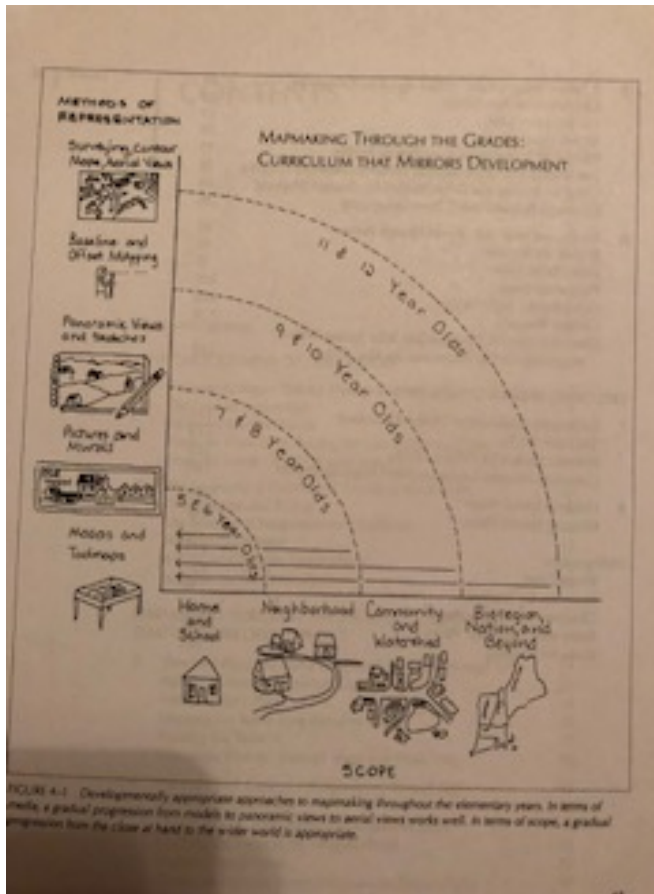
## Classroom Activities

### Lesson One: Map It!

**Objective:** I can observe my surroundings and transfer to paper. I will be able to use perspective to create a series of drawings.

Students will create a series of scale drawings classroom, school, and the city of Charlotte. Students will create a scale drawing of their classroom with a legend for direction symbols. As a class we will walk the outside spaces around the school observing where the trees and rocks are placed if they were placed intentionally. Students will study maps of Charlotte from the past and present to create a map of Charlotte focusing in on one specific place. The mapmaking series will be 8x10 pictures using the same art process for all. Paintings will be hung together.

This graphic from David Sobel, *Mapmaking with Children*, shows how students view their surroundings. The scope of their observations through their immediate community and beyond.



Tools: Pencil, Sharpie, Crayon and Watercolor, white paper

Process is Crayon resist

Students will use Elements of Art line, shape, and color to create their paintings and add in balance, perspective, and unity from Principles of Art. Students will observe their surroundings more carefully. Draw using shapes first then adding details to pull the painting together.

## Lesson Two: Observation (biome) Journals

**Objective:** I **can** observe my surroundings to create observational drawings. I **will** assemble a journal using layers to create a picture.

Students will create a window observation journal each page building on the next so when closed the viewer will see a picture. This project will take planning of each page it is similar building overlays on blueprints. After assembling the journal students will create observational drawings on each page for example laying down on grass to observe the clouds.

Tools:

Scissors, Tag board, staples, markers, sharpies, blue paper, white chalk.

Students will use elements of art line, shape, color, texture, and space and add perspective, movement, and emphasis.



Example:

### **Lesson Three: Landscape Painting**

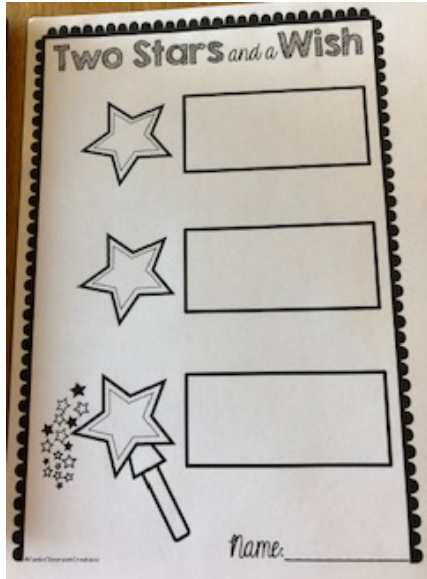
**Objective:** I **can** observe my surroundings similar to Hudson River School artists. I **will** compare and contrast historic paintings to photographs of today.

I will discuss three landscape artists Moran, Bierstadt and Church from our history. The three artists/explorers were part of the Hudson River School movement. These artists were very passionate about nature and the purity of the land. Together students will compare and contrast Bierstadt's painting of the Colorado Rockies to a photo taken from the same location. I will then have the students work in pairs to create a double bubble map of Frederic Church's painting Niagara Falls and compare to a photo taken from the same location. Students will create a double bubble thinking map to show both side by side then add the differences in the middle. Students will focus on one area outside to paint the landscape, what they see.

Tools:

Materials: Photographs, Watercolor, sharpie, pencil, white paper

## Assessments



Two Stars and One Wish - This is a self-reflection activity. I use it at the end of most art lessons. This gives my students a chance to think about their own picture and to reflect on their own growth.

Student Name/Class Code \_\_\_\_\_

Name of Project \_\_\_\_\_

Completeness				
Craftmanship				
Creativity				
Clean-Up				

Teacher Comments ....

## Art Rubric

On the back of every art piece students fill out their art rubric it gives them a checklist to complete. This is a way for students to gage their effort put into every project.

## List of Materials for Classroom Use

Discovery Ed

Google Earth

Mecklenburg Time Machine

Google Arts and Culture

Thinking Maps

<https://www.nationalgeographic.org/education/map-skills-elementary-students/>

## **Vocabulary**

**Climate Science** a scientific study of science

**Anthropogenic Landscape** are areas of Earth's surface where direct human alteration of ecological patterns.

**Landscape painting** is a style of painting which includes a view of the land.

**Greenhouse gases** a gas that contributes to the greenhouse effect by absorbing infrared radiation.

**Hudson River School** was a mid-19th century American art movement supported by a group of landscape artist.

**Topography** is the arrangement of the natural and artificial physical features of an area.

## **Appendix 1 - Implementing District Standards**

### Third Grade Essential Science Standards

3.G.1 Understand the earth's patterns by using the 5 themes of geography: (location, place, human-environment interaction, movement and regions)

3.H.1.3 Exemplify the ideas that were significant in the development of local communities and regions.

### National Science Standards

3-ESS3 -1 Earth and Human Activity A variety of natural hazards result from natural processes. Humans cannot eliminate natural hazards but can take steps to reduce their impacts.

3-ESS2-2 Climate describes a range of an area's typical weather conditions and the extent to which those conditions vary over the years.

### Visual Arts Essential Standards

3.CX.1.2 Understand how art documents the history of the local community.

3.CX.1.3 Classify artist, styles and movements.

3.CX.1.4 Compare purpose of art in different cultures, time periods, and societies.



## Bibliography

- Anthropogenic Landscapes, n.d. [http://www.ecotope.org/about/anthropogenic\\_landscapes/](http://www.ecotope.org/about/anthropogenic_landscapes/).  
A website managed by a group of scholars investigating populated landscapes throughout the world under the direction of Erle Ellis.
- “A Science & News Organization.” Climate Central. Accessed October 27, 2019.  
<https://www.climatecentral.org/>.  
A website about current events regarding science and climate change.
- Google Arts & Culture. Google. Accessed October 27, 2019. <https://artsandculture.google.com/>.  
A Google website focused on art and diversity
- Greenfieldboyce, Nell. “NPR Special Series Solutions.” Climate Game Gives Real Options to Save World, June 25, 2007.  
A series about scientific opinions on how to save our current climate situation.
- Fischer, Diane Pietrucha. Primal Visions: Albert Bierstadt Discovers America: Montclair Art Museum, 2001.  
Primal Vision is an exhibition of Albert Bierstadt's work that took on a pivotal role in American art history.
- Howat, John K. American Paradise: the World of the Hudson River School: Metropolitan Museum of Art, 1987.  
A book of the first group of landscape artists that participated in the Hudson River School.
- Leedy, Loreen. Mapping Pennys World. Square Fish, 2012.  
Lisa learns to read maps and with the help of her dog Penny they visit many places.
- Lomas, Sue. Maps and Symbols. Wayland, 2006.  
A book about how to read maps and symbols.
- Novak, Barbara. Nature and Culture: American Landscape and Painting, 1825-1875 /Barbara Novak. Oxford University Press, 1981.  
A book about the American landscape from 1825-1875 and painters that painted the beautiful landscape at that time.
- Sobel, David. Mapmaking with Children: Sense of Place Education for the Elementary Years. Heinemann, 1998.  
A book about the importance of hands-on mapmaking for children.

## End Notes

---

<sup>1</sup> Sobel, David. *Mapmaking with Children: Sense of Place Education for the Elementary Years*. Heinemann, 1998.

<sup>2</sup>Anthropogenic Landscapes, n.d. [http://www.ecotope.org/about/anthropogenic\\_landscapes/](http://www.ecotope.org/about/anthropogenic_landscapes/).

<sup>3</sup> Novak, Barbara. *Nature and Culture: American Landscape and Painting, 1825-1875* /Barbara Novak. Oxford University Press, 1981.

<sup>4</sup> Anthropogenic Landscapes, n.d. [http://www.ecotope.org/about/anthropogenic\\_landscapes/](http://www.ecotope.org/about/anthropogenic_landscapes/).

<sup>5</sup> Wendel, Joanna. “A Window into the Emerging Anthropocene...Through Art.” *Eos* 99 (September 2018). <https://doi.org/10.1029/2018eo088375>.

<sup>6</sup> Socolow, Robert H., and Stephen W. Pacala. “A Plan to Keep Carbon in Check.” *Scientific American* 295, no. 3 (2006): 50–57. <https://doi.org/10.1038/scientificamerican0906-50>.

<sup>7</sup> Socolow, Robert H., and Stephen W. Pacala. “A Plan to Keep Carbon in Check.” *Scientific American* 295, no. 3 (2006): 50–57. <https://doi.org/10.1038/scientificamerican0906-50>.

<sup>8</sup> Howat, John K. *American Paradise: the World of the Hudson River School*: Metropolitan Museum of Art, 1987.

<sup>9</sup> Howat, John K. *American Paradise: the World of the Hudson River School*: Metropolitan Museum of Art, 1987.

---

<sup>10</sup> Novak, Barbara. *Nature and Culture: American Landscape and Painting, 1825-1875* /Barbara Novak. Oxford University Press, 1981.

<sup>11</sup> Google Arts & Culture. Google. Accessed October 27, 2019.  
<https://artsandculture.google.com/>.

<sup>12</sup> “a Common Visual Language.” Thinking Maps, n.d. <https://www.thinkingmaps.com/>.