

NATURAL EXPLOITATION AND ENVIRONMENTAL CRISIS DEPICTED IN *IO*

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ABSTRACT

This research investigates the depiction of natural exploitation and environmental crisis in *IO*, a science-fiction film directed by Jonathan Helpert. This study uses Greg Garrard's theory of ecocriticism. This study engaged with a qualitative descriptive method, which centers the analysis on the writer's perspectives. This study identifies two major forms of natural exploitation in the film: the use of chemicals and the dependency on artificial systems, which culminate in ecological collapse. These exploitations manifest in environmental crises such as air crises and food scarcity, and climate instability. The environmental crisis in environment is the impact of the exploitative practices done by humans. The findings demonstrate that *IO* reflects Garrard's ecocritical tropes: pollution, apocalypse, wilderness, and the earth. Therefore, this study concludes that the film not only critiques anthropocentric practices but also underscores the urgency of fostering environmental awareness and sustainable human–nature relationships.

Keywords: *IO*, Ecocriticism, Natural Exploitation, Environmental Crisis

INTRODUCTION

The 21st century has witnessed an unexpected escalation of the environmental crisis that threatens the stability of Earth's ecosystems and human civilization. Climate change has accelerated dramatically, with the Intergovernmental Panel on Climate Change (IPCC) reporting that global temperatures have already risen by approximately 1.5°C above pre-industrial levels, triggering more frequent extreme weather events, rising sea levels, and disruptions to agricultural systems worldwide (Pörtner et al., 2022). Over the last five years, biodiversity loss has reached alarming proportions, with current extinction rates estimated to be 100 times higher than natural background rates, prompting scientists to declare that humans are experiencing the sixth mass extinction event in Earth's history (Ceballos et al., 2020). Deforestation, freshwater scarcity, and various forms of pollution further compound these crises, creating what scientists have termed “planetary emergency.” These issues depict the unsustainable relationship between human activities and natural systems, showing the urgent need for reassessment of humanity's interaction with the environment. Environmental crisis, as conceptualized in environmental studies and ecological criticism, refers to the severe, often irreversible degradation of natural systems resulting from anthropogenic activities that exceed the Earth's regenerative and absorptive capacities (Buell, 2009). This concept encompasses

both acute environmental conditions and systemic deterioration of ecosystems that threaten their functionality and resilience. Natural exploitation, meanwhile, denotes the extraction, utilization, and commodification of natural resources and systems primarily for human benefit, often without adequate consideration for ecological sustainability or the intrinsic value of non-human life (Plumwood, 2005). The illustration of both natural exploitation and environmental crisis has emerged broadly along with the development of technology. The depiction of both has emerged in various media, such as television, cinema, newspapers, and literary texts. Literary works are distinguished by their imaginative and creative expression, employing language in innovative ways. These works possess aesthetic value, with their formal structure enhancing their artistic impact, and they examine multifaceted themes that offer profound understanding into human experience (Wellek & Warren, 1956). The evolution of cinema has elevated film to a distinctive form of literary analysis. Movies utilize visual language, film structure, and symbolic elements that parallel conventional literary techniques while introducing unique aesthetic dimensions (Osborne, 2008). In analyzing environmental concepts in literature, ecocriticism offers an understanding of ecological concerns. The term “ecocriticism” was first coined by William Rueckert in his essay *Literature and Ecology: An Experiment in Ecocriticism*, where he proposed applying ecological concepts to the study of literature (Rueckert, 2000). Along with this emergence of ecocriticism, Garrard (2004), in his seminal work *Ecocriticism*, further developed this theoretical approach, where he emphasizes that it is associated with the implementation of the intricate relationship between humans and their environment and how humans behave in it. In order to analyze natural exploitation and environmental crisis, one such film examined by the writer is *IO*, a science-fiction film directed by Jonathan Helpert, released in 2019, which serves as a notable example of how humans behave and impact nature. This film portrayed a post-apocalyptic Earth abandoned by most of humanity due to environmental destruction. The writer considers choosing this movie due to the interest in environmental issues happening in today's era, which can also shape the future of human life on earth as represented through *IO*. Therefore, to analyze the object of this study, the writer is engaged with ecocriticism. Referring to the research topics, ecocriticism is best suited to the center of this study. This study centers on two topics, the depiction of natural exploitation and the portrays of environmental crisis in *IO*.

LITERATURE REVIEW

The issue of natural exploitation and environmental crisis has received considerable critical attention. In this study, the object of the data is based on Netflix's original *IO*, which depicts environmental crisis and human-centered pictures of natural exploitation and control over nature. This study conducted ecocriticism theory due to the central focus on the environment, nature, and human responsibility.

1. Ecocriticism

Ecocriticism emerged as a distinct literary and cultural theory in the late 1970s and early 1980s, developing alongside growing environmental awareness and ecological movements of that period. The term “ecocriticism” itself was first coined by William Rueckert in his essay *Literature and Ecology: An Experiment in Ecocriticism*, where he proposed applying ecological concepts to the study of literature (Glotfelty & Fromm, 1996). In her influential introduction to *The Ecocriticism Reader*, Glotfelty (1996) defines ecocriticism as “the study of the relationship between literature and the physical environment,” positioning it as a critical approach that brings an ecological perspective to literary studies. She added that the perspective of environmental studies in ecocriticism using an earth-centered approach, which is the

interaction between humans and the physical environment, is just like feminism with a gender-conscious perspective and Marxism that deals with social class.

Buell (2009), another foundational figure in the field, expanded this definition by proposing that environmental texts should contain certain elements: the nonhuman environment presented as more than merely a backdrop, human interests not understood as the only legitimate interests, human accountability to the environment as part of the text's ethical orientation, and some sense of the environment as a process rather than a constant. Among the various descriptions of ecocriticism, Garrard's (2004) framework has become particularly influential for its explanation of recurring motifs, which he calls "tropes," that shape environmental discourse. Ecocriticism, according to Garrard (Garrard, 2012), is primarily based on empirical studies that investigate how human stewardship of nature is mediated by means of human relationships with non-human aspects like animals and the environment.

1.1 Pollution

According to Garrard (2004), pollution is not the ecological substances, but rather it is derived from the situation where high concentration of substances is released into nature, where their presence causes ecological issues in the environment. He described that pollution is a term in moral and personal contamination as derived from the Latin *polluere*, meaning "to defile". He mentioned that the increasing variety and sources of "pollution" now include elements like artificial light and noise, chemicals, while even naturally abundant substances like carbon dioxide are classified as pollutants due to their impact on the climate.

1.2 Wilderness

The notion of wilderness, denoting nature in its pristine state, unaltered by human civilization, represents the most influential conceptualization of nature within the New World environmental discourse. According to Garrard (2004), wilderness refers to a concept of nature as untamed and separate from human civilization. He then explained how the scientific revolution led by influential figures like Francis Bacon, René Descartes, and Isaac Newton promoted a different view, opposing organic beings to the machines controlled by humans.

1.3 Apocalypse

Garrard defined the term Apocalypse as 'proleptic', which means that it is the phenomenon not yet to come, symbolized as 'born out of crisis', which not only reacts to perceived crises but amplifies them (Garrard, 2004). Therefore, an apocalypse can be defined as the image of the end of time. Garrard argues that apocalyptic rhetoric is a powerful tool in the environmental landscape to address environmental issues frequently reported by the media as catastrophes. The news media frequently present environmental events in catastrophic forms, not solely to heighten dramatic appeal or incorporate human-interest elements, but also because news reporting tends to favor discrete events over ongoing processes.

1.4 Dwelling

According to Garrard (2004), dwelling is not merely what they call "home" or a living place, but signifies a deep and enduring connection between humans and a landscape shaped by memory, heritage, morality, rituals, daily life, and labor. Garrard argues that the concept of "Dwelling" represents a more profound, long-term ecological relationship between humans and

their environment, in contrast to more transient or aesthetic perspectives. Dwelling is not a transient state; rather, it implies the long-term imbrication of humans in a landscape of memory, life, and work.

1.5 Animals

According to Garrard (2004), animals have been historically represented in literature, science, and cultural discourse, revealing deep-seated tendencies to marginalize animal subjectivity and agency. Garrard critiques how animals have often been reduced to passive objects, lacking intrinsic value beyond human instrumentalization. Garrard advocates for a more understanding that respects animal autonomy and recognizes the inherent worth of all life. Additionally, animal testing and factory farming are among the most widespread and violent practices. These treat animals as tools for human use, causing immense suffering with little moral justification.

1.6 The Earth

Garrard (2004) reveals how various cultural, scientific, and literary discourses have constructed problematic planetary narratives that position the Earth as an object for human domination and extraction. This critique extends to representations in fields like economics, politics, and biology, as well as popular media like literature, TV, and film. Garrard added that the earth must be understood as a complex, dynamic system that fundamentally resists anthropocentric worldviews. Garrard continued that the planet is not merely a backdrop for human activity, but an active, responsive entity with its own intrinsic processes and ecological significance.

2. Natural Exploitation

In its broadest sense, exploitation itself refers to the act of using something or someone unfairly or selfishly for one's own advantage or profit. The term derives from the French "exploiter," meaning "to get value from" or "to make use of," and carries connotations of extracting maximum benefit with minimal consideration for sustainability or ethical implications (Fairclough, 2014). Exploitation, then, can occur across multiple dimensions, including economic, social, political, and environmental concepts. Foster (2000) argues that exploitation represents a fundamental contradiction within capitalist systems, where the drive for profit and accumulation creates inherent tensions between economic growth and social and environmental well-being. According to environmental philosopher, Plumwood (2005), natural exploitation stems from a dualistic worldview that positions humans as separate from and superior to nature, treating the nonhuman world primarily as a resource reservoir for human consumption. Besides, ecocriticism provides valuable frameworks for analyzing natural exploitation as both a material process and a discursive construction.

3. Environmental Crisis

Clark (2011) defines environmental crisis as a situation in which the environment of a species or population destabilizes so as to threaten its continued survival. The environmental crisis itself is a situation where ecological systems face severe disruption, degradation, or collapse due to human activities, threatening both natural and human well-being. However, as environmental historian Worster (1994) notes, the current understanding of environmental crisis represents a significant evolution from these earlier formulations, increasingly recognized as a complex, multidimensional phenomenon encompassing climate change, biodiversity loss, resource depletion, pollution, and various forms of ecosystem degradation.

In contemporary environmental studies, the concept of crisis has expanded beyond specific incidents or localized problems to encompass large-scale, systemic challenges to planetary systems. Rockstrom et. al. (2009) have developed the influential framework of “planetary boundaries” to identify the ecological thresholds beyond which human activities risk triggering the environmental crisis. These boundaries include climate change, biodiversity loss, nitrogen and phosphorus cycling, ocean acidification, land use change, freshwater use, ozone depletion, atmospheric aerosol loading, and chemical pollution.

A considerable amount of literature has been published on ecocriticism in film. These studies examined the relationship between humans and nature within the ecocriticism approach, which has grown significantly in recent years. However, despite the broad volume of relevance of this theme, no prior academic research seems to focus on the same object - *IO*. Conversely, this lack of specific studies on this movie brought an opportunity to deeply examine its broader depiction of natural exploitation and environmental crisis. Several studies have been discussed ecocriticism within the same theory by Greg Garrard. However, there are no previous studies discussing the same movie, *IO*. The studies such as the ecocriticism in *The Sea Beast*, *Interstellar*, and *Man* (Cahyadi, 2022; Susanti & Permana, 2024; Veronika, 2024). This study aims to analyze ecocriticism with the theory of ecocriticism by Garrard but focusing in the specific tropes such as animals and the earth.

METHODOLOGY

In analyzing the object of this research, the writer used a qualitative descriptive approach. Qualitative research is a method that explores the quality of relationships, activities, situations, or materials by emphasizing holistic and detailed descriptions of complex phenomena (Fraenkel & Wallen, 2009). In qualitative research, Fraenkel and Wallen argue that data are primarily collected from natural settings and conducted in the form of non-numerical aspects, with the researcher serving as the central instrument for gathering and analyzing information. The primary source for this study is the Netflix original *IO*, released in 2019 and directed by Jonathan Helfert. The secondary sources for this study will be drawn from a comprehensive and interdisciplinary range of academic materials carefully selected by the writer that are theoretically related to the object of the data. The secondary data will be derived from ecocritical literature, anthropocene and environmental studies, film studies, and media analysis.

FINDINGS AND DISCUSSION

1. Natural Exploitation Depicted in *IO*

Garrard (2004) composed six tropes for understanding ecocriticism: pollution, wilderness, apocalypse, dwelling, animals, and the Earth. The following data will reveal the evidence of how human activities exploit the natural environment. Based on *IO*, humans use and produce many kinds of products, including the use of chemicals, electronics, and toxic gases. These activities have been the strongest agents in destroying the natural environment, especially due to the significant changes in the atmosphere. Furthermore, the use of animals and plants in experiments for human life results in their extinction, and some genetic mutations, which is considered unfair that humans and natural elements living on the same earth do not have the same power over their own lives. Additionally, the overpopulation has forced the demand for production, which leads to the overuse of natural resources, resulting in environmental degradation and significant changes in the atmospheric composition.

The film *IO* opens by depicting a post-apocalyptic Earth, where human civilization has largely collapsed due to environmental degradation. The film centers on Sam Walden, portrayed as the sole remaining inhabitant on the planet. The rest of the human population has evacuated to a distant exoplanet named IO, as part of an Exodus mission driven by the unsustainable conditions on Earth. IO is described as a potential source of geothermal energy and habitable resources, in stark contrast to Earth's uninhabitable state. Sam refers to the remnants of human civilization as "the zone," highlighting the extent of the environmental collapse. Urban infrastructure lies in ruins, and the atmosphere is saturated with toxic gases, rendering it impossible to breathe without artificial aid. Sam continues the scientific efforts initiated by her late father, focusing on restoring the Earth's air quality and exploring the possibility of making the planet habitable again. Her work involves experimentation and communication with her partner, who resides on IO, maintaining contact through email to exchange updates on both planetary conditions.

As Sam working on her analysis, she is affected and also impacting the environment by using chemicals and substances. The data below shows how certain chemicals, potassium and caesium in the air react to the ammonia-rich water environment can cause degradation in plant colors. Figure 1 shows Sam in the surrounding environment of the power station, where the plants in the area are colored grey, while some of them are black.

IO
(06:06 – 06:07)



Figure 1. Plants Are Changing Colors.

Figure 1 depicts the situation where Sam is walking in the zone (formerly human civilization) using a full-body cover and an oxygen mask to protect her from the severe air conditions. Sam points to the plants that appear around her. The surrounding vegetation exhibits extensive discoloration, ranging from dark grey to black, indicative of severe disruption to plant health. The plants are probably affected by air pollution, evidenced by Sam saying "plants are changing colors," meaning that something bad happened to the plants, causing the change in the plants' color. Refer to the data, Sam found certain chemicals are introduced, such as potassium, cesium, and ammonia, that have reached high levels and are released to the air and

water, meaning that the reaction of the chemicals is also affecting the growth of the plants in the same area.

Research shows that cesium (Cs^+) behaves similarly to potassium (K^+) and competes with it for uptake through important transport channels (Burger & Lichtscheidl, 2018). This competition reduces the plant's ability to absorb potassium, an essential macronutrient (Hess et al., 2006). This interference impairs chlorophyll synthesis and destabilizes pigment balance, often resulting in chlorosis, bronzing, or unusual pigmentation such as purple or grey tints. Concurrently, elevated levels of ammonia (NH_3) in soil or water - often measured through colorimetric testing - may further alter soil pH and nutrient availability, exacerbating pigment degradation and cellular stress responses (Madzunya et al., 2020). Taken together, the combined presence of caesium, potassium imbalance, and ammonia-induced alkalinity creates an environment in which plants visibly lose normal green pigmentation and develop the dark, necrotic appearance observed (Madzunya et al. 2020).

Caesium (Cs), especially in its radioactive form (^{137}Cs), is a byproduct of nuclear activities and industrial pollution (Shrestha et al., 2018). In potassium-deficient soils, common in industrial zones, plants increase their uptake of caesium, which disrupts essential physiological functions such as photosynthesis, nutrient transport, and osmotic balance. This disruption often leads to visible symptoms like chlorosis (yellowing), necrosis (death of plant tissue), and eventual darkening of the foliage (Rai & Kawabata, 2020). Therefore, the resulting environment, filled with darkened, dying vegetation under a grey sky, is a clear sign of ecological collapse fueled by the unchecked use of chemicals and heavy industrial activity.

IO

(19:26 – 19:28)



Figure 2. The Use of Emissions and Artificial Systems.

The data depicts the laboratory's warehouse of scientific equipment constructed in a remote wilderness zone. The laboratory functions primarily as a storage and operations center for experimental equipment, housing various electronic devices, machinery, and communication tools. In the scene, severe weather conditions are shown impacting the facility, reflecting the persistent instability of Earth's climate and the ongoing toxicity of the atmosphere. The laboratory contains advanced instruments, likely powered by generators or stored fuel, showing

continued dependence on energy systems that produce greenhouse gas emissions. Although intended for ecological restoration, the facility still relies on technologies tied to the very processes that worsened environmental collapse. The film subtly critiques humanity's failure to separate scientific progress from unsustainable technological reliance.

The dependency on emissions and artificial systems reflects real-world industrial and scientific practices where high-energy labs often require constant electricity for experiments, refrigeration, and safety protocols, often powered by non-renewable energy sources (Sovacool, 2012). In the film, renewable alternatives appear to be either inaccessible or insufficient, forcing Sam to continue exploiting emission-heavy solutions.

2. Environmental Crisis Depicted in *IO*

This point presents evidence of the environmental crisis depicted in *IO*, resulting from human exploitation of nature as discussed in the previous point. These signs confirm that the crisis has indeed affected the environment through several elements. The environmental crisis involves water and air, climate, resources, animals, and the devastation of the Earth itself. Towards the exploitation stated previously, the impact of natural exploitation can be seen through the illustration of the Earth crisis represented in *IO* as follows.

IO reveals that air and water pollution constitute a genuine environmental crisis through their systematic disruption of Earth's fundamental life-support systems. The movie is set in a post-apocalyptic world as a result of human activities. Human civilization is in an abandoned condition, and almost all the places are polluted and dangerous for breathing. Thus, Sam, one of the two humans left on Earth, always uses a gas mask, relies on oxygen tanks, and only depends on her greenhouse for living. The first data shows the indication drawn by Sam in the hilltop area, indicating the boundary between the clean oxygen and polluted oxygen area. Although the air is not totally clean in the hilltop area, it is still possible to breathe.

IO
(07:35 – 07:37)



Figure 3. The Bold Indication of Clean Oxygen Area.

The data depicts a marked boundary drawn by Sam to indicate the limit of breathable air in the hilltop region, one of the few remaining areas on Earth with relatively safe atmospheric conditions. After the relocation to this remote location, she transports all essential infrastructure, including her house, laboratory, greenhouse, and research equipment's warehouse. Despite the area's relative safety, air quality remains in crisis, requiring continuous atmospheric testing and environmental monitoring.

The act of marking the street to signal air quality thresholds makes the invisible crisis of atmospheric degradation a visible spatial boundary. This mapping of breathable zones shows how air, once freely available and unregulated, has become restricted and potentially dangerous. The reliance on gas masks and oxygen systems outside these marked areas highlights the severity of atmospheric collapse and the failure of the planet's natural self-regulation. These conditions are the cumulative result of prolonged industrial emissions, climate destabilization, and the systemic erosion of ecosystems caused by anthropogenic activity. The film uses these boundaries not only as survival strategies but as visual indicators of a world in which natural life-support systems can no longer be assumed or accessed freely.

Although she lives in the most breathable area left on earth, even that space is shrinking and uncertain. The need to draw physical lines that separate safe from unsafe air illustrates how extreme the environmental damage has become. The air, once a symbol of life and freedom, has turned into something that must be measured, feared, and controlled. This situation also indicates a larger environmental crisis: when air, something essential for all living beings, becomes polluted, it signals not just ecological damage but also a planetary emergency. The reliance on technology to survive on Earth's natural atmosphere reveals how deeply disconnected humans have become from the environment that once sustained them.

IO

(01:08:01 – 01:08:21)



Figure 4. A Crisis of Food Sources.

The data clearly illustrate that Micah, before he came to live with Sam on the hilltop, had experienced a crisis of food. His wife died because lack of food source, and he, as the military army, hid rations so he could survive longer. He takes the helium balloon to fly to the hilltop to find Sam. In a world where natural ecosystems have collapsed, food is no longer something that grows locally or abundantly. Instead, it becomes a manufactured and hoarded resource.

Similarly, Sam is also faced with the crisis of food, then she builds a greenhouse, engineers the genetics of bees that can extend her life longer on Earth. The artificial systems that once supported human life - greenhouses, ration packs, and food technology - are now insufficient. Micah's experience exposes how dependency on artificial systems has replaced self-sustaining agriculture and disrupted ecological food chains. Once these systems fail or become inaccessible, survival becomes a matter of who can access the last remnants, not who can grow or share. Based on these data, the exploitation of Earth depicted in the film *IO* results in the devastation of the Earth. This devastation is driven by four primary factors: the excessive use of chemicals; the surge in population accompanied by territory expansion; dependence on greenhouse gases and artificial systems; and the use of animals for experimentation and genetic mutation. Therefore, the accumulation of natural exploitation is the major factor in the environmental crisis and causing the devastation of the earth.

CONCLUSION

The findings show that the object of research, a Netflix original *IO* released in 2019, clearly represents how natural exploitation and environmental crisis are manifested. In conclusion, this study underlines that there are 4 data in total, which are divided into two categories: natural exploitation and environmental crisis in *IO*. Based on the findings, it can be concluded that the representation of natural exploitation and environmental crisis is caused by three situations: overpopulation, the higher demand for production, and environmental degradation. These issues lead to the eager for humans to search for survival, which leads them to exploit nature, then this exploitation leads to an environmental crisis. Therefore, *IO* is evidenced shows the natural exploitation and environmental crisis, aligned with the tropes composed by Garrard's (2004) Ecocriticism. Therefore, the movie has shown the need for environmental awareness and to start building healthy relationships with nature and the environment. Based on the research findings, the writer is inclined to believe that the research object provides a foundation for more extensive investigation from various approaches of ecocriticism and anthropocentrism. This movie cannot only be described through ecocriticism, but also through anthropocentrism, because the movie and other science fictions provides a brief understanding and view of the natural destruction.

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