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Term Project Proposal

My project largely focuses on corporations, industries and their impacts on ecological functioning. It examines how forces of capitalism and its focus model for short term profit maximization sets the foundation for long term problems through local case study examples as well as cumulative research of industries impact on a global scale. This system of profit-maximization at all costs has been shown to function in a pattern of incredibly destructive ways; of the multitude of industries, my project focuses on their carbon emissions and other sorts of pollution, as well as their harm to ecosystems at a global and local scale. A book titled “The Bridge at the Edge of the World” by Author James Gustave Speth argues that the current rate of climate degradation is a direct result of modern capitalist forces. Speth presents the idea that current rate of environmental efforts will fail to resolve the root systematic driving forces which are entirely aimed at profit maximization. This book targets the boundary between science and politics because it addresses the systems of modern capitalist industries and their devastating impacts on ecological processes, and how they are directly correlated to each other.

One example of this is demonstrated through a study examining carbon emissions, deforestation, and community land conversion as a result of palm oil plantation expansion. The study on a region of Indonesia found that forests and peatlands in the area for conversion into palm oil plantation acted as a substantial source of greenhouse gas emissions from land cover change, which as a whole is responsible for 10-20% of net emissions on a global scale; still, numbers are largely uncertain as data from plantations are largely undocumented (Carlson 7559). Direct impacts by plantations replacing forested/peatland environments include the significant loss of 40% of lowland forests in the region (7559). However, impacts extend beyond the area of a plantation development, due to escaping fires, which were responsible for significant amounts of net carbon emissions from the industry (7562). This study reveals the nature of industry expansion in how it concerns short term economic benefits reaped from the commodity of palm oil rather than looking at the long-term degradation of the local ecological systems as well as its global contribution to the impacts of GHGs emissions. As forest habitats are lost, the ecological systems which once functioned within them are also lost, and with it a loss of biodiversity, and the ecosystem services it provides to humans. Because the rate of expansion exceeds the rate in which forests can regenerate themselves, this destructive pattern cannot function long enough to sustain the needs of the future.

Mirroring the findings previous study is that of industrialized animal production and its ecological impacts. A study analyzing the impact of concentrated animal feeding operations (CAFOs) in North Carolina revealed the scale of this industry and how it directly impacted the local Aquatic ecosystems through nutrient and microbial pollution. Within the confined space of an enclosed building, animals are fed large quantities of feed containing nitrogen and phosphorous which then travels from their excrement into “waste lagoons” (Mallin, Lawrence 370). Much of the material from this concentrated waste cesspool is dispersed into fields, where it may enter aquatic systems through runoff and groundwater infiltration (370). These high concentrations of waste are anomalies which “can easily exceed the assimilatory capacity of the local landscape” (370). Data collected from a waste lagoon rupture incident that occurred in 1995

that resulted in 22 miles of river polluted from 25 million gallons of swine waste was shown to cause months of significant estuarine fish kills and algae blooms (371). Algae blooms like these are responsible for the death of bottom dwelling organisms, finfish, and seagrass bed habitats that cannot survive in compromised oxygen levels (380-379). Along with the impacts of nutrient pollution, pathogenic bacteria also thrive in these waste lagoons which eventually reach aquatic systems through rain runoff; this has resulted in “large-scale microbial disease outbreaks” (380). This study revealed the great extent to which industrial production through CAFOs had impacted the local environment through nutrient and microbial pollution, and thus serves to represent how industrial agriculture and its processes harm the ecosystem and its ability to provide us with services. Long term impacts of aquatic dead zones include compromised ability to sustain ourselves through aquatic food sources, as habitats such as seagrass beds are lost and can no longer sustain life. As of today, food production such as through animal agriculture takes up 40% of the earth's land cover (*National Geographic*). Because these ecological systems cannot regenerate at the rapid pace and scale by which human activities have degraded them, this process reflects industries concern with short term benefits over long term problems.

An article of similar nature focuses in on the impacts of industrial impacts of pollution through aquaculture. One point it highlights on is that of the world's oceans, 75% of major fisheries have been exploited to the point of extreme or complete depletion (Clark, Brett, Clausen 91). From a historical context, innovations in fishing technologies have significantly increased the extent to which aquaculture is able to exploit fish stocks; nylon nets carried by trawlers are now able to capture 400 tons of fish, all at once (96). Apart from the impact of overfishing the oceans, industrial aquaculture also requires significant amounts of fossil fuel burning to power ships in their ability to harvest from the world's oceans; In 2000, “global fisheries used up to 12.5 times the amount of fuel energy that they provided as edible-protein energy”, through 13 billion tons of fuel (99). The sheer magnitude by which the aquaculture industry depletes natural resources needed for to the comparatively minimal amount of goods it is able to produce reflects the wasteful inefficiency that characterizes the industrial aquaculture industry. This statistic directly uncovers a situation in which the short term benefits of profit are outweighed by the long term cost of environmental degradation posed unto the earth's ecosystems through GHG emissions. The capitalist forces of profit maximization drive competition within the industry, which leads to fishing down the ecosystem food chain; this disrupts metabolic energy flow cycle and erodes marine biodiversity, which poses an ultimate threat of “wholesale collapse of marine ecosystems” (101). This once again mirrors the pattern of how industries prioritize the short term benefits of industrial fishing, ignorant to the long term degradation their activities have caused to marine ecosystems and the climate as a whole.

A more visible impact of the earth's ecosystems can be seen through the industrial history of oil pollution, especially through oil spills in marine environments. From current day data, spanning back to as early as 1967, events of catastrophically damaging oil spills have been largely attributed to oil companies such as by Exxon Valdez and BP (Farrington 3-4). Although natural oil and gas seeps have occurred on earth for millions of years, human activities have resulted in significantly higher concentrations of chemicals entering the environment, such as in the case of petroleum, and how “during the 1950s and 1960s it became apparent that routine operations of oil tankers resulted in significant inputs of oily tar-like material in the oceans” (6). Disastrous events like these are representative of the model upon which the oil industry functions under the system of global capitalist production, as accidents like these occur are symptomatic of

the scale of the industry driven by demand, and aims at profit maximization disregarding long term problems. Some of which include the adverse effects on marine mammals and birds as oil coats their bodies; another impact functions through the ecosystems as chemicals accumulate in the marine food system, which are then consumed by humans (6) in their aquacultural practices. This represents a direct impact the oil industry has on both ecological systems as well as the human beings to which they serve.

A long term historical analysis of human caused greenhouse gas emissions found that two-thirds of emissions can be traced back to “90 of the largest corporate investor-owned and state-owned producers of fossil fuels and cement from as early as 1854 to 2010” (Heede 230). Along with this statistical fact, the study also found that many of these carbon major entities are in possession of carbon reserves that are capable of greatly intensify climate change if produced and emitted into the environment (237). Similarly, the Carbon Majors Database identified how 100 companies alone produced and released 923 Billion tonnes of carbon emissions into the atmosphere, which is about half of GHGs released into the climate since the beginning of the industrial revolution (Griffin 5). Both these figures are important because they unveil the immense role that these industries have played in the degradation of the earth's climate from the release of greenhouse gasses and how they should be held responsible for their actions. These large corporation’s systems of capitalist industrial production with sole focus on profit maximization are the direct contributors to significant anthropogenic increases in greenhouse gasses.

Another factor that has contributed significantly to degradation of the environment has been through the mining industry. In the region of southwestern Sierra Leone, mining operations had produced a hefty weight 200,000 tons of usable material (rutile and ilmenite), but this is minimal compared to the 7.8 million tons of waste rock produced alongside that figure (Akiwumi, Butler 313). Globally, it is found that 70% of excavated material from mining operations is waste rock or “tailings”, otherwise economically void and unusable sediment from an ore (310). The impacts of this include spatial and temporal changes as a result of erosion, pollution of local water systems, as well as hydrogeomorphic effects from waste rock runoff; this alone can cause significant flooding of local canals due to sediment collected in local creeks and rivers, which are impediments to natural drainage systems (313). These serve as abiotic systems within which ecosystems may function, and a disruption of this subsequently results in a disruption of ecosystem services provided for the local area. Another process of extraction used by the mining industry, namely Mountaintop Removal Mining, also reveals geological damages through waste runoff causing flash floods (Holzman 478). An ecological threat that this sort of mining poses on a local environment is conducted directly through the process of earth removal, which results in slow regrowth of native plant species and trees due to the compromised state of the soil (478). On a grand scale, these methods reflect the industry’s intent on maximizing profits at the cost of local ecological functioning. Even at a local scale, forces like these exacerbated by the pace and scale of global capitalism pose disastrous implications on the earth's ecosystems and represent large scale degradation of the environment.

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| Scientific Idea #1 | This idea can be incorporated into an illustration of each major industry mentioned through a grouping of small “clip art like” |
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| <p>Ecological degradation and the depletion of the earth's natural resources are driven by the forces of industries' heedless pursuit for profit maximization through large scale and widely varying of pollutants, waste byproducts, GHG emissions and geomorphic impacts.</p> | <p>depictions of the industries in a natural environment, and depictions of how they impact the surrounding environment.</p> |
| <p>Scientific Idea #2</p> <p>If we continue to operate with scale and pace by which the capitalist industries throughout history have contributed to ecological and environmental degradation, we will have to face consequences of catastrophic earthly conditions</p> | <p>I will incorporate this idea visually to essentially show a before (prior to industrialization) , now (our present day state in which we have impacted the environment, and a potential after (a state of catastrophe and significantly exacerbated effects that are seen in the present)</p> |

One way way I may choose to incorporate these scientific ideas into my creative work related to industries and corporations through a visual depiction of their process and practices through representational forms or otherwise a more general abstraction. If possible, I may incorporate actual waste objects or products I find that can connect back the the major industries I've mentioned throughout my paper. This may take on a sculptural form, or all fit onto a painted canvas or digital illustration. Between a sculpture or painting, I may combine both mediums, such as through using everyday items we throw into the trash and melding it into a scene of a mine or forest to connect the waste product to the industry from which it is born out of.

Another concept I have for my creative work is to show these industries in Adobe Illustrator in which I will depict each of them through representational vector forms. I want to represent the before, present, and after through a triptych in a method similar to the northern renaissance artwork "The Garden of Earthly Delights" by Hieronymus Bosch, which follows the same timeline. In the first panel, I want to illustrate something idyllic and akin to pre-industrial environments. Following this in the 'present' panel I want to represent where we stand currently, a middle ground in which we have already depleted the earth's resources and have induced a variety of ecological impacts, but have not reached the tipping point. The third panel will showcase the possible future towards which we are headed if we do not work to sustain the ecological systems from which industried reap their profits. This panel will depict extreme, catastrophic conditions that are magnifications of the middle panels visual impacts. An example of this would be the GHG emissions that I would show in a plume of smoke, but by the third panel it would fill the depicted environment and blacken the sky around it as the earth is consumed under a blanket of emissions.

Annotated Bibliography

Akiwumi, Fenda A., and David R. Butler. "Mining and Environmental Change in Sierra Leone, West Africa: A Remote Sensing and Hydrogeomorphological Study." *Environmental Monitoring & Assessment*, vol. 142, no. 1–3, July 2008, pp. 309–318. *EBSCOhost*, doi:10.1007/s10661-007-9930-9.

This study conducted in Southwestern Sierra Leone, Africa used remote sensing/satellite technology along with field data to reveal the effects of mining in the area. Particularly, they used this technology for hydrogeomorphic assessment on the impacts to the environment. Globally, it is found that about 70% of excavated material from mining is waste rock or "tailings", the unusable and economically invaluable sediment of an ore. One of the scientific ideas presented in this study are that even at a local scale, the environmental impacts mining represent how broadly the world's economic interests are exploitative of natural resources. Some of the impacts the study presents are due to the actual mining process, such as the magnitude of temporal and spatial changes from erosion, as well the polluting of local water systems through contamination from leaking dams and waste rock runoff. The study uses archival records and data collected between 1967 and 1995, as well as additional data collected in more recent years. They found that of 200,000 tons of usable material (rutile and ilmenite) produced from mining, 7.8 million tons of waste was produced alongside that. The study also found incidents of significant flooding in local canals due to sediment collecting in local creeks and rivers, impeding natural drainage systems. Through the remote sensing data, the study concluded that mining operations had visually impacted the local area in Southwestern

Sierra Leone. This study helps answer the question of how human activities have altered the functioning of ecosystems, as it reveals how waste produced from mining operations have disrupted hydrogeomorphic functioning in a local area that serves as the abiotic environment to a local ecosystem.

Carlson, Kimberly M.1,2,, et al. “Committed Carbon Emissions, Deforestation, and Community Land Conversion from Oil Palm Plantation Expansion in West Kalimantan, Indonesia.” *Proceedings of the National Academy of Sciences of the United States of America*, vol. 109, no. 19, May 2012, pp. 7559–7564. *EBSCOhost*, doi:10.1073/pnas.1200452109.

This study assesses the current rate of plantation agricultural expansion in West Kalimantan, Indonesia as well as the current and projected release of GHGs in the local area. One idea that the article proposes is that the world’s growing demand for the natural resources, such as food and biofuel, is a driving force of capitalization on agricultural development, especially in tropical regions. Even so, the impacts by the amount of carbon emissions as a whole are largely uncertain due to a lack of documentation. The study identifies the statistical data of land use for oil palm expansion in the local regions, such as the loss of 40% of lowland forests to deforestation for plantation development. This study examined Landsat and land cover maps from the late 1980s to 2008 to study the current expansion as well as projected models of future expansion, in doing so revealing the significant, rapid rate of conversion of intact forest cover. The data from study also reveals impacts of deforestation indirectly caused by expansion, such as escaping fires. These uncontrolled fires, along with peatland deforestation were shown in the data of carbon flux to be significant sources of net carbon emissions. This study helps to reveal

how human activities pose major threats to the earth's biomes and ecosystems, through deforestation and carbon emissions in tropical environments.

Clark, Brett, and Rebecca Clausen. "The Oceanic Crisis: Capitalism and the Degradation of Marine Ecosystems." *Monthly Review*, no. 3, 2008, p. 91. *EBSCOhost*

This article examines the ecological impacts of industrial agricultural pollution, aquaculture, and other forms of environmental degradation in the marine environment under the driving forces of global capitalist economic expansion. The article uses statistical data from studies of marine impacts as a basis of scientific support for its arguments and ideas. Statistical data, such as how 75% of major fisheries have been exploited to the point of significant or absolute depletion are used to represent the extent to which industrial aquaculture and human activities under capitalists systems drive the rapid degradation of marine environments. The article also uses historical analysis of technological advances in capitalist production beginning in the late 19th century up until our modern day industry to demonstrate these rapid impacts. Innovations such as nylon nets carried by trawlers capable of capturing 400 tons of fish all at once demonstrated the increasing scale of humans ability to alter their environments in significant ways. In addition to the ecological degradation as a result of aquaculture, the article also highlights the magnitude of fossil fuel burning that is needed by ships to harvest from oceans. The article also explains how industry competition leads to fishing down the ecosystems food chain, which disrupts the metabolic energy cycle flow within and erodes marine biodiversity, all of which may lead to a "wholesale collapse of marine ecosystems". The exploitation of the ecosystem services that are provided in marine environments reveals

how human activities have altered the flow of materials within and between ecosystems, as they disrupt energy cycles, biodiversity, and have significantly depleted the stocks of fish in the ocean.

“Farming Claims Almost Half Earth's Land, New Maps Show.” *National Geographic*, National Geographic Society, 9 Dec. 2005,
news.nationalgeographic.com/news/2005/12/agriculture-food-crops-land/.

This article reveals the extent to which human activities has degraded the earth's land cover and thus the eliminated the diverse ecosystems which they have replaced.

Farrington, John W. “Oil Pollution in the Marine Environment I: Inputs, Big Spills, Small Spills, and Dribbles.” *Environment*, vol. 55, no. 6, Nov. 2013, pp. 3–13. *EBSCOhost*,
doi:10.1080/00139157.2013.843980.

This article examines the human impacts of oil spills and pollution on marine ecosystems. Using data collected since 1967, the article provides data of largest spill sizes (tons) from various events from various companies/ships. The article points out the fact that despite natural oil and gas seeps that have occurred for millions of years, human activities have resulted in significantly high concentrations entering the environment. The article also examines oil inputs unrelated to spills in marine environments, such as through from humans use of petroleum inputting through rivers and coastal runoff, or motor oil runoff in city sewage.

Griffin, Paul (2017) *The Carbon Majors Database: CDP Carbon Majors Report 2017*, 14 pp.

This publication uses statistical data collected from the Carbon Majors Database to examine how industries and corporations influence the environment through large scale

GHG emissions. One fact that the study uncovered was that since 1988, only twenty five of the worlds largest fossil fuel producers produced more than half of total industrial GHGs. The publication uses graphs to show trends of GHG emissions since the onset of the industrial revolution. It also highlights the projected impacts of continuing the current rate of emissions, which includes substantial exction of species, food scarcity and famine, and crossing several “tipping points” in the earth's climate. The article also proposes suggestions of how these current trends must be thwarted by radical change in the global energy systems, led by the fossil fuel industry.

Heede, Richard. “Tracing Anthropogenic Carbon Dioxide and Methane Emissions to Fossil Fuel and Cement Producers, 1854-2010.” *Climatic Change*, vol. 122, no. 1/2, Jan. 2014, pp. 229–241. *EBSCOhost*, doi:10.1007/s10584-013-0986-y.

This article primarily analyzes the historical production of fossil fuel and cement producers and their impacts on CO₂ and methane emissions. The study uses collected data to reveal the top producers of emissions and proposes that this data may be used to provide factual basis in holding companies and states responsible for their emissions.

Holzman, David C. “Mountaintop Removal Mining.” *Environmental Health Perspectives*, vol. 119, no. 11, Nov. 2011, pp. A476–A483. *EBSCOhost*, doi:10.1289/ehp.119-a476.

This article looks at the adverse environmental and health impacts resulting from of mountaintop removal mining. A graphic showing of the process of mountaintop removal mining is used to illustrate the geological impacts of the process, which include waste runoff being dumped into valleys, flash flooding occurring from landscape changes, and the aftermath, in which native plant species and trees are slow to grow in the area that has

been mined, due to compromised soil. This reveals how human activities can significantly alter an environment in a way that cannot be regenerated to its former state, and thus compromising the ecological functioning in the area.

Mallin, Michael A., and Lawrence B. Cahoon. "Industrialized Animal Production A Major Source of Nutrient and Microbial Pollution to Aquatic Ecosystems." *Population & Environment*, vol. 24, no. 5, May 2003, pp. 369–385. *EBSCOhost*, doi:10.1023/A:1023690824045.

This study closely examines the livestock production industry and the environmental impacts it poses on the environment, specifically pertaining to nutrient pollution that stems from concentrated animal feeding operations (CAFOs). The study provides historical insight into the industry as with the availability of feed and transportations systems, animal producers were able to exceed the "ecological constraints imposed by the landscape", and thus these anomalous concentrations cannot be balanced by the local environment. The process in which waste enters the water systems is described in this article, through the means of runoff and seepage into groundwater. The study examines case study data from events where major leaked into the local environment, largely symptomatic of faulty waste disposal systems the industry has adopted. The article describes the magnitude in which nitrogen and phosphorus used in animal feed leads to the eutrophication of these local bodies of water in North Carolina, and the process in which nutrient loading causes algae blooms, which then lead to death of bottom dwelling organisms, finfish, and seagrass bed habitats that cannot survive in low oxygen environments. This study demonstrates the extent to which human activity impacts

nutrient levels experienced by ecosystems.

Speth, James Gustave. *The Bridge at the Edge of the World: Capitalism, the Environment, and Crossing from Crisis to Sustainability*. Yale University Press, 2008

Author James Gustave Speth argues in the book that the current rate of climate degradation is a direct result of modern capitalism, and the evidence-based idea that current environmental efforts will fail to resolve the root systematic causes. The book is rich in references to scientific literature and incorporates facts and statistics regarding the issue. An example of these factual references are measured numerical data on US Fish species, estimating that about 40% of US Fish species are vulnerable to extinction. This book targets the key question of the boundary between science and politics because it addresses the system of modern capitalism and its devastating impact.