

**CLIMATE CHANGE PROBLEMS AND THE RESPONSES OF
THE MAIN CHARACTER IN ROBERT MACFARLANE'S
UNDERLAND: A DEEP TIME JOURNEY (2019)**

THESIS

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FACULTY OF HUMANITIES

UNIVERSITAS ISLAM NEGERI MAULANA MALIK IBRAHIM

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THESIS

Presented to

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In Partial Fulfillment of the Requirements for the Degree of *Sarjana Sastra (S.S.)*

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MALANG
2020**

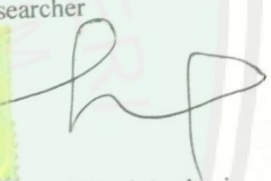
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APPROVAL SHEET

This to certify that Muhammad Rizal Anshori's thesis entitled **Climate Change Problems and the Responses of the Main Character in Robert Macfarlane's *Underland: A Deep Time Journey* (2019)** has been approved for thesis examination at Faculty of Humanities, Universitas Islam Negeri Maulana Malik Ibrahim Malang, as one of the requirements for the degree of *Sarjana Sastra* (S.S).

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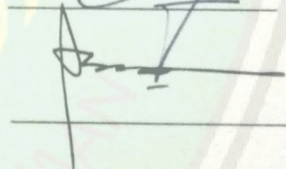
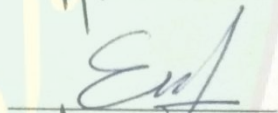
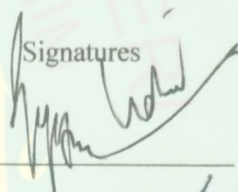
This is to certify that Muhammad Rizal Anshori's thesis entitled **Climate Change Problems and the Responses of the Main Character in Robert Macfarlane's Underland: A Deep Time Journey (2019)** has been approved by the Board of Examiners as one of the requirements for the degree of *Sarjana Sastra (S.S.)* in Department of English Literature.

Malang, 27 July 2020

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MOTTO

Our greatest responsibility is to be good ancestors.

-Robert Macfarlane-



DEDICATION

This thesis is dedicated to my beloved parents, brother, and sister.

Muh. Kamil (Alm) and Ulyah

Anas Rahman Febrianto and Rizqiyah Annisa Romadhona



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All my praises and my gratitude are extended to Allah the Almighty, the Greatest One who creates the nature. He has been teaching me with unsurpassed knowledge and abilities to think, read, write, and giving me a chance to finish my thesis entitled “**Climate Change Problems and the Responses of the Main Character in Robert Macfarlane’s *Underland: A Deep Time Journey* (2019)**”. *Sholawat* and *salam* belongs to our prophet, Muhammad *pbuh*, the most flawless people exist.

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6. My close friends (Zahra, Vena, Ibnu, Danial, and Anggy in Stafsus Dosen Millenial group) who have encouraged me to finish my thesis. Thank you for your time and see you on top;
7. All of “my” mahasantri at Ibnu Sina 78, Al-Ghazali 89, and Al-Faraby 90 doermitories. They have shared to me about the meanings of life.

I do realize that this study might have some weaknesses in some ways. Therefore, criticisms and suggestions are welcome for the improvement of this thesis and the future research. Hopefully, this thesis will be beneficial for other researchers and for the readers.

Malang, 20 May 2020



Muhammad Rizal Anshori
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ABSTRACT

Anshori, Muhammad Rizal. 2020. *Climate Change Problems and the Responses of the Main Character in Robert Macfarlane's "Underland: A Deep Time Journey (2019)"*. Undergraduate Thesis. Department of English Literature, Faculty of Humanities, Universitas Islam Negeri Maulana Malik Ibrahim Malang. Advisor: Miftahul Huda, M.Pd.

Keywords: *Anthropocene, Climate Change, Ecocriticism*

In the last three decades, human activities have been greatly influencing the global earth environment, commonly characterized as Anthropocene era. Following humans' low environmental awareness, a number of unusual natural phenomena happen. One of them is climate change, which gives the biggest impacts for humans, animals, and plants.

This study aims to describe the scopes of climate change problems in Robert Macfarlane's *Underland: A Deep Time Journey* novel. Besides, this research attempts to investigate the responses of the main character on the climate change problems. This research applies ecocriticism (Garrard, 2004) to achieve the objectives. Psychoterratic theory (Albrecht, 2011) is also applied to identify the responses on the main character toward climate change problems. The data was taken from Robert Macfarlane's novel entitled *Underland: A Deep Time Journey* published in 2019.

The results of the analysis show that climate change problems occur in five major areas: pollution, wilderness, animals, apocalypse, and earth. They all have positive and negative impacts for human living. The series of environmental degradradation in the have always trigger the climate change phenomenon and threaten living creatures. Furthermore, the main character responses toward climate change, according to the pschoterratic theory, can be viewed from two perspectives: solastalgia and ecoanxiety. The main character responses to solastalgia by finding a solace condition which is more comfortable than his home environment. Meanwhile, in terms of ecoanxiety, the main character writes "human and nature" to gain social support from his feeling of anxiety, being worried of the nature preservation.

ABSTRAK

Anshori, Muhammad Rizal. 2019. *Isu-Isu Perubahan Iklim dan Respon Tokoh Utama dalam Novel "Underland: A Deep Time Journey" Karya Robert Macfarlane*. Skripsi. Jurusan Sastra Inggris, Fakultas Humaniora, UIN Maulana Malik Ibrahim Malang. Dosen Pembimbing: Miftahul Huda, M.Pd.

Kata Kunci: Antroposen, Perubahan Iklim, Ekokritisisme

Pada era yang dikenal dengan istilah "Antroposen" ini, aktivitas manusia sangat mempengaruhi lingkungan di planet bumi secara global. Sebagai akibat rendahnya kesadaran manusia terhadap lingkungan, fenomena alam yang tak biasa mulai sering terjadi, salah satunya adalah perubahan iklim yang memiliki dampak terbesar bagi kelangsungan hidup manusia, hewan, dan tumbuhan. Naiknya permukaan air laut, memanasnya suhu bumi, dan semakin tidak menentunya cuaca merupakan dampak nyata dari fenomena ini.

Tujuan penelitian ini adalah untuk menjelaskan isu-isu utama perubahan iklim dalam novel *Underland: A Deep Time Journey* karya Robert Macfarlane. Selain itu, penelitian ini juga mencoba menelisik respon tokoh utama terhadap isu-isu perubahan iklim. Penelitian ini menggunakan pendekatan ekokritik (Garrard, 2004) untuk menjelaskan isu-isu perubahan iklim dalam novel serta teori psikoteratik (Albrecht, 2011) untuk mengetahui respon tokoh utama terhadap perubahan iklim tersebut. Data diperoleh dari novel *Underland: A Deep Time Journey* karya Robert Macfarlane yang diterbitkan pada tahun 2019.

Hasil analisis data menunjukkan bahwa isu-isu perubahan iklim dalam novel tersebut mencakup lima aspek, yaitu polusi, (kerusakan) hutan, (kepunahan) hewan, bencana alam, dan bumi. Kelima aspek tersebut memiliki dampak besar pada kehidupan manusia, khususnya kesehatan, ekonomi, dan tempat tinggal. Meski demikian, perubahan iklim tidak selalu memiliki dampak negatif. Hal ini misalnya tampak pada cerita penemuan peninggalan bersejarah masa lalu dan keberadaan industri tambang mineral di Greenland. Selain itu, respon tokoh utama terhadap perubahan iklim bisa dianalisis dengan teori psikoteratik yang terdiri dari *solastalgia* dan *ecoanxiety*. Tokoh utama merespon *solastalgia* dengan mencari tempat yang lebih aman dari lingkungan asalnya. Sementara itu dalam *ecoanxiety*, dia menulis tentang manusia dan bumi untuk mendapatkan dukungan masyarakat dari kekhawatirannya terhadap kelestarian alam.

ملخص البحث

أنصاري، محمد ريزال (2019) قضايا تغير المناخ واستجابة الشخصية الرئيسية في رواية أوندريان رحلة زمنية عميقة (Underland: A Deep Time Journey) لروبرت ماكفارلين (Robert Macfarlane) (2019). البحث. قسم الأدب الإنجليزي، كلية العلوم الإنسانية، الجامعة الإسلامية الحكومية مولانا مالك إبراهيم مالانغ. محاضر: مفتاح الهدى، م. بد. الكلمات الرئيسية: أنتروبوسن، تغير المناخ، فسيكوتراتيك (psychoterratic)

في العصر الحديث، يبدأ النشاط البشري بطيئاً في التأثير على بيئة الأرض على الصعيد العالمي. وتسمى هذه الفترة الزمنية أيضاً عصر الأنثروبوسين. ونتيجة لانخفاض سلوك الوعي البيئي، تحدث غالباً حوادث عالمية غير عادية، منها تغير المناخ. إن تغير المناخ له أثر كبير على استمرار حياة الإنسانية والحيوانية والنباتي. إن ارتفاع مستوى سطح البحر، وارتفاع درجة حرارة الأرض، والطقس التي يسعر التقدير به هي الآثار الحقيقية لهذه الحوادث.

الغرض من هذا البحث هو شرح القضايا الرئيسية لتغير المناخ في رواية أوندريان رحلة زمنية عميقة (Underland: A Deep Time Journey) لروبرت ماكفارلين (Robert Macfarlane). وبالإضافة إلى ذلك، حاولت الدراسة أيضاً بحث استجابة الشخصية الرئيسية لقضايا تغير المناخ.

تستخدم الدراسة مقاربات محاكاة ونفسية. استخدم الباحث نظرية الإكوكريتيزم (Garrard, 2004) لمعالجة قضايا تغير المناخ. وبالإضافة إلى ذلك، طبقت أيضاً نظرية فسيكوتراتيك (psychoterratic) (ألبريخت، 2011) للرد على استجابة الشخصية الرئيسية لتغير المناخ. النقد الأدبي هو طريقة تستخدم في تحليل البيانات. البيانات مستمدة في رواية أوندريان رحلة زمنية عميقة (Underland: A Deep Time Journey) لروبرت ماكفارلين (Robert Macfarlane) التي نشرت في عام 2019.

من تحليل البيانات، تنقسم قضايا تغير المناخ إلى خمسة نطاقات وفقاً لنظرية الإيكولوجية، وهي التلوث والبرية والحيوانات والكوارث الطبيعية والأرض. هذه المجالات الخمسة لها تأثير سلبي على بقاء الإنسان من جوانب الصحة والاقتصاد والمأوى. غير أن تغير المناخ ليس دائماً له أثر

سليبي، والدليل على ذلك اكتشاف آثار تاريخية من الماضي ووجود صناعة تعدين المعادن في غرينلاندا. بالإضافة إلى ذلك ، يمكن تحليل استجابة الشخصية الرئيسية لتغير المناخ مع نظريات نفسية تتكون من سلاستلكيا (*solastalgia*) وإكوانسي (*ecoanxiety*). الشخصية الرئيسية يستجيب لسلاستلكيا (*solastalgia*) من خلال العثور على مكان آمن من بيئته المنزلية. وفي الوقت نفسه، في إكوانسي (*ecoanxiety*)، يكتب عن البشر العالم لنيل الدعم المجتمعي من اهتمامه باستدامة الطبيعة.



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CHAPTER I

INTRODUCTION

A. Background of the Study

In the last five years, environmental degradation has been one of the most serious issues in mainstream mass media all over the world. *BBC News*, for example, frequently report the problem of multiple environmental crisis covering climate change, forest felling, erosion, loss of species, and acidifying oceans (Harrabin, 2019). *New York Times* also reported a number of increasing threats of plant and animal extinction caused by human activities that damage the environment (Plumer, 2015). Meanwhile, *Kompas*, one of Indonesian national newspapers, highlighted the severe impact of environmental pollution on children's brains (Dewi, 2015). Such terrible news indicates that the spread of natural damage is quite alarming for the existence of any living species on the Earth.

Today's condition of the Earth is indisputably very poor. The longer humans exploit the Earth, the more escalating their ability to "change" the nature (van der Linden, 2014). In 2018, approximately 75 percent of Earth's ground areas were defective, endangering about 3.2 billion people. The damages straightforwardly create new dry deserts and polluted areas, converted to agricultural production; deforestation is also the primary reason why some species have become extinct. If this situation continues, about 95 percent of the Earth's

ground areas would be degraded in 2050 (Leahny, 2018). This poor condition of the Earth is, to the biggest extent, compounded by the so-called climate change.

Climate change, as the major current environmental issue, has enormous impacts on human basic needs, particularly in terms of food, health, and shelter. The stability of food supplies may be at risk because of the climate change. Crop failure occurs as a result of unpredictable weather, which in turn leads into hunger and undernutrition (Wheeler & Braun, 2019). In public health sector, heat exhaustion reduces human productivity as people can't resist the boiling temperature. Increased body temperature and excessive sweating cause dehydration and may lead into serious diseases. Chronic kidney disease, head trauma, and slow brain development, to mention some, are diseases triggered by climate change (Kjellstorm et al., 2016). The rising sea levels, as a result of warming sea temperatures and melting ice, can also threaten homes, offices, and infrastructures (Fowler, 2017). The effects of environmental damages which triggered climate change have indeed been threatening to the fulfilment of the human basic needs.

Environmental problems have inspired some authors to write literary works like novels and short stories on recent issues of the nature around them. Most of the narrations are the reflection of human relation to nature; some authors wrote a story based on of their real life experience. This kind of "green novels" usually narrates the inter-relationship between human and nature: two entities which affect one another. Some popular published green novels for instance, *The*

Deserted Village by Oliver Goldsmith (1770), *Ecotopia* by Ernest Callenbach (1975), and *The Overstory* by Richard Powers (2018).

The object of this research *Underland: A Deep Time Journey* by Robert Macfarlane is also categorized as green novel. Before publishing his magnum-opus in 2019, he has spent about ten years to observe and do “research” on climate change. Macfarlane also wrote some fictions of similar genre: *The Old Ways* (2012), *Landmarks* (2015), and *The Lost World* (2019). Almost all of his novels contain an exploration of the main character into the Earth as they exist in myth, literature, memory, and the land itself. His novels mostly combines journey with the landscape of beautiful nature, and how environment becomes a big timeline of the whole narratives.

In *Underland*, Macfarlane invites his readers to explore the burial, darkness, and secrecy of what lies under time, place, and mind — a journey explores “deep time” in several geological places around the world from ancient times to present. The main character roams from the beginning of the universe into a sophisticated human in the future time, from Bronze Age funeral chambers to the Catacomb labyrinth below Paris, from underground fungal connection where trees communicate with a deep-sinking where nuclear waste will store for 100,000 years to come and from the prehistoric art of Norwegian sea caves to the blue depths of the Greenland ice cap.

In reading *Underland*, Greg Garrard’s theory of ecocriticism is implemented to elaborate the complex relation of human and environment resulting in climate change. Ecocriticism has its uniqueness amongst

contemporary literary and cultural theories because of its proximity with ecology (Sachmadi et al., 2019). Ecocriticism may not contribute directly in pure ecology, but it seeks to transgress disciplinary boundaries and develop the readers' "ecological literacy" (Garrard, 2004). Ecocriticism is an essential approach in critical literary analysis as it underlies biocentric thinking, a philosophical and ethical premise that all living organisms should be considered as equals i.e. the Earth and whatever inside is viewed as having two-fold purposes: economic activity and human culture fulfillment (Sachmadi et al., 2019). These are the perspectives used to see the *Underland* in terms of climate change that it brings.

How environmental issues are raised in and are related to literary works, especially green novels, have been widely reviewed (through ecocriticism point of view) in the last ten years. Conflicts between environmentalists versus capitalists are the most frequently discussed topic (see Gogoi, 2014; Zhengwen, 2018; Sachmadi et al., 2019). Some other researchers focused their studies on anthropocentric perspective in reading fictional works (Mishra, 2016; Romadhon, 2011), issues of ecology and technology in a novel (Setyorini, 2016), climate change (Glesson, 2016), and the studies about Robert Macfarlane's *Underland: A Deep Time Journey* novel (Giggs, 2019 and Barrel, 2019)

In this present study, the researcher tries to discuss the issues of climate change in Macfarlane's *Underland: A Deep Time Journey* viewed from ecocriticism perspective (Garrard, 2004) and the main character's responses in facing such a phenomenon using psychoterratic theory (Albrecht, 2011).

B. Problems of the Study

In accordance with the aforementioned rationale, this research seeks to answer the following questions:

1. What are the scopes of climate change problems in Robert Macfarlane's *Underland: A Deep Time Journey*?
2. How does the main character respond on the climate change problems in Robert Macfarlane's *Underland: A Deep Time Journey*?

C. Objectives of the Study

In line with the research questions, this study aims at:

1. Identifying the scopes of climate change problems in Robert Macfarlane's *Underland: A Deep Time Journey*;
2. Describing the main character's responses on the climate change problems in Robert Macfarlane's *Underland: A Deep Time Journey*.

D. Scope and Limitation

This research focuses on studying a literary work entitled *Underland: A Deep Time Journey* written by Robert Macfarlane, particularly on the discussion of climate change issues by applying the of ecocriticism theory (Garrard, 2004). Due to the limited data of dwelling issues, this research only focus on five aspects; pollution, wilderness, animals, apocalypse, and earth. This study also attempts to describe the main character's responses on the climate change

phenomenon by applying the psychoterratic theory that consist of solastalgia and ecoanxiety (Albrecht, 2011).

E. Significance of the Study

The results of the study can contribute to two levels: theory and practice. Theoretically, this study might enrich the readers' perspectives on the dangers of climate change problems narrated in a literary work as well as on the importance of increasing environmental awareness to reduce the potential damages of the nature in forthcoming time. Practically, this research can give new insights on how to read Robert Macfarlane's *Underland: A Deep Time Journey* in terms of the emergence of anthropogenic environmental issues and the responses of the main character. Besides, it might serve as an additional reference for future studies on similar work and issue.

F. Research Method

1. Research Design

This study is under the design of literary criticism. As a part of art (Frye, 2005), this method attempts to analyze a literary work entitled *Underland: A Deep Time Journey* by Robert Macfarlane by focusing at the first place on the topic of climate change problems as viewed from ecocriticism approach proposed by Garrard (2004). The approach applies critical analysis on the relationship between human and nature in all areas of production. The researcher gives emphasis on such world issues as pollution, wilderness, apocalypse, dwelling, animals, and the

earth (Garrard, 2004). Those problems occur due to humans' activities that give dangerous impacts on the nature.

At the second place, this study tries to capture the main character's responses on the climate change, assuming that humans are now living in an Anthropocene era whose activities influence and are influenced by the Earth's ecosystem. The way the main character responds this phenomenon is analyzed by psychoterratic theory by Albrecht (2011) who comprehensively discusses the distress caused by anthropogenic environmental changes.

2. Data and Data Source

The data of the study are words, phrases, and sentences taken from *Underland: A Deep Time Journey* novel by Robert Macfarlane. This 496-page novel was first published by W. W. Norton Company in 2019.

3. Data Collection

The data from Macfarlane's *Underland: A Deep Time Journey* are collected by following the steps below:

1. Carrying out detailed reading and deep understanding on every essential element in the novel;
2. Underlining the required data, particularly on the representation of climate change and how the main character responds to this phenomenon through narrations and dialogues;

3. Categorizing the data of “climate change problems” into five aspects according to ecocriticism theory by Garrard (2004) and classifying the data of “main character’s responses” into two parts of psychoterratic theory by Albrecht (2011), i.e. solastalgia and ecoanxiety.

4. Data Analysis

The steps of data analysis are as follows:

1. Elaborating the categorized data of climate changes related to the background of issues and giving the supporting evidences from the novel and other related studies;
2. Describing the responses of the main character on the climate change problems and giving the supporting details from the novel and other related research;
3. Drawing conclusions which are in line with the research questions and formulating relevant suggestions.

G. Definition of Key Terms

There are several technical terms in this study. The terms are used in the following definitional contexts:

1. Anthropocene is the era in which humans’ activities began to have a global impact on the Earth's ecosystem;
2. Ecocriticism is the study of the relationship between humans and nature;

3. Climate change is a long-term change in the distribution of weather patterns over a period of time from decades to millions of years as a result of increased concentrations of carbon dioxide and other gases in the atmosphere.

H. Previous Studies

The previous studies below were carried out in the last ten years. They applied ecocriticism approach to investigate environmental issues in literary works. They are taken here because of the similarities in terms of the theory applied, i.e. ecocriticism and studies about the object of this research.

The first study is *Country and Climate Change in Alexis Wright's The Swan Book* by Glesson-White (2016). The country in this research was described as a land and its complex interrelations with human and non-human beings in Australian Indigenous Law, especially among Aboriginal Tribes. This research applied elements of Garrard's "tropes" consisting of pollution, pastoral, wilderness, apocalypse, and Earth, in addition to its added elements like country, capital, and Christianity. The result of the study highlights that Western civilizations should take the greatest responsibility for climate change occurring in their colonized countries.

The second is Gogoi's (2014) study on *Chinua Achebe's Things Fall Apart and Arrow of God from Ecocritical Approach*. The result of the study describes that the industrial activities of Western countries have been continuously depriving nature of its riches and destroying the environment of African countries which leads to the conflict between environmentalists and

capitalists in utilizing nature. The article portrays ecocriticism, as a part of postcolonialism study, plays an essential role in the study of ecology especially in criticizing environmental degradation.

The third study, i.e. *The Reading of Chander Pahar's The Mountain of the Moon* by Mishra (2016), shows that many issues lie under the umbrella of ecocriticism in this film, such as the pristine beauty of nature, the wilderness, the animals, the godliness of nature, the tribal living in harmony with the forest, and above all man's tragic flaw, and his anthropocentric attitude to dominate nature is at the risk of his life. This film, according to Mishra (2016), is a good piece of Ecocritical work to build up an ecological vision for humankind.

The fourth study is a thesis by Romadhon (2011). He investigated the environmental issues in James Cameron's film, *Avatar*. The film shows different treatments of human and non-human through their relationship with literature. Explicitly, it warns humankind to concern more in the conservation of nature. The research was underlain by anthropocentric, human as the master of nature; they exploit, and also keep, the environment to make balance.

The fifth study is on Veronica Rossi's dystopian novel entitled *Under the Never Sky* conducted by Azizah (2017). The researcher describes the synergy of Aria and Peregrine as the main characters and the representation of nature as their living place. The data from the novel are presented in terms of three concepts: pastoral, wilderness, and apocalypse. Even though nature is sometimes dangerous, it has its own uniqueness. Aria and Peregrine prove that nature is a peaceful place where their thoughts can be free.

The sixth study is of Setyorini (2016), who investigated the representation of technology and ecology in two dystopian novels, Suzanne Collin's *The Hunger Games* and Veronica Roth's *Divergent*. Both fictional works present technology as the cause and answer to ecological problems. In line with technology, nature is represented as an antagonistic space in which dystopian dictator leaders use it to establish absolute power. Nature is a place where they can develop their identity beyond dystopian system regulation. The natural world becomes an escape from urban and technological settings.

The seventh study is Zhengwen's (2018) reading on Rodrigo V. Dela Peña Jr.'s poems in *A Monk Walks along Orchard Road*. This research applied Edward W. Soja's theory on "Third Space" the epistemic boundaries between binarism categories. Orchard Road as the setting of the poem describes the dichotomy of past and present, nature and capitalism, asceticism and desire, and urban and natural. The researcher considers that *A Monk Walks along Orchard Road* has reshaped the views and definitions of human and environment, and deconstructing binaries is important to understand nature.

The eighth study was carried out by Sachmadi, et al. (2019). They investigated Blair Richmond's trilogy: *Out of Breath*, *The Ghost Runner*, and *The Last Mile*. After analyzing the structure of the novels, the researchers conclude that the trilogy contains biocentrism, a belief that the planet and all living things on it have rights to meet their needs. Two conflicting problems become the main point of the trilogy: herbivores versus omnivores and environmentalists versus

capitalists. This study suggests that animals should not be consumed to save the fauna. In other words, the novels indeed tend to have a biocentric orientation.

Those studies profoundly discussed the relationship between nature and capitalists. This relationship cannot be separated because, according to the biocentric notion, Earth and anything in it are provided for humans for two purposes, i.e. economic activity or human culture fulfillment (Sachmadi et al., 2019). However, humans are prohibited from exploiting the nature greedily for the sake of creating harmony.

The ninth study came from Barrel (2019) in a published article by National Geographic entitled *'Underland' by Robert Macfarlane review*. The author discusses the phenomena of environmental change and solastalgia in a nutshell. To convince the reader, the article also contains the data from novel about the influence of climate change in human living.

The tenth study is Gigg's article (2019) in *The Atlantic* entitled *What Lies Beneath: Burrow far below the planet's surface, and even there, humanity has left its imprint*. The author gives explanation about the evidence of today's major environmental changes, following what trickles down into the Earth and what migrates upward from beneath. She also broadens the description of climate change using biology, history, physics, and glaciology scopes.

The previous studies all applied ecocriticism approach to analyze some literary works containing environmental issues in different perspectives: environmentalists versus capitalists (Gogoi, 2014; Zhengwen, 2018; Sachmadi et al., 2019), anthropocentric perspective (Mishra, 2016; Romadhon, 2011), ecology

and technology (Setyorini, 2016), the representation of nature (Azizah, 2017), and climate change (Glesson, 2016) and studies about the novel itself (Giggs, 2019; Barrel, 2019). Quite differently, the present research tries to investigate the climate change issues using ecocriticism perspective, and how the main character responds in *Underland: A Deep Time Journey* by Robert Macfarlane.



CHAPTER II

REVIEW OF RELATED LITERATURE

A. Ecocriticism

Ecocriticism is a “new comer” in literary criticism. Studies on this theory just started in the late twentieth century. Academicians found it difficult to find a suitable theory to analyze nature issues in literary works. However, massive issues on environmental damages raised by almost all mass media in the world have brought ecocriticism into popularity. The urgency to investigate literary works using this theory is portrayed not only inside the series of events in the story but also in conformity with the reality, regardless the fact that literary works containing human-nature elements were produced long time before this theory was established. “Green literature” has in fact existed since thousand years ago, such as in the portrayal of Mayan mythography. It was told that human beings made serious mistakes upon the nature which led gods destroy them all. The gods then recreated them from corn collaborating with the help of already-created animals. This mythography implies that “there is a synergy between humans, animals, and nature to survive in the earth” (Montejo, 177:2001). Whereas in the cosmology of Maori, creation was told as a continuous process where humans and all the natural elements always emerged, always unfolded (Montejo, 198:2001). Those literatures indicate that, in terms of ecology, human activities are inter-related with the environment.

Ecology is the main focus of ecocriticism. Humans and nature need harmony to live with a decent life, as well as literature and nature. At the moment when this close relationship is disturbed, serious problems of either humans or nature are likely to occur. Therefore, ecocriticism is applied to find the friction that happens in a literary work and increase people's environmental awareness. Besides, this theory also helps to preserve the ecological balance, and literature has the function as a saviour of nature and humans for a living.

1. Definition(s) of Ecocriticism

Some experts have tried to define what "ecocriticism" actually means. According to Garrard, ecocriticism conveys the critical investigation about the relationship between human and nature through the cultural history of human (2004:iv). In defining this theory, Garrard does not limit the use of ecocriticism in literature only; it might be applied in other studies. Meanwhile, Clark (2011:xiii) defines ecocriticism as the analysis of the relationship between environment and literature, focusing on the latest global environmental issues, be it theoretical or practical. Furthermore, Endraswara defines ecocriticism as a literary study that focuses on the physical environment (2016:ix). Both Clark and Endraswara tend to specify the theory of ecocriticism in the context of literature. However, they all assert that ecocriticism could not stand alone. It needs supports from other scientific theories.

To deal with any environmental issues, interdisciplinary theories are required to find more comprehensive results and solutions. Buell (2005:viii) in his book *The Future of Environmental Criticism: Environmental Crisis and Literary*

Imagination emphasizes the interdisciplinary collaboration of literature and critical environmental research, limelight on the human as well as the natural sciences with cultural studies perspective. Juanda (2018:5) also states that ecocriticism is basically an interdisciplinary study of ecology and unusual literary criticism as a combination of natural science and humanistic disciplines. The interdisciplinary of ecocritics might therefore require literary critics to come across disciplines: philosophy, sociology, psychology, history, politics, economics, and even religion (Garrard, 2004:8).

2. Scopes of Ecocriticism

The focus of ecocriticism is to investigate the development of the environmental movement and explore the concepts related to the existing theory. Garrard (2004:iv) categorizes the scopes of ecocriticism into six categories; pollution, wilderness, apocalypse, dwelling, animals, and earth. Nature and environment are the crucial elements of these six categories that must be carefully taken into account when applying ecocriticism.

a. Pollution

Pollution is excessive of any harmful substance in the form of solid, gas, liquid or energy (radioactive, heat, and sound). They influence the stability of nature and environment, which cannot be tolerated (Nathanson, 2019). For instance, air pollution may effect ecosystems. Air pollutants such as sulfur may lead to excess amounts of acid in lakes and streams, and can damage trees and forest soils. Nitrogen in the atmosphere can harm fish and other aquatic life when

deposited on surface waters. Ozone damages tree leaves and negatively affects scenic vistas in protected natural areas. Mercury and other heavy metal compounds that are emitted into the air from fuel combustion and deposited on land and in water accumulates in plants and animals, some of which are consumed by people. Different from old society who faced three “classic” pollution of water, land, and air, modern society are now dealing with more various kinds of pollution, such as light, noise, and plastic pollutions. Humans should regretfully accept the impacts of these pollutions especially on health. In ecocriticism, pollution is considered the producer of environmental degradation (Garrard, 2004:8).

b. Wilderness

The notion of wilderness means to express the untouchable place of nature from human activities. The design of the wilderness enables people to protect the habitat of particular animals or even plants from pollution and extinction (Garrard, 2004:59). The term “conservation” is identical with the wilderness of protected areas. This movement has ecological and social sustainability that is profitable for biodiversity and human civilization (Brockington & Soltau, 2004:142). In ecocriticism, the question about wilderness is centred in the cultural and literary studies that does not burden on social aspects of humanities (Garrard, 2004:59).

c. Apocalypse

Humanity in the future will face several possibilities of the so-called “apocalypse.” Even though the worst events are theoretically easier to avoid

terrifying impacts, in another slow-moving apocalypse such as climate change, humans seem hard to imagine the description of the scenario and how to deal with it (Cascio, 2019:269). Apocalypse also triggers a deep emotion on the complexity of incoming issues that will be reduced into monocausal crises between the group of society (Garrard, 2004:105). In responding to apocalypse, ecocritics might examine the scale of scientific consensus, while the final results should show the shape of rhetoric and ideology (Garrard, 2004:107).

d. Dwelling

Dwelling indicates long-term living of humans in the context of history, heritage, death, habits, work, and life (Garrard, 2004:108). Ecocritics investigates dwelling issue by interpreting the political aspects rather than the moral and spiritual ones (Garrard, 2004:135). The example of dwelling issue is about the politics of farming. This scope tends to analyze the conflict between the agricultural labourers against the depredations of rural capitalism than any other issues.

e. Animals

The study about relationship of human and animals in humanities has brought philosophers into a conversation on animal rights and the representation of animals in cultural perspectives (Garrard, 2004:136). There are several issues commonly discussed, such as the discourse of human and animals in globalization era, the human-animal politics and ethics, animal behavior interpretation, and the environmental aspects of animals habitats that are slowly wiped out (Philips,

2010:1). Ecocriticism can approach this concept through metonymy and metaphor in literary works (Garrard, 2004:140).

f. The Earth

In ecocritics' perspective, Earth (from its small entity of the soil to the most significant matter of biosphere) is viewed as the prime object of study. The construction of the earth contains economics, politics, literature, and popular cultures (Garrard, 2004:162). Therefore, the earth provides many issues related to social ecology, cultural studies, and even literary criticism. It helps academicians to focus their discussions on the legacy of modernism of social, environment, and nature as a specific part of aesthetic practices (Heise, 2012:90).

3. History of Ecocriticism

The 1960s is considered as the beginning of the environmental academics research that implemented ecocriticism theory. This is the time on which Rachel Carson's *Silent Spring* was first published (Garrard, 2004:1). However, the term "ecocriticism" was first introduced at the conference of the West Literature Association by the end of 1970s (Barry, 2009:6). The Association for Study of Literature and Environment (ASLE) is the pioneer to conduct scientific discussions in the forms of conferences and published journals on literary analysis, education, creative writing, and activism about the environment. The early works of ecocriticism were dominated by Romantic poetry, wilderness narrative, and nature writing. However, in recent years, these trends have changed into cultural ecocriticism, research on films and TVs, and popular writings that

underlie the nature elements. The popularity of ecocriticism shows the greater concern of humans on environmental issues.

The long historical journey of ecocriticism movement, according to Marland (2013:848), can be divided into four sections. The explanation below gives a simple description of the ecocriticism movement timeline.

1. The First Wave: “Getting Back the Reality”

The first wave ecocriticism defined the word “environment” as “natural condition of the environment.” The position of human and nature was separated in practical at first; in order to reunite them, the theory of environmental criticism was proposed (Buell, 2005:8). Ecocriticism, as a part of Earthcare, aimed at preserving of the biotic community to any extent possible (Coupe, 2000:4). The framework was generally to examine the cultural effect upon nature with the perspective of respecting nature, criticizing the stakeholders, and decreasing the harms through political action (Howarth, 2000:69). Later on, this theory asserted the concept of culture with a new philosophical notion of organism.

As one of literary theories, some ecocritics crave “real-world” impacts to broaden the connection with the nonhuman world and create the text-based analysis viewed as a blueprint of an ecological and sustainable mode of being and living in the world that dominated reality of modern era (Rigby, 2002:159). Thus, the characteristic of first-wave ecocriticism is nature-writing-oriented.

2. The Second Wave: “Disputing Nature”

The second wave ecocriticism has the central question of understanding an organic design between the environment and environmentalism (Buell, 2005:22). This period mostly brought the elements of the first wave, keeping the realization idea of the general physical presence of nature and the improvement of its implementation in the form of finding environmental imagination (Marland, 2013:851). The second movement of ecocriticism tended to be a more flexible approach in order to find the hidden context of nature, social, and sexual politics. Moreover, it was also developed into more complex objects (e.g. ecopoetry, post pastoral, green novel and new style nature writing) to explore textual and contextual meaning towards the world, social, and environmental history (Cowley, 2008:8).

The disputes on the second wave ecocriticism are portrayed in Greta Gaard's argumentation (2010:648), She argues that this movement overmuch omitted the importance of feminist notion due to the comprehensive ecocritical analysis but marginalized the perspective of feminist and ecofeminist in literary works.. On the other hand, Philips (2003:8) proposes the rethinking of the environmental literary research by applying mimetic writing towards imagining the realistic world. Thus, the second ecocriticism is mostly about urban and ecojustice revisionist.

3. The Third Wave: "Eco-Cosmopolitics"

The third wave ecocriticism was marked by the development of ethnic identification, national identities, and investigating human experience from an environmental perspective (Adamson & Slovic, 2009:7). The discourse of the

term cosmopolitanism in all aspects around the late 1990s shapes the idea of cultural imagination to reach beyond all nations without limit (Heise, 2016:147). Besides, globalization as the product of cosmopolitanism creates the status of “global citizenship.” This movement supported the declaration of Mother Earth in 2010 stressing the importance of living together to preserve the nature from environmental damage and promoting environmental justice.

4. The Fourth Wave: “Material Ecocriticism”

The fourth wave is considered the consummation of the third, and it raises a new idea about material ecocriticism (Marland, 2013:255). The material ecocriticism makes a creative way of examining the environmental issue through the text, agency, and narrativity. This kind of theory focuses on two matters: the nonhuman agency portrayed and represented in narrative texts and the power of narratives in creating a description between meanings and substances which correlate the reality of human lives and nature (Iovino & Opperman, 2012:78).

Moreover, material ecocriticism also presents a reference for the ecology of politics based on the competence, knowledge, and acting as moments of a “conversation with those who are not us.” According to Haraway (2008:174), humans should initiate a conversation where they are not a centre of anything and where no one claims access to anyone else. The objective of material ecocriticism, then, is to sharpen insights of the term nature and culture, conveying the number of participants who get involved in this grand pattern of material-discursive agencies (Iovino & Opperman, 2014:89).

B. Psychoterratic

Climate change is continuously damaging the earth's environment and its population. Besides affecting physical aspects, it also endangers humans' psychology. Human beings are likely to suffer more than any other creatures. The vital relationship between human and earth (*terra*) has now been threatened due to climate change. This condition potentially creates distressed and diseased. Albrecht (2011:48) calls this earth-related mental illness "psychoterratic". The high temperature, pollution, and volatile organic compounds are perfect components to raise the cortisol level or stress hormone. Therefore, the mind (internal mental ecosystem), the body (internal physical ecosystem), and changing environments (external ecosystem) might cause the increasing number of stress (Albrecht, 2011:48).

The syndromes of psychoterratic is divided into four: ecoanxiety, ecoparalysis, solastalgia, and econostalgia/nostalgia. Ecoanxiety discusses the worried of environmental change, and ecoparalysis focuses on the inability to do something in responding to global climate change. Meanwhile, solastalgia and econostalgia are quite similar; those psychoterratic sub theories investigate the homesickness of the missing home environment. However, a person who has experienced solastalgia has "lived experiences" in the environment, while in econostalgia the condition occurs in the other way. This research is focused more on the main character's responses in terms of ecoanxiety and solastalgia.

1. Ecoanxiety

The explosion of news report contains eco-information are easier to find. Any bad news linked with eco-information can trigger anxiety. People are getting worried about the incoming ecological problems that they will face in the future. A form of ecological anxiety can lead many people to become stress. Albrecht (54:2011) defines this phenomenon as ecoanxiety. Ecoanxiety also influences the individual's contentment by the escalation of hopelessness and paralysis (Pihkala, 545:2018).

As the consequences of the Anthropocene era, climate change can be the main source of trauma and disabling emotions. The direct and indirect stress from climate change could not be avoided. Mental health issues in the form of anxiety and depression can result in physical health effects, such as immunodeficiency disease, sleep disorder, and lowered life quality due to an unhealthy environment. (Pihkala, 546: 2018).

2. Solastalgia

The Earth, on which humans are now living, is continuously changing and, to some extent, being damaged. Human activities like industrial production, deforestation, and massive plastic usage are have undoubtedly contributed to the environmental damages which in turn affected people for an indefinite period. The ecological changes create several harmful effects in terms of shelter, food, and health, including the disorder of mental health.

Solastalgia describes the distress feelings of people suffer from losing their solace and place of living due to environmental degradation (Albrecht, 2005:42).

This theory is a new concept for examining the relationship between human and environmental degradation on emotional, mental, and spiritual health (Galway et al., 2019). As the effect of uncontrolled natural damages, the chance of people to suffer from this mental illness reaches an increasing extent. If a person seeks solace or solitude in a much-loved place that is being chronically desolated, then they will suffer distress. The symptoms of solastalgia involve anxiety, sadness, anger, distress, and discomfort, which are categorized as psychoterratic syndromes (Warsini et al., 2014:88).

The term “psychoterratic” is closely related to Earth mental health syndromes (Albrecht, 2011:44). This condition occurs due to the environmental changes. When nature no longer synchronizes solace condition of human living, people tend to move to a more pleasant place. The best example is probably the relocation of people living in flood-prone settlements in Jakarta. Flood disaster as the effect of the Ciliwung River constriction forced the occupants around the river to be relocated. However, they decided to back to their original place as they did not know what to do in a new environment. It caused distress due to inability to find the solace condition in a new settlement.

Environmental distress, according to Higginbotham et al. (2007:245-250), might come in four steps. First, the individuals feel the intensity of environmental damage. The surrounding environment slowly changes, but they have not felt the impact yet. Second, the individuals view the potential threatening to oneself and others living. Human activities such as pollution and deforestation have reciprocal effects on them in such forms as climate change, global warming, and biodiversity

loss. Third, individuals suffer from the environmental damages, be it physically or mentally. They could not control the emotional reactions (anger and fear), suffering from stress and anxiety, social and economics, and the potential threat of having solastalgia. Fourth, individuals are fully aware of the threat, and its impact is the trigger for them to avoid, control, resolve, or adapt to such changes.

C. Climate Change

Climate change means the changing of the Earth's environmental elements including higher temperatures, unpredictable weather patterns, rising sea levels, and biodiversity loss (IPCC, 2007:102). It seems that climate change is similar to global warming; yet, the two terms are slightly different. Global warming mainly refers to the increase of earth temperature due to the excess of greenhouse effect and gas emission from human production; meanwhile, climate change has a broader realm of the affected aspects more than the rising earth temperatures as the effect of human activities (IPCC, 2007:121).

There are many shreds of evidence showing the reason(s) why humans contribute to the occurrence of climate change. When scientists were observing the type of carbon in the atmosphere, they found it dominated by carbon monoxide as the combustion of fossil fuels (Romm, 2016:10). The use of fossil fuels cannot be avoided because they have a vital role in economics, mobility, and entertainment activities. Fossil fuels is continuously needed although the alternative fuels containing fewer emissions like wind, solar, and electricity have been invented.

Climate change creates several harmful effects for the living creatures on Earth. The changing of weather patterns has led to ecosystem imbalance. Temperature, wind speed, humidity, and pressure are examples of environmental factors affected by climate change. The plants and animals should adapt more to adjust the nature condition. Those which cannot adapt will die out, or even extinct (Mader, 2010:24), and this creates domino effects to other elements of the environment (Scheleuning et al., 2016:4).

Climate change also has great impact on national security. The notion of the relationship between climate change and the violent conflict is concerned on two main reasons: migration and natural resource scarcity. The environmental conflicts and resource wars might happen as triggered by the increasing number of migration and food scarcity (Briggs & Weissbecker, 2011: 155).

The issue of climate change has also been the concern in fictional works. The researchers are sued to reveal the literary elements such as setting, plot, characters, and theme with regard to environmental problems. The phenomena are critically viewed from different perspectives like ecocriticism, psychoterratic, or even postcolonialism. This trend is noticeable mostly in the reading of green literary works which raise ecological issues like climate change, global warming, pollution, and deforestation (Trexler & John-Putra, 2011:186).

CHAPTER III

ANALYSIS

A. A Brief Reading on *Underland: A Deep Time Journey*

Robert Macfarlane's *Underland: A Deep Time Journey* is a green novel containing the exploration of several beautiful nature landscapes and human-made structures. The work narrates a number of environmental issues from the perspective of the main character, Robert Macfarlane (as the author also) and the other characters. Rob visited ten places across Europe: Mendip Hills (Somerset, UK), Boulby Underground Laboratory (Yorkshire, UK), Epping Forest (London, UK), Catacombs (Paris, France), The Italian Carso (Italy), Slovenian Highlands (Slovenia), Lofoten Island (Norway), Andøya Island (Norway), Kulusuk Island (Greenland), Knud Rasmussen Glacier (Greenland), and Olkiluoto Island (Finland). These places have different conditions; some are good, but the others are damaged because of climate change.

Mendip Hills are portrayed as surrounded by exotic caves. The caves are hard to explore because of challenging terrains. It also needs expert caving skills. This place keeps the burial of the artifacts from the Bronze Age. Meanwhile, Rob finds Boulby Underground Laboratory as an observable area of a dark matter fundamental to everything in the universe; it ties all structures together. The author brings the readers "a room tour" of the lab's facilities. In another part of the UK, Epping Forest provides the view of Virgin Forest. This forest has some plants growing between the forest floor and tree canopy.

Outside the UK, an invincible city lies beneath the center of Paris. This city is known as the Catacombs. Deep, dark, and frowsy are some of the impressions that the main character gets when visiting this burial place for millions of dead bodies. Moving to Italy, a Carso or karst plateau wide stretches with the beautiful scenery of 10.000 caves. This place has a long history of the past civilization. Besides, the Carso also has a river that is closely related to Greek mythologists called Timavo River. In the North of Carso, a Slovenian Highlands provide the landscapes of the sinkhole, glacier, Isonzo River, and also karst plateau. These places give the image of natural nature. However, along Slovenian Highlands become the witness of Nazi troop's violence in the past.

Reaching the Scandinavia, Rob first visits Norway. There are two destinations here, Lofoten and Andøya Island. Both places expose two different points of view; Lofoten Island for its cave art, while Andøya Island with the conflict between cod fishers and oil companies in the Arctic Ocean. In other parts of Northern Europe, precisely in Greenland, Kulusuk Island, Knud Rasmussen Glacier shows the readers the real impacts of climate change. Both places encounter the melting of the glacier. This phenomenon threatens biodiversity sustainability and the humans. The journey comes into the last part in Olkiluoto Island, Finland. A Nuclear power plant is built there; it creates a problem of how to manage the nuclear waste.

B. The Problems of Climate Change in *Underland: A Deep Time Journey*

Climate change creates extreme damages to the affected area of an environment. In the long run, this phenomenon will upset the balance of nature and human living in peculiarly. Therefore, humans should change their mindset to be more eco-centric, focusing on how to preserve nature in the Anthropocene era. This action is crucial because climate change has affected almost all aspects of human life due to its massive occurrence in terms of pollution, wilderness, animals, apocalypse, dwelling, and the earth.

1. Pollution

Pollution is on one of the major causes of climate change. It intolerably influences the stability of nature and the environment (Nathanson, 2019). Modern life contributes to the new kinds of pollution, such as plastic pollution, weapon testing, oil leaked, and nuclear waste. These kinds of waste pollute the air, water, and ground. The plastic waste in ocean becomes the latest issue of environmental degradation as mentioned in the *Underland*:

The oceans dance with hundreds of thousands of tons of plastic waste, slowly settling into sea-floor sediments. (69)

The author's use of the personification "dance" to modify the activity of "the oceans" can be interpreted as the insinuation for the people who throw plastic waste into the oceans. He also pluralizes "oceans", meaning that such a pollution happens not in one place, but many. Seas and coasts are thickened with plastic trash. The research of Jambeck et al. (2016) estimates that the total of plastic in the ocean is between 4.8 to 12.7 million tons each year. As plastic production is

pushed to fulfill human needs, the total is potentially increasing year by year. Ocean pollution from plastic waste accelerates climate change.

Human's demand on plastic contributes towards the amount of plastic waste each year. Fortunately, plastic waste is hard to be fully decomposed by bacteria. Therefore, it needs a special treatment to manage the waste to avoid the impacts of plastic accumulation in the ground or ocean. Human beings' ability to "survive" in a full-of-plastic-waste environment is endangered.

The problem of undecomposed plastic is supported by the excerpts in the novel:

Among the relics of the Anthropocene, therefore, will be the fallout of our atomic age, the crushed foundations of our cities, the spines of millions of intensively farmed ungulates, and the faint outlines of some of the billions of plastic bottles we produce each year – the strata that contain them – precisely dateable with reference to the product-design archives of multinationals. Philip Larkin famously proposed that what will survive of us is love. Wrong. What will survive of us is plastic, swine bones and lead-207, the stable isotope at the end of the uranium-235 decay chain. (71)

The anthropocene era happened because of the human activities. "The crushed foundations of our cities, the spines of millions of intensively farmed ungulates, and the faint outlines of some of the billions of plastic bottles we produce each year" are the example of anthropocene in human living aspects. The unconscious matter is about the plastic waste, aside from swine bones and lead-207, the stable isotope at the end of the uranium-235 decay chain. This kind of waste can contribute into the global warming.

According to a report from the Center for International Environmental Law (2019), plastic waste also contributes to greenhouse emissions. When the greenhouse effect is uncontrollable, the global temperature will rise. The cause of

ocean pollution is not only from the plastic waste but also from the industrial production activities.

The novel also portrays the oil spill incident in the Gulf of Mexico that influenced the ocean ecosystem as follows:

Two hundred and ten million gallons of oil escaped into the Gulf of Mexico, rising on the ocean as a slick that was visible from space. At sea level, the oil devastated marine life. Tar-balls, rolled by the waves, gathered in their thousands on the coastline. Striped dolphins leaped through floating slicks. It would take until the autumn to cap and seal the well successfully, such that it could be declared 'effectively dead', but the consequences for the ecosystems and communities of the Gulf persist today. (282)

“A slick that was visible from the space” is probably the reflection of the horrible oil spill incident in Mexico. More than 112.000 km² ocean's surface was covered by oil, creating a disaster for the marine life ecosystem, degrading microbes in ocean water, breaking the coral life, and it was estimated to kill more than millions of fish (Beyer et al., 2016). This tragedy was considered the second biggest oil spill after the Gulf War oil spill. Besides, the novel tells the suffering of the dolphins that swim across the floating slick, indicating the terrible effect of the Mexican oil spill which ruined the happiness and freedom of everyone who lived there. The recovery of the environment ecosystem takes an extended period, likewise the threat of climate change.

The oil spill makes the raising of earth temperature. Methane substance contained in the oil can trigger the explosion, then releasing this gas into the atmosphere, creating the greenhouse effect. The effect is 23 times more dangerous than carbon dioxide (Grayson, 2010), as dangerous as the nuclear weapon test for the preparation of war, which also creates ecological imbalance. Many countries

have been developing nuclear weapons. USA, Russia, China, and North Korea are few examples.

Weaponry tests have dispersed artificial radionuclides globally. (69)

The radioactive contamination in nuclear weapons should be responsible for the radioactive pollution on the atmosphere, sea, and underground environment. It also creates the nuclear autumn, that affected the decrease of agricultural production, ozone loss, and the spread of radioactive in the air (Robock & Toon, 2010). The impacts of nuclear waste also increase the chance of thyroid cancer in humans (Pravalie, 2014).

In correlation with climate change, the carbon in a nuclear can harm the ozone layer in the atmosphere; the global warming cannot be avoided (Science Daily, 2012). The pollution of plastic trash, oil spill, and nuclear weapon test have impacts on nature. Both of them also contribute to the rising levels of climate change. Decreasing the use of plastic, oil, and nuclear is considered the best way to bring down the climate change level.

The data above indicates that eradicating pollution is almost impossible due to the increase of human activities which are not eco-friendly. At least humans should decrease their unfriendly environmental activities slowly to reduce the effect. One of the examples is “*No Plastic Waste*” campaign all around the world. Seventy-four countries apply the regulation of banning plastic bags. It proves that the society has started being aware of the environment sustainability as the consequence of the Anthropocene era.

2. Wilderness

Wilderness is identical to a place of no human contamination, an ideal living place for animals and plants. Most people associate the term wilderness to “jungle.” In the novel, wilderness is one of the places that the main character visited. Forest fire for monoculture production that produces toxic smog issue has raised in the novel:

The burning of rainforests for monoculture production sends out smog-palls that settle into the soils of nations. (69)

Monoculture production is applied in agricultural sector to boost the production. Burning forest is considered as the most efficient land clearing from financial aspect. However, the farmers often ignore about the result of burning forest that produce smog-palls that settle into the soils of nations, it threaten the ecosystem preservation. Rainforest is a home for animals, plants, and humans. Forests should be used wisely to keep its richness for the next generation. Therefore, burning the forest is one of forestry deviations. Through the novel, the author sends a message that burning forests can turn the image of the forest from oxygen producer to carbon monoxide producer. The toxic smog from fire-raising is the major cause as it spreads a terror of lung diseases for everyone living near the forest or even a thousand miles from the fire point. Several primary causes of fire forests have been revealed, from natural to human-made causes.

A study from the University of Colorado-Boulder (2017) found that humans cause 84 % of all fire forests in the USA. The human-caused forest fire is usually for land clearing purposes to start monoculture production for industries. The efficiency of cost production underlies people’s burning the forests. It is 75%

percent cheaper than any other methods of land clearing (Ahmady & Cossar-Gilbert, 2015). Human is getting richer, while nature is suffering.

Underland: A Deep Time Journey wants to criticize the monoculture productions excessively without paying attention to the nature sustainability. However, the fire-fighting process needs a long time, especially in peatlands. This is because the fire not only burns the vegetation on the surface but also the Underland layer (Adinugroho et al., 2005). The longer the fire blazes, the faster the climate changes.

Again, the greenhouse effects from fire blazes have increased the average temperature of earth for approximately one-degree Celsius. The sea surfaces is also getting warmer in level 0.8 Celsius. The increasing temperature causes the disability of the ocean to absorb energy and CO₂ of water from the atmosphere.

This phenomenon creates extreme weather and unpredictable seasons (Schaunberg, 2020), and it is also evidenced in the novel's quotation below:

'Climate change is felt in our lives here strongly,' says Frederick. 'New species have come here, old ones have gone. There is thunder and lightning sometimes in autumn. (304)

“New species have come here, old ones have gone” indicates the ability of animals adaptation into their new habitats is very low. The ability of animal evolution is slower than the rate of animal adaptation. Meanwhile, Thunder and lightning during autumn seem unusual because they usually come in the rainy season. This “strange” phenomenon is indeed the effect of warmer global temperature.

For every 1 degree, Celsius of warming can increase 12% rates of lightning and thunder activity. Since scientists predict that in 2100 the global temperature will be increasing by 4 degrees Celsius, there could be about a 50% increase in strikes by the end of the century (Romps et al., 2014). The increasing rates of lightning and thunder also have impacts on human and nature.

A lightning strike releases atmospheric electricity, which is made from the accumulation of differing charges in the cloud. The injury could occur if a person touches the hitting object. In an extreme case, lightning injury causes concussive, respiratory failure, or even death. Besides, the lightning strike can trigger the fire, causing the wildfires. These prove that the impacts of climate change also influence an unexpected thing, such as lightning strikes.

In addition, climate change also affects the tree mental health as described in the novel:

Ecologists in the US seeking to understand how American trees will respond to the stress of climate change have begun to focus on the presence of soil fungi as a key indicator of future forest resilience. Recent studies suggest that well-developed fungal networks will enable forests to adapt faster at larger scales to the changing conditions of the Anthropocene. (93)

By stresses in a tree, the main character means that any animate beings have a potential of suffering mental health problem. This mental health issue in trees can lead to the raising of mortality rates. Climate change often creates prolonged drought, which inhibits the water supply, so the photosynthesis process is disturbed. Trees often do not express the response of stress because of their accumulated growth habit. However, it creates abnormalities for trees. For example, leaves become smaller and fewer, producing excess fruit or seeds. These

activities affect the survival mechanism of trees (Feeley, 2007). Therefore, humans should respect the existence of the tree and treat them responsibly.

Ecologists in the US work to observe tree stress as described in the text. Understanding tree needs require the sensitivity of natural preservation. Human stress needs special treatment as well as the tree; all God's creatures must be treated equally. As a part of climate change phenomena, stresses in a tree should be viewed as a serious issue. The novel delivers a message for the readers to treat the trees properly. Reducing tree stress can be viewed as good morality towards the environment.

3. Animals

The relationship between humans and animals cannot be separated. Humans take advantages of animals in the form of power, food, and economy. However, in the Anthropocene era, the existence of animals has been seriously threatened. Humans will face into the sixth great extinction as shown in the quotation of the novel below:

Biodiversity levels are crashing worldwide as we hasten into the sixth great extinction event, while the soaring number of a small number of livestock species ensures the geological posterity in the fossil record of sheep, cows, and pig. (69)

The Anthropocene era is a path towards the sixth great extinction. It was begun in the past decade when the scarcity of both common and rare species all over the world was getting worse. The biodiversity level is also affected; “the soaring number of a small number of livestock species” indicates the wild animals is suffering by the extinction, because human prefer to “keep” the livestock

because it is more profitable. Scientists assume that overpopulation and overconsumption in the form of habitat destruction, pollution, and poaching for the black market are the main reasons for animal extinction, creating a 50% loss of all individual animals, which equals to a billion of the populations of birds, mammals, reptiles, and amphibians (Carrington, 2012). The animals seem a force to adapt to the environmental damages. Whereas, the ability of animal evolution is slower than the rate of animal extinction. The Anthropocene era is terrifying; yet, some people are not aware of this serious issue.

The author's narration about the soaring number of the geological posterity in the fossil record of sheep, cows, and pig is the indication of the Anthropocene era. It means that the number of wild animals is less than the number of humans and their livestock or pets. Livestock or pets are considered more profitable than wild animals. Therefore, humans tend to neglect wild animal existence, or even consider wild animals as pests, which leads to the decrease of wild animal population from year to year. At last, wild animals move from their natural habitats to find an ideal place for living. It will increase the animal stress level as portrayed in the novel:

The sea ice was gone from the fjords by June. The snowfall over the winter was minimal. No one's ever seen a year like it. Normally now the channel would be full of ice. A bear was seen swimming off Kulusuk two weeks ago. He must have been desperate. No one shot him. (300)

The quotation portrays in detail how a bear has driven away from home because of climate change. Finding a new place is resistant to living. Often, wild animals enter the settlements, creating a new conflict with humans. They attempt to warn people, but the people think them a threat. In the end, humans become the

winner of this conflict, without giving any solutions but killing. Besides, losing habitats of climate change has the impacts of animal's health. The increasing temperatures and intensity of heatwaves may affect the immune suppression, metabolic disorder, and oxidative stress (Lacetera, 2018).

The increasing number of stress in animals affects animal mortality. Animals' stress leads to increased production of adrenaline and cortisol hormones which trigger the escalation of blood pressure and heart rate, also decrease the immune system. These symptoms can lead into heart attack (Alkema, 2019). The stress and disease can, in turn, endanger animals' hunting ability. Therefore, the starvation could not be denied. In this case, mass mortality of an animal ruin the food chain and human activities, as portrayed in the novel by the inability of Greenlanders to hunt anymore due to global climate change that eliminates the animals habitats:

Bears die of starvation rather than bullets. Inlets and fjords are dangerous to cross. Snowmobiles run the risk of plunging through thin ice, carrying their drivers with them. Hunting – one of the few aspects of traditional Greenlandic life that survived settlement – is under threat of erasure, this time by global temperature change. (303)

“Bears die of starvation rather than bullets” represents nature could not provide enough food for animals living due to environmental change. As the consequences, the bears suffered starvation and leads into death. The human also affected, as portrayed by traditional Greenlandic that lose their house and hunting activities.

The reciprocal relationship between human and nature in Anthropocene era is on crisis level. Human needs animal for production and consumption purposes. Meanwhile, animals need human to balance the food chain. However,

this relationship is in trouble right now because of the activities of some people who are not eco-friendly. As the consequences, animals' habitats are damaged.

The author explains human-animal relationship in the novel as follows:

But the Anthropocene, for all its faults, also issues a powerful shock and challenge to our self-perception as a species. It exposes both the limits of our control over the long-term processes of the planet, and the magnitude of the consequences of our activities. It lays bare some of the cross-weaves of vulnerability and culpability that exist between us and other beings now, as well as between humans and more-than-humans still to come. Perhaps above all the Anthropocene compels us to think forwards in deep time, and to weigh what we will leave behind, as the landscapes we are making now will sink into strata, becoming underlands. (70)

There are two points about Anthropocene era from the text. The first is a notion about human perception as one of the top species in the food chain. Although instinctively inferior from other species, human beings are superior in terms of intelligence for creating stuffs to dominate and survive in the world. Human activity has changed the biosphere and earth ecosystems on a large scale. Besides, they can influence the lower species, having accessibility to control the environment instead of a consumer. The responsibility of human who is living right now is not only for the recent species or environment but also for the uncertain future.

Second, human beings should rethink on the ideal ways to overcome the damage of earth and preserve the sustainability of other species. The uncertain future is the consequence of human exploitation to nature. That “*the landscapes we are making now will sink into strata, becoming underlands*” seems an ultimatum from the author to create the awareness of humans about the incoming catastrophe. To overcome this problem, cooperation of all humans in the entire world to save future generation is highly required. As the author says:

What legacies will we leave behind, not only for the generations that succeed us but also for the epochs and species that will come after ours? Are we being good ancestors . . .? (373)

The present human should think forward about what problems might be faced by the next generation and other species. The question “Are we being good ancestors?” reflects human to always do beneficial in every aspects of life, especially in environmental aspect that dealing the threat of anthropogenic environmental changes. Climate change is a villain for anything on Earth, especially animals. There should be preventive ways to avoid extinction. Educate people aware of the environment can be an effective solution. Humans can support the ecosystem of animals to keep the balance of nature. Animals can also support human life by providing food and help the economy grow. The reciprocal relationship must last forever, without harming either side.

4. Apocalypse

Discussion of apocalypse does not mean talking about the final day on Earth, but the realm of studies, including disaster issues. Apocalypse is an incident that disrupts people’s life by natural and unnatural factors, resulting in environmental damages, property losses, and psychological impacts. In the novel, the author shows an apocalypse while raising the issue of Sidoarjo mudflow, the world’s muddiest disaster, as mentioned in the following quotation:

Early this millennium, on the sweltering north coast of Java, a lake of toxic mud has spread over four square miles of landscape, gouting out of a central crater from which a plume of foul-smelling gas also rises, and burying twelve villages. This mud volcano began to erupt ten years previously, shortly after a multinational corporation, drilling for oil in a Late Miocene stratum some two miles below ground, ruptured a high-pressure aquifer and opened a series of blowout vents on the surface – from which ever since has flowed this torrent of

ancient, poisonous sludge. By some the mud volcano is seen as a consequence of corporate greed – an unnatural disaster. (224)

The Sidoarjo mudflow is one of the longest ongoing disasters in recent memory. A mud volcano in the Sidoarjo district, East Java, Indonesia, has been ejecting hot mud and gases since 29 May 2006. “By some the mud volcano is seen as a consequence of corporate greed” refers to Lapindo mining company that was drilling for natural gas. Suddenly, the hot water began to come out of the well, but this was quickly suppressed with more mud pumped into the ground, burying twelve villages until now.

The Sidoarjo mudflow can be categorized as an unnatural disaster. The disaster, as explained in the text, is because of a company’s drilling for the natural gas, which results in the eruption of toxic mud. This kind of mud can harm the environmental area over four hundred hectares. Animals and trees in the covered area died, and it forced the local people to relocate their houses. Meanwhile, the toxic mud has polluted water, soil, and air. The nearby river sediment contained a high level of Lead (Pb) contains, reaching 146 times from the predetermined threshold. The risk of Lead (Pb) excess content can trigger cancer, reproduction issue, skin irritation, and lung disease. Instead of water pollution, air pollution has a more profound impact on humans and nature.

A research of Wahana Lingkungan Hidup Indonesia (WALHI), an independent environmental advocacy organization, found the soil and air in a covered area of Sidoarjo mudflow contained Polycyclic Aromatic Hydrocarbon (PAH) 2000 times from reasonable limit. PAH substance affects cancer and lung disease. Meanwhile, the air pollution index has surpassed 8000-220.000 times

from reasonable conditions. Besides, the PAH hasten climate change. Methane gas, as one of Hydrocarbon chemical substances, contributes 10% of Greenhouse Gas Emissions (EPA, 2018). Overall, the Sidoarjo Mudflow has damaged the environment and potentially affects climate change.

Robert Macfarlane takes the issue of Sidoarjo Mud Flow to explore corporate greed that results in natural damages and climate changes at once. Industrial activities contribute to harmful substances more significantly than individual ones. Meanwhile, Industrial policies have a vital rule in both nature preservation and social sustainability (Naude, 2011). The government, as the stakeholder, should watch over the activities and formulate policies that would reduce the harm of industrial waste. Due to increasing greenhouse emission, they should synergize in mitigation of climate change.

Underland: A Deep Time Journey also tells about the disaster in Europe. The European drought in several countries has revealed some archeological treasures, such as an ornate of 17th century garden in UK, prehistoric Henge in Ireland, and a sinking underwater village in Germany. The reappearance of historical relics has uncovered the fact that Europe has been suffered by drought from the ancient time. In Robert Macfarlane's *Underland: A Deep Time Journey*, the drought issue in Europe is also presented by Hunger Stone in the Czech Republic, as the author explains:

Where the River Elbe flows through the Czech Republic, summer water levels have recently dropped so far that 'hunger stones' have been uncovered – carved boulders used for centuries to commemorate droughts and warn of their consequences. One of the hunger stones bears the inscription 'Wenn du mich siehst, dann weine': 'If you see me, weep.' (14)

The hunger stones is a type of hydrological landmark placed in Czech Republic. This “warning” memorial was built in ethnic German settlements throughout Europe from 15th to 19th century. These stones were embedded into a river during droughts to mark the water level as a warning to future generations that they will face extreme drought if the water sinks to this level again. One of the famous stones has the message in German "Wenn du mich siehst, dann weine" (If you see me, weep") carved into it as a warning.

The reappearance of hunger stone marks the extreme drought along with Elbe river flows. This river, placed in Central Europe, runs from the Czech Republic and crosses Germany up to the North Sea. As a result of drought, hydrological landmarks appear beneath the water due to decreasing water debit. Unlike floods, which is indicated by the rise of water level, the hunger stone signs a drop of water level. The rocks are scratched with dates of 1616. In one of the hunger stones engraved a message, *“If you see me, weep.”* This message is a warning for people near the river about the impacts of drought. A drought brings a crop failure, lack of food, rise of price, and starvation of poor people. Besides, the hunger stone is closely linked to climate change.

In the Anthropocene era, the annual disaster such as drought is considered as a climate change effect. The scorching temperature around Europe is the major cause. A recent study from Hanel et al. (2018) found that 21st century is the time on which most extreme drought occurs as measured by precipitation deficits during the vegetation period. This condition reiterates the historic drought in Europe over 250 years ago. It is also supported by data from NOAA (National

Oceanic and Atmospheric Administration), that 2018 is the fourth hottest year ever recorded. From the sequences of climate change events, people are always warned by the symbol or events. However, they do not realize, “*what does it mean.*” This worsens the impact of the catastrophe from climate change.

5. Earth

The “Earth” in the discussion of ecocriticism refers to any problems in the universe that are not covered by pollution, wilderness, animals, apocalypse, and dwelling. As a place for human life, the Earth has been “insecure” place to live in the Anthropocene era. The first problem of the “Earth” lies on Greenland, a country with arctic climate whose average temperature is no more than 10 degrees Celsius. Due to climate change, the condition has changed. In summer, the temperature can reach 24 degrees Celsius. This kind of situation for meteorologist is beyond the normal condition.

The raising temperature in Greenland caused the acceleration of ice cap loss twice in present century as explained in the novel:

The heat in the Arctic that summer was record-breaking, and so was the melt. New lows were set for the extent of Arctic sea-ice coverage. In Nuuk, the Greenlandic capital, the temperature hit 24°C. Meteorologists in Denmark rechecked their measurements. No mistake. For the past decade, the ice cap had been losing mass at twice the rate of the previous century. That year it also began melting a month earlier than usual, and the flow rates on the meltwater rivers of the glaciers reached exceptional speeds. The glaciologists checked their models. No mistake. (298-299)

Greenland ice, which melts due to warmer temperature, has threatened not only people in the country itself but also millions of people on the Earth with inundation and unavoidable impacts. The warmest temperature in Greenland was

recorded in Nuuk, Greenland with 24 degree celcius. In the text, summertime is viewed as the possible time for melting ice. The warmer temperature is supposed as the primary cause. Moreover, the ice sheet in Greenland is placed as the second biggest in the world. However, it contributes around 1,5 millimeters to the rising global sea levels. From 1992 to 2018, Greenland has lost 3,8 trillion tons of ice (Tutton, 2019). The trend of ice loss has always been rising year by year. The society should help to stop the ice melting in this country.

Ice melting in Greenland is an alarm from nature, reminding people to change the way of living to be more aware of nature preservation. In fact, the melting of ice is such an anomaly. According to the above excerpt, there are two repetitions of surprise in responding to this phenomenon: *“Meteorologists in Denmark rechecked their measurements. No mistake”* and *“The glaciologists checked their models. No mistake”*. Different from the previous years, 2019 is the peak year of ice loss. Any efforts to reduce the effects of climate change are effective only if people are collectively aware of the danger of this catastrophe for the future generation.

Climate change not only affects the ecology but also attacks the mentality. The loss of ice becomes the major cause of the physical health problem especially for native Greenlanders causing rates of depression, alcoholism, obesity and suicide to rise, as mentioned in the novel:

The melting of the ice, together with forced settlement and other factors, has had severe effects upon the mental and physical health of native Greenlanders, causing rates of depression, alcoholism, obesity and suicide to rise, especially in small communities. ‘The loss of that landscape of ice,’ writes Andrew Solomon, studying depression rates in Greenland, ‘is not merely an environmental catastrophe, but also a cultural one.’ (304)

The melting of ice as the result of extreme heat in Greenland connects with the increase of aggressive behavior. The intense heat, as a part of climate change, affects the escalating rates of alcohol in order to reduce depression (Morganstein, 2019). As a result, a drinker gains extra weight, so does the increase of the number of obesities. Besides, disruption caused by climate change also contributes to the rising suicide rate. The majority of Greenlanders depend on their life from nature to fulfill their needs and economic purposes. Since the loss of ice, their income is less than before, causing depression, which leads to suicide. These cases show that climate change can kill people softly.

The psychological effects of climate change can impact individuals and communities. For the individual, climate change has a high potential to cause temporary and serious trauma, from the loss of personal property, a damaged environment, and disruption of livelihood (Neria & Schultz, 2012). The impacts could be acute (trauma, post-traumatic stress disorder or PTSD, compounded stress), and lasting impacts (Aggression and violence, solastalgia, and ecoanxiety) (Clayton et al., 2017). The community would suffer of more terrifying impacts.

Take an example from Inuit people who mostly inhabit Greenland and Canada. They are at the frontline suffering from global warming and climate change. The people are threatened because they still preserve old traditions such as hunting, fishing, and harvesting. All of their needs depend on nature, including the dwelling.

The rising number of weather-related disasters which destroy homes has forced people to seek shelter elsewhere, as portrayed in the novel:

Yet if any population knows what it is like to live with the unpredictability of ice it is surely the Inuit, who have been adapting to its shifts for millennia. (304)

As a nomadic tribe, the Inuit build their house called Igloo for a temporary winter house. Ice is the main material to build this kind of house; it can be a great conductor to keep the house warmer. Melting of ice in the North Pole is considered a threat to Inuit. The main character in the novel exposes the unpredictability of ice as the effect of climate change. This phenomenon shifts the Inuit's life to adapt to this kind of situation. An Igloo is a symbol of Inuit people, a part of their culture. Thus, the climate change problems have threatened Inuit's culture instead of "merely" losing their house.

According to research from Cunsolo (2017), the impact of climate change in community mental health are: the increasing number of drug and alcohol usage, losing self-affiacy and self-regulation, and expanded the stress effect in the community. Climate change impacts on mental health need serious countermeasures from the stakeholders.

The relationship between Inuit and Igloo cannot be separated. Traditional housing in every tribe symbolizes the nature of social interactions. If this symbol is lost, it may contribute to the alienation and disruption of community life (Furgal & Seguin, 2006). Climate change suffered by Inuit is categorized as a violation of the rights of housing. United Nations of High Commissioner for Human Rights (UNHCHR), The right to Adequate Housing, general comment 4 (1991) and No.7 (1997) stated that, "*Housing must comprise more than shelters; it must extend to a place to live in dignity, security, and privacy.*" Climate change has indeed threatens three aspects: the availability of services, materials, and facilities,

location, and cultural adequacy (Hohman, 2009). The problems faced by Inuit have more complex impact than merely of housing. Humans, therefore, should soon stop climate change; otherwise, it will ruin the human life.

Reducing climate change is not only about the environment but also the people. In reality, people suffer from climate change, but they are not ready to endure the consequences. The disruption in the livelihood can give birth to long-term stress if there is no treatment. Many people do not become aware that they have a mental health problem because sometimes the symptom seems invisible. Mental health issues must be solved by professionals or psychiatry.

The phenomena of climate change sometimes can be an income for some opportunists – rather than capitalists. This case is hugely contradictory to previous cases, foreign investors have gathered as the ice has retreated, and access to Greenland's fabulous mineral wealth has become easier as written in the novel:

The melt is seen by some as an opportunity rather than a loss. Foreign investors have gathered as the ice has retreated, and access to Greenland's fabulous mineral wealth has become easier. 'There'll be a lot of billionaires made by what the melt reveals,' a geologist told me before I came to Greenland. 'Mining's coming to Greenland soon, and big style – in a country that's never before had anything deeper than a quarry.' (305)

From the potential mining industry in Greenland ice loss, sand and gravel become the most profitable resources. Mining of sand and gravel, widely used in the construction industry, could boost the economy for Greenland's 56,000 population. Worldwide demand for sand totaled about 9.55 billion tonnes in 2017 with a market value of \$99.5 billion and is projected to reach almost \$481 billion in 2100, driven by rising demand and likely shortages (Doyle, 2019). In other word, Greenland could the advantage of the climate change phenomenon.

The researcher assumes this case on the other side of climate change, seeing Greenland's ice containing mineral wealth which can be converted into money. The image of climate change as a destructive catastrophe is not found in this case. A mining industry is profitable for commercial purposes. However, environmentally, the mining industry has several risks for the environment unless the factory has good mining waste management. Thus, climate change is not always considered a threat to the existence of humans.

The threat about earth-related problem and the existence of human in *Underland* is about gas-leaking from the melting of permafrost that spread anthrax spores:

In the Arctic, ancient methane deposits are leaking through 'windows' in the Earth opened by melting permafrost. Anthrax spores are being released from reindeer corpses buried in once-frozen soil, now exposed by erosion and warmth. (14)

A huge mysterious explosion was exploded in the Yamal Peninsula in 2016. The flames shooting up with pillars of smoke and found a large crater left in the ground. Melting permafrost considered as the main suspect, thawing out dead vegetation and erupting in a blowout of highly flammable methane gas. Then, in the summer, a heat wave hit and a thicker layer of permafrost melted, and the reindeer's carcass rose to the surface. As it warmed up, the anthrax spread around the Yamal Peninsula.

This part shows the readers of one of the effects of climate change, i.e. the melting of permafrost, symbolized by the opened windows. Permafrost itself has a temperature below 0 degrees Celsius. The places are below the Earth's surface, which can contain soil, gravel, sand, and organic carbon. Scientists believe that

permafrost provides rich information about climate change effects. Due to the melting of the ice, it raises the sea surface and makes erosion. This phenomenon occurs when permafrost is melted because the soil and sediments are easily washed away without ice that binds soil aggregates. The erosion makes organic carbon releases threaten humans with dangerous impacts.

Climate change shows humans everything about what they do not want to see. Permafrost is a suitable place for bacteria to stay alive for very long periods, maybe for one million years. It means the melting of the ice has the potential to open Pandora's disease box. The anthrax spores have returned from the burial. The origin of this virus begun in the early 20th century, when the virus outbreak infected and killed 1,5 million of arctic deer in Russia. The corpses were buried in permafrost. Due to climate change, the corpses release anthrax spores. Although the virus is from the animals, humans are also potentially infected.

A case of the anthrax virus from buried reindeer corpses released from melting permafrost and infected the people living around was reported in Yamal peninsula, as mentioned in the novel:

On the Yamal peninsula, between the Kara Sea and the Gulf of Ob, 4,500 square miles of permafrost thawed. Cemeteries and animal burial grounds turned to slush. Reindeer corpses that had died of anthrax seventy years earlier were exposed to the air. Twenty- three people were infected, their skin blackened with lesions. One, a child, died. Russian veterinarians travelled the region dressed in white anti-contamination suits, vaccinating reindeer and their herders. Russian troops burned infected corpses in high-temperature pyres. Russian epidemiologists predicted other releases from Arctic burial sites and shallow graves: smallpox from victims who had perished in the late 1800s, giant viruses that had been long-dormant in the frozen bodies of mammoths. (297)

A heat wave has thawed the frozen soil in the Yamal Peninsula and the outbreak from a reindeer carcass infected with anthrax decades ago, followed an

intense heatwave in Siberia, temperatures reaching over 30C that melted the frozen permafrost. As a result, twenty three people were infected. Russian officials working hard to get the outbreak under control. They were vaccinating reindeer and burning the carcasses of dead animals. Meanwhile the incoming smallpox also predicted to released from underland that threaten the people who are living around there.

The virus outbreak in Yamal peninsula indicates thawing permafrost impacts not only nature but also the human. Climate changes show lethal damage to humans. If the human do nothing in responding to the climate change phenomena, the number of the victims is predicted to escalate quickly. The melting permafrost might highly contribute to accelerating climate change.

The methane gas, as explained previously, is one of the causes of greenhouse that results in holes of the atmosphere. As explained in the novel:

In the Anthropocene we cannot easily keep nature at a distance, holding it at arm's length for adoration or inspection. Nature is no longer only a remote peak shining in the sun, or a raptor hunting over birch woods – it is also tidelines thickened with drift plastic, or methane clathrates decomposing over millions of square miles of warming permafrost. (292)

The methane was from dead plants. Due to the cold temperature, the plants are not fully decomposed, leaving the organic carbon that contains carbon dioxide and methane. When the permafrost starts to melt, it will release to the atmosphere, creating nature pollution (Resnick, 2019). Scientists estimate the melting permafrost releases around 120 gigatons of carbon in the atmosphere by the year 2100. This phenomenon raises the earth temperature 0.29 degree Celsius.

Meanwhile, every 1.5 million squares of thawing permafrost contribute to additional warming of 1 degree Celsius (Schaefer et al., 2014).

Besides influencing the Earth's temperature, melting permafrost also contributes to the formation of a new landscape of nature as described below:

In the forests of Eastern Siberia a crater is yawning in the softening ground, swallowing tens of thousands of trees and revealing 200,000-year-old strata: local Yakutian people refer to it as a 'doorway to the underworld.' (14)

The doorway to the underworld is the evidence of the existence of climate change. It causes large-scale changes of ecological aspects and local topography. Local people gave a name to this place the Batagika crater. This crater uncovered the place that was previously covered with ice. Scientists assume that the Batagika crater records 200.000 years of Earth's climate in sediment. Measuring the sediment in the crater is the same as looking for historical data of earth temperature in the past. The result was not surprising; the global interglacial temperature is several degrees warmer than today (Nace, 2017).

However, the loss of ice does not always release risks from the past, but it may facilitate humans to reveal past human civilization. The novel has several examples of this phenomenon; The Roman Empire history as represented by the the discovery of the bodies of those engulfed by their ice decades before in Alpine and Himalayan, World War I is shown by three Hapsburg soldiers discovery near the peak of San Matteo, and the Camp Century which keep the dangerous chemicals for war preparation in Cold War against Russia, the novel gives clear details of these historical relics discovery:

Retreating Alpine and Himalayan glaciers are yielding the bodies of those engulfed by their ice decades before. Across Britain, recent heatwaves have caused the imprints of ancient structures – Roman watchtowers, Neolithic

enclosures – to shimmer into view as crop-marks visible from above: aridity as X-ray, the land's submerged past rising up in parched visitation. (14)

Three Hapsburg soldiers melted out of an ice wall, hanging upside down near the peak of San Matteo at an altitude of 12,000 feet. The problem is not that things become buried deep in strata – but that they endure (214)

In north-west Greenland, a buried Cold War US military base and the toxic waste it contained began to rise.... It is all interred there still: some 200,000 litres of diesel fuel and unknown amounts of radioactive coolant and other pollutants, including PCBs. But as global temperatures have risen, so snowmelt is forecast to exceed snow accumulation in the region of Camp Century. In a dynamic I have seen so often in the underland that it has become a master trope, troublesome history thought long since entombed is emerging again. (298)

Britain's long hot summer helps the archeologist to discover the relics of Neolithic monuments and Roman settlements in crop marks across the country.. Dry ground heightens changes in the colour or height of crops, revealing the presence of ancient ditches, walls or post holes.the oldest landscape marks in the country, dating back to between 3600BC and 3000BC. Meanwhile, the peak of San Matteo within the Austro-Hungarian empire witness the undiscovered dramatic episode of WWI which is the White War. Decades after that era, the world warmed up and the glaciers started to melt and reapper what lies underland. There were also corpses of three WWI Hapsburg soldiers, frequently in mummified state, as one of the WWI relics. Move across Greenland, In 1959, the U.S. Army Corps of Engineers built the subterranean city for research and military purposes. However, the military ultimately rejected the project, and the corps abandoned Camp Century in 1967. Melting could begin to release waste stored at the camp, including sewage, diesel fuel, persistent organic pollutants like PCBs, and radiological waste from the camp's nuclear generator

Although climate change will ruin human civilization, this phenomenon also records the activities from the previous generation. Talking about history, this branch of knowledge cannot be separated from human civilization. Learning history makes people know about the past events. They can take good values or avoid past mistakes. From the novel, climate change reveals the evidence of historical relics from the Roman Empire, World War I, and Cold War.

One of the factors of the fall of the Roman Empire is climate change. However, the changing of climate at that time was caused by a natural factor, not an unnatural factor like today. The sequences of volcano eruptions in 530-540s AD triggered “Late Antique Little Ice Age,” the era when the Earth has colder temperatures for 150 years. This era is considered the major factor of crop failure in many regions of Roman’s jurisdiction. Therefore, economics activities collapsed. The global cooling in other aspects is linked to catastrophe or even the pandemic of bubonic plague, known as the plague of Justinian. This plague had reached a peak of killed 10.000 people per day in Constantinople (Light, 2011).

Meanwhile, the finding of Three Hapsburg soldiers after 100 years buried in the ice has two messages about the power of nature and the weakening of nature. The power of nature in this context is marked by the death of the soldiers against nature. More than two-thirds of Austrian Hapsburg soldiers died because of avalanches, illness, and frostbite in Punta San Matteo Mountain. Whereas, the melting of ice portrays the weakening of nature due to global warming.

In another place, located just 800 miles from the North Pole, an abandoned US cold war military camp has raised since the melting escalation of Greenland’s

ice beyond the historical average. During the cold war, the Camp Century was built to compete with the Soviet Union in military power aspect. In contrast with two previous examples, this place has more potential damage to the environment rather than historical values. The radioactive waste and PCB emerge from Greenland's melting ice. Although the attempts to remove the waste require expensive costs, this work is considered the best solution before the wastes damage the environment. Greenland, right now, is suffering from the actual impacts of global warming.

C. The Main Character's Responses on Climate Change

Climate change becomes one of the major issues in Robert Macfarlane's *Underland: A Deep Time Journey*. This novel provides actual events from several places that emphasize ecological perspectives from the main character. The novel uses self-insertion; the character represents the real author of the novel. The researcher believes the main character is affected psychologically by climate change in the psychological aspect. The influence of the Anthropocene era creates a new term called "*psychoterratic*."

The responses of the main character in this section is divided into two: ecoanxiety and solastalgia.

1. The Main Character's Solastalgia

At first, solastalgia has been applied to criticize the impact of natural disasters on refugees and survivors. However, recently, the scope of solastalgia

has developed to human-made disasters like mining land degradation, pollution, and climate change. This psychological phenomenon is recognized by the feeling of loss from the migrated people from their home environment.

In the novel, the main character migrates into many places around Europe in order to explore the *Underland*. This issue is alluded in the novel:

No word existed to describe the unhappiness of people whose landscapes were being transformed about them by forces beyond their control. He proposed his new term to describe this distinctive kind of homesickness. Where the pain of nostalgia arises from moving away, the pain of solastalgia arises from staying put. Where the pain of nostalgia can be mitigated by return, the pain of solastalgia tends to be irreversible. (288-289)

The author discusses solastalgia symptom from the Bjornar character of his feeling on the environmental condition of Andoya Island that is polluted by the oil industry. He misses out on the solace condition before the pollution wide-spreads around the island. In other words, his home becomes unfriendly around its inhabitants. Meanwhile, the main character also deals with this issue. He misses the nature landscape and tries to find another solace place to cope his distress of climate change.

A nature explorer hobby is fulfilled by moving to one place to other places as a form of his/her admiration for the beautiful landscape of nature or for research purposes. As nature explorer, the main character requires to leave his hometown for a long period of time, exploring his country and Europe to experience adventure in the “Underlands” and the historical story of a place. Although exploring many places, the main character never forgets about his origin. The homesickness of the main character is explained in the novel:

From the glade it is up again, the path switch-backing past a hut in a clearing, the trees diminishing in size as height is gained purple scabious remind me of the chalklands of home. (213)

The text above indicates homesickness of the main character by saying, “*remind me of the chalklands of home.*” The purple scabious flower becomes an object that reminds him of home. This part of the novel narration is located in Slovenian highland; meanwhile, the main character’s home does not explicitly show by the author. Although it seems like nothing happens in chalkland, this place suffers from drought because of industrial activities. 65% of groundwater from chalk streams are pumped out for drinking water supplies (Ferguson, 2019). This case lies under the category of solastalgia.

Solastalgia reminds the homeland of every place that has a similarity with the origin landscape. The main character experiences solastalgia because of his feeling of missing home. Climate change leads to human life in an uncomfortable condition. The damages of the environment, conflicts, and disasters often appear when climate change happens. These are significant components triggering stress conditions for individuals. Relating to stress and climate change, solastalgia is considered as a response to changes.

In responding to the climate change, he attempts to find another solace place for living, as mentioned in the novel:

The darkness of these beautiful landscapes has leached a little into me, shadowing the edges of sight and spirit. I want to be with them, to make them safe. (217)

The tendency of the main character in seeking the missing solace condition is shown in the sentence, “*I want to be with them, to make them safe.*” Many

people build a strong bond in a place where they live, keep it to give a sense of solace, secure, and create personal identity. When the place is lost, people try to find other areas to maintain the solace condition. The main character's bonds to the origin place loses up because of climate change. Therefore, Rob expresses his feeling in responding to this phenomenon when he finds such a kind of perfect place to live. When nature is no longer synchronize with the solace condition of human living, people tend to move or find a more pleasant place. The main character finds the duplication of his home condition, as the response of the environmental crisis in a place he called home. Thus, the main character experiences solastalgia. Finding a new solace condition is an effort of the main character to cope the distress of climate change.

2. The Main Character's Ecoanxiety

Climate change has an impact on individual's mental health. Whether he/she suffers directly and indirectly, the stressors experience depression and anxiety. This mental health condition is called eco-anxiety. Different from solastalgia, ecoanxiety in this novel is not explicitly described by the author. However, the researcher found two shreds of evidence indicating ecoanxiety symptoms of the main character from different events and reasons.

Ecoanxiety can influence the individual's contentment by the escalation of hopelessness and paralysis (Pihkala, 2018). The worrying of the main character towards the existence of nature in climate change leads to hopelessness and stress.

In this case, he is over justified by an impossible thing like a glacier becoming a warmer place, as mentioned in the novel:

As we walk, Lucian explains the glacier's existence to me, but I can hardly believe what he is saying to be true. A flowing river of ice at this height, in this heat? There is no lying snow for many miles around. (200)

The main character's anxiety is portrayed by his question about the glacier's existence. Although Lucian, the local man who guides him on the exploration of Julian Alps, knows well the location, giving Rob information about glacier, Rob could not believe it and he still questions the truth to himself. His assumption is not mistaken; in fact, the glacier is identical to the ice-filled region. However, it does not rule out the possibility of its existence on warmer temperature land. This case happens due to his unconscious mind about climate change effect, especially the melting glaciers due warmer global temperatures that changes nature drastically.

The worrying of the main character in natural degradation is one of the ecoanxiety symptoms. His devotion to the sustainability of nature leads him to over-worrying behavior. Climate change also shifts the perception of the individual to nature. From the main character's ecoanxiety symptom, the researcher can draw a conclusion that everybody should accept the changes of nature and takes action to keep the sustainability for the future generation.

The emerging climate change stress cannot be ignored. If a sufferer neglects this problem, other serious health might threat. Relieving stress is very important to avoid negative emotions. The adaptive coping strategy, e.g., seeking

social support, is likely an effective way, as the main character shows in the novel:

For more than fifteen years now I have been writing about the relationships between landscape and the human heart. (17)

The main character's response on climate change, in this case, is notable in the relationship between nature and humans. Writing about "human and nature" is kind of retreat from climate change stress by taking action to gain social support. Relieving stress instead of dealing with own well-being, he also concerns to others' well-being. The "others" could be the readers of his writing or the future generations. The assessment of environmental damage as the consequences of climate change threat and its impact can influence some of action to control, resolve, or adjust the changes (Higginbotham et al, 2007). Meanwhile, different social status also influences how individual deals the climate change impacts on mental health.

The responses of the main character represent the wealthy communities. He has privilege to support and have safer environment. On the other hand, poor society is likely to be more destructive as they prioritize primary resources such as housing and economics as shown by Inuit people. The response of the main character describes an environmental awareness underlying the fear of climate change effect. Thus, the ecoanxiety attitude of the main character is caused by accumulation from the threat of climate change described in the novel. He is overwhelmed to deal with this phenomenon and worried about the future generation and the nature sustainability. To cover his anxiety, the main character attempts to be closer with nature by writing about nature.

CHAPTER IV

CONCLUSION AND SUGGESTION

A. Conclusion

Based on the research questions, the researcher concludes Robert Macfarlane's *Underland: A Deep Time Journey* portrays the major climate change problems using five scopes of ecocriticism (Garrard, 2004) that consist of pollution, wilderness, animals, apocalypse, and earth. From the pollution scopes, it is proven by recent pollution in the ocean like plastic waste and oil spill in Mexico Gulf, and may take the form of nuclear weapon test; each contributes to the raising of earth temperature. Furthermore, in wilderness, the effect of burning forest towards unpredictable season in Anthropocene era is undeniable, together with the tree mental health. Also, climate change endangers human-animal relation. The loss of habitats for some species increases their stress level and, in turn, affects the stability of food chain pattern. Last, climate change affects the Earth in terms of the melting permafrost and its impact to environment and human beings;

The second research question, the researcher investigates the response of the main character in climate change problems using psychoterratic theory (Albrecht, 2011) that consist of solastalgia and ecoanxiety. Solastalgia of the main character is obvious when he shows his feeling of missing the home environment. However, Rob soon tries to find another solace condition to deal with this kind of climate change distress. Meanwhile, the ecoanxiety is noticeable in his worrying the existence of nature in climate change and future generations.

B. Suggestion

This research focuses on climate change problems using five scopes of ecocriticism and psychoterratic theory (solastalgia and ecoanxiety) as the responses of the main character. Robert Macfarlane's non-fiction novel *Underland: A Deep Time Journey* has many other interesting issues to discuss by using other theories or perspectives. Future researchers, therefore, can conduct the similar environmental-based researches with other relevant theories.

Another suggestion is addressed to the readers of Robert Macfarlane's *Underland: A Deep Time Journey*. By reading the novel, people should increase their environmental awareness and do something beneficial to keep the nature preservation for the next generations.

Finally, policy makers can supervise the industrial activities more strictly and give effective punishment for the violator factories toward environment policies. Thus, in anthropocene era, the synergy between industries, policy makers, and society is absolutely needed to reduce the negative impacts of climate change that widespreading so fast on global level.

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CURRICULUM VITAE



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