Hacettepe University Graduate School of Social Sciences

Department of English Language and Literature

British Cultural Studies

THE BRITISH CLIMATE CHANGE FICTION IN THE AGE OF THE ANTHROPOCENE: ECOCRITICAL READINGS OF J.G. BALLARD'S *THE DROWNED WORLD*, MAGGIE GEE'S *THE ICE PEOPLE* AND IAN McEWAN'S *SOLAR*

Fatma AYKANAT

Ph.D. Dissertation

Ankara, 2018

THE BRITISH CLIMATE CHANGE FICTION IN THE AGE OF THE ANTHROPOCENE: ECOCRITICAL READINGS OF J.G. BALLARD'S *THE DROWNED WORLD*, MAGGIE GEE'S *THE ICE PEOPLE* AND IAN McEWAN'S *SOLAR*

Fatma AYKANAT

Hacettepe University Graduate School Of Social Sciences

Department of English Language and Literature

British Cultural Studies

Ph.D. Dissertation

Ankara, 2018

KABUL VE ONAY

Fatma Aykanat tarafından hazırlanan "The British Climate Change Fiction in the Age of the Anthropocene: Ecocritical Readings of J.G. Ballard's *The Drowned World*, Maggie Gee's *The Ice People* and Ian McEwan's *Solar*" başlıklı bu çalışma, 07 Haziran 2018 tarihinde yapılan savunma sınavı sonucunda başarılı bulunarak jürimiz tarafından Doktora Tezi olarak kabul edilmiştir.

Prof. Dr. Burçin Erol (Başkan)

Prof. Dr. Serpil Oppermann (Danışman)

Prof. Dr. Aytül Özüm

Doç Dr. Nurten Birlik

Dr. Öğrt. Üyesi Sinan Akıllı

Yukarıdaki imzaların adı geçen öğretim üyelerine ait olduğunu onaylarım.

Prof. Dr. Musa Yaşar Sağlam

Enstitü Müdürü

BİLDİRİM

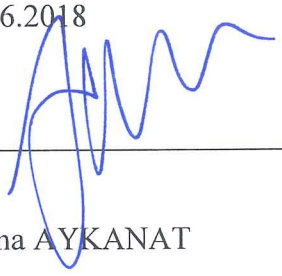
Hazırladığım tezin/raporun tamamen kendi çalışmam olduğunu ve her alıntıya kaynak gösterdiğimi taahhüt eder, tezimin/raporumun kağıt ve elektronik kopyalarının Hacettepe Üniversitesi Sosyal Bilimler Enstitüsü arşivlerinde aşağıda belirttiğim koşullarda saklanmasına izin verdiğimi onaylarım:

☐ Tezimin/Raporumun tamamı her yerden erişime açılabilir.

☐ Tezim/Raporum sadece Hacettepe Üniversitesi yerleşkelerinden erişime açılabilir.

☒ Tezimin/Raporumun 3 yıl süreyle erişime açılmasını istemiyorum. Bu sürenin sonunda uzatma için başvuruda bulunmadığım takdirde, tezimin/raporumun tamamı her yerden erişime açılabilir.

07.06.2018



Fatma AYKANAT

YAYIMLAMA VE FİKRİ MÜLKİYET HAKLARI BEYANI

Enstitü tarafından onaylanan lisansüstü tezimin/raporumun tamamını veya herhangi bir kısmını, basılı (kâğıt) ve elektronik formatta arşivleme ve aşağıda verilen koşullarla kullanıma açma iznini Hacettepe Üniversitesine verdiğimi bildiririm. Bu izinle Üniversiteye verilen kullanım hakları dışındaki tüm fikri mülkiyet haklarım bende kalacak, tezimin tamamının ya da bir bölümünün gelecekteki çalışmalarda (makale, kitap, lisans ve patent vb.) kullanım hakları bana ait olacaktır.

Tezin kendi orijinal çalışmam olduğunu, başkalarının haklarını ihlal etmediğimi ve tezimin tek yetkili sahibi olduğumu beyan ve taahhüt ederim. Tezimde yer alan telif hakkı bulunan ve sahiplerinden yazılı izin alınarak kullanılması zorunlu metinlerin yazılı izin alınarak kullandığımı ve istenildiğinde suretlerini Üniversiteye teslim etmeyi taahhüt ederim.

o**Tezimin/Raporumun tamamı dünya çapında erişime açılabilir ve bir kısmı veya tamamının fotokopisi alınabilir.**
(Bu seçenekle teziniz arama motorlarında indekslenebilecek, daha sonra tezinizin erişim statüsünün değiştirilmesini talep etseniz ve kütüphane bu talebinizi yerine getirse bile, teziniz arama motorlarının önbelleklerinde kalmaya devam edebilecektir)

x **Tezimin/Raporumun 07 Haziran 2021 tarihine kadar erişime açılmasını ve fotokopi alınmasını (İç Kapak, Özet, İçindekiler ve Kaynakça hariç) istemiyorum.**
(Bu sürenin sonunda uzatma için başvuruda bulunmadığım takdirde, tezimin/raporumun tamamı her yerden erişime açılabilir, kaynak gösterilmek şartıyla bir kısmı veya tamamının fotokopisi alınabilir)

o**Tezimin/Raporumun.....tarihine kadar erişime açılmasını istemiyorum ancak kaynak gösterilmek şartıyla bir kısmı veya tamamının fotokopisinin alınmasını onaylıyorum.**

o **Serbest Seçenek/Yazarın Seçimi**

07/06/2018

Fatma AYKANAT

ETİK BEYAN

Bu çalışmadaki bütün bilgi ve belgeleri akademik kurallar çerçevesinde elde ettiğimi, görsel, işitsel ve yazılı tüm bilgi ve sonuçları bilimsel ahlak kurallarına uygun olarak sunduğumu, kullandığım verilerde herhangi bir tahrifat yapmadığımı, yararlandığım kaynaklara bilimsel normlara uygun olarak atıfta bulunduğumu, tezimin kaynak gösterilen durumlar dışında özgün olduğunu, Prof. Dr. Serpil OPPERMANN danışmanlığında tarafımdan üretildiğini ve Hacettepe Üniversitesi Sosyal Bilimler Enstitüsü Tez Yazım Yönergesine göre yazıldığını beyan ederim.

Fatma AYKANAT

To the Earth, and all its human and nonhuman inhabitants...

ACKNOWLEDGEMENTS

Completing this dissertation was a long and exhausting journey for me. Without the light of my wise and insightful advisor Prof. Dr. Serpil Oppermann I would never have seen the end of the tunnel. I would like to thank her wholeheartedly for being my light, my inspiration, and my mentor all the way through this journey. She introduced me to the unexplored corners of ecocriticism, helped me realise my potentials, encouraged me to push my limits and explore new horizons. I will be indebted to her forever for her invaluable guidance. I would also like to thank the members of the committee, Prof. Dr. Burçin Erol, Prof. Dr. Aytül Özüm, Assoc. Prof. Dr. Nurten Birlik, and Assist. Prof. Dr. Sinan Akıllı for their invaluable comments and suggestions, as well as their open-mindedness about new ideas, and their encouraging approach to my humble explorations in the untrodden fields of literature.

I also feel indebted to my teachers, colleagues and friends at Hacettepe University, Department of English Language and Literature, and my fellow co-workers at Zonguldak Bulent Ecevit University, Department of English Language and Literature, especially to the Head of the Department and my friend Assist. Prof. Dr. Özlem Aydın Öztürk and my office mate Res. Assist. Muammer Özoltulular. I am particularly grateful to my dear friends Dr. Zümre Gizem Yılmaz, Dr. Başak Ağın, Dr. Kerim Can Yazgünoğlu, and Şafak Horzum for their support during my long academic journey at Hacettepe University. I have always felt lucky to be surrounded by such loving and supportive friends, who are also brilliant young academicians, and enjoyed the luxury of the thought-provoking, as well as entertaining, academic network provided by them. They have provided me with the necessary motivation, energy, support, and encouragement, especially at times when I felt the most vulnerable and exhausted.

Finally, I owe special thanks to my dear family - my mother, my father and my brothers, who stood beside me all the way through this journey. I can never find the correct words to adequately express my gratitude to each one of them for loving me unconditionally, supporting me tirelessly, and showing me how proud they are of me in every occasion. Without all these invaluable and irreplaceable people in my life, I would not have been successful, and without sharing with them, no achievement would have tasted so well.

ÖZET

Aykanat, Fatma. *Antroposen Çağı'nda İngiliz İklim Kurgu Romanı: J.G. Ballard'ın* The Drowned World*, Maggie Gee'nin* The Ice People *ve Ian McEwan'ın* Solar *Romanlarının Ekoeleştirel Okumaları,* Doktora Tezi, Ankara, 2018.

Jeolojik bir kavram olarak, Antroposen, ağır sanayileşme, aşırı nüfus artışı, doğal kaynakların sömürülmesi ve çevre kirliliği gibi çeşitli insan eylemlerinin küresel ölçekte çevresel değişimlere sebep olduğu, Yerküre'nin jeolojik zaman çizelgesindeki en son "devre"ye işaret eder. Bir araya geldiklerinde, tüm bu eylemler, gezegenimizde yaşamın sürdürülebilirliğini ve Yerküre'de ikamet etmekte olan sadece insan türünün değil, diğer tüm canlıların da hayatta kalabilmesi için ciddi bir tehdit oluşturan ekolojik felaketlere sebep olurlar. Dolayısıyla, Antroposen çağında insan yaşadığı gezegenin ekosistemlerini değiştirebilme kapasitesine sahip jeolojik bir güç olarak görülür. İnsan kaynaklı pek çok çevresel değişim arasında muhtemelen en tehlikeli olanı iklim değişimidir. Antroposen'in önde gelen belirtilerinden biri olan iklim değişimi krizi, edebi metinlerde, çevresel yıkım ve gezegenimizde yaşamın sürdürülebilirliği, türlerin yok oluşu gibi geleceğe dair ekolojik endişelerin ön planda olduğu, çeşitli yansımalara sahiptir. Bu bağlamda, bu çevresel endişeleri edebiyata yansıtmayı amaçlayan iklim kurgu (ya da kısaca Cli-Fi), Antroposen çağında doğan yeni bir edebi tür olarak ortaya çıkar. Bu doktora tez çalışması, seçilen İngiliz iklim kurgu romanları yoluyla, (J.G. Ballard'ın *The Drowned World* (1962), Maggie Gee'nin *The Ice People* (1998) ve Ian McEwan'ın *Solar* (2010) romanları) Antroposen'de görülen insan kaynaklı iklim değişimleri ve sonuçlarını araştırırken, Yerküre'nin yeni bir jeolojik çağa girişini tartışmaya açar. Bu bağlamda, bu çalışmanın amacı, Antroposen'i, edebi, psikolojik, sosyo-kültürel ve ekonomik alanlara da sızan, çok katmanlı bir kavram olarak sunmak ve insan-doğa birlikteliğini, aynı zamanda da yeryüzü bilimleri ile çevreci beşeri bilimlerin ortaklığını, seçilen romanların ekoeleştirel okumaları yoluyla vurgulamaktır.

Anahtar Sözcükler

Antroposen, Cli-Fi, iklim kurgu, insan kaynaklı iklim değişimi, eko-psikoloji, ekoeleştiri, *The Drowned World* (J.G. Ballard), *The Ice People* (Maggie Gee), *Solar* (Ian McEwan)

ABSTRACT

Aykanat, Fatma. *The British Climate Change Fiction in the Age of the Anthropocene: Ecocritical Readings of J.G. Ballard's* The Drowned World*, Maggie Gee's* The Ice People *and Ian McEwan's* Solar*,* Ph.D. Dissertation, Ankara, 2018.

The Anthropocene, as a geological concept, refers to the most recent "epoch" in the Earth's geological time in which various human activities, such as heavy industrialisation, overpopulation, abuse of natural resources, and environmental pollution, cause global-scale environmental changes. Cumulatively, they cause ecological disasters, which pose serious threats to the planet's sustainability and the survival of not only humans but also all living beings inhabiting the Earth. So, in the Anthropocene humans are considered as a geological force capable of changing planetary ecosystems. Among various human-induced environmental transformations, climate change is probably the most dangerous one. Being one of the most prominent symptoms of the Anthropocene, climate change crisis has various thematic reflections in literary texts that foreground environmental degradation and ecological concerns about the future, such as the sustainability of the planet at a time of global warming, and species extinction. In this context, Climate Change Fiction (or, Cli-Fi), which aims to reflect these environmental concerns into literature, emerges as a new literary genre born in the age of the Anthropocene. This dissertation discusses the Earth's entrance into a new geological epoch, the Anthropocene, exploring the anthropogenic climatic changes in the Anthropocene and their outcomes through selected examples of British Cli-Fi novels: J.G. Ballard's *The Drowned World* (1962), Maggie Gee's *The Ice People* (1998), and Ian McEwan's *Solar* (2010). In this regard, the aim of this dissertation is to propose the Anthropocene as a multi-layered concept extending its geological origins to literary studies and social sciences and leaking into psychological, socio-cultural, and economic spheres, and to emphasise the entanglement of humans and nature, as well as the cooperation of the Earth sciences and the environmental humanities, through ecocritical readings of selected British climate change novels.

Key Words

Anthropocene, Cli-Fi, climate change fiction, anthropogenic climate change, ecopsychology, ecocriticism, *The Drowned World* (J.G. Ballard), *The Ice People* (Maggie Gee), *Solar* (Ian McEwan)

TABLE OF CONTENTS

INTRODUCTION

"The Anthropocene" is a geological term which was first introduced by the Earth scientists as a replacement for the name given to the recent interglacial period, "the Holocene." In the scientific context, the Anthropocene describes the global anthropogenic environmental changes due to the global scale human activities on the planet's life support systems. The global scale environmental changes can also be triggered by natural causes like volcanic eruptions, regular explosions on the surface of the Sun, extinction of certain biological species due to inter-species challenges and/or natural disasters, or by a possible meteor strike, changing the present curvature of the Earth, hence radically changing the current climatic conditions. However, in accordance with the aim of opening to discussion the role of the humans in global scale environmental and climatic changes on Earth, as the term the Anthropocene suggests, this dissertation focuses particularly on human-induced environmental changes.

Besides its scientific debates, the term Anthropocene has also attracted attention in political, social, economic, philosophical, and literary circles. The aim of this dissertation is to analyse how the Anthropocene contributes to the dialogue between the Earth sciences, social sciences, and the environmental humanities, and particularly as a theoretical concept, how it is also relevant in the literary field and finds expression in literary texts. In this regard, the dissertation explores the Anthropocene through three examples of the newly-emergent literary genre called climate change fiction (or climate fiction), or, as it is popularly known, Cli-Fi. The role of climate change fiction here is important in displaying how environmental crises in the Anthropocene are also social and cultural. Since both "the Anthropocene," proposed for the first time in 2000, and "Cli-Fi," born in 2007, are contemporary concepts, this study focuses only on contemporary British novels written in the late twentieth and early twenty-first centuries to discuss these two concepts. Within this framework, J.G. Ballard's *The Drowned World* (1962), Maggie Gee's *The Ice People* (1998), and Ian McEwan's *Solar* (2010) are discussed in terms of the ways in which they represent the different aspects of the Anthropocene. Each novel presents different climatic portrayals of the Earth, as freezing, frozen, warmed, and scorched by heat waves. These exemplary Cli-Fi novels

depict how the lives of all living beings change in parallel with changes in climate. Highlighting the ecological, social, psychological, cultural, and economic effects of the anthropogenic climatic changes, these novels enable us to view the Anthropocene in its various manifestations. Hence, focusing on these various ways in which climate crisis is treated by each author, this dissertation explores how climate change infiltrates into human relationships on psychological, social, and economical levels. The theories of the Anthropocene provide the general ecocritical framework in the analyses of the novels. To explain the contextual and theoretical basis of the Anthropocene concept (and also the relevant geological terms), the first part of this Introduction examines the origins and content of the concept, followed by the second part which focuses on the anthropogenic environmental changes in the Anthropocene. The last part discusses the emergence and the development of Cli-Fi in relation to the Anthropocene in the literary scene.

The Anthropocene as a term was mentioned for the first time in 2000 by the American biologist Eugene Filmore Stoermer and the Dutch Nobel Prize-winning atmospheric chemist Paul Crutzen in their co-authored article "The Anthropocene," published in *The Global Change Newsletter*. In this foundational article, Stoermer and Crutzen clearly underline the outcomes of the human involvement in the planetary ecosystems:

> Considering these and many other major and still growing impacts of human activities on earth and atmosphere, and at all, including global scales, it seems to us more than appropriate to emphasize the central role of mankind in geology and ecology by proposing to use the term "Anthropocene" for the current geological epoch. (17)

In 2002, Crutzen revisited the idea of the Anthropocene in "Geology of Mankind," published in *Nature*, and elaborated on the initial proposal as follows:

> For the past three centuries, the effects of humans on the global environment have escalated. Because of these anthropogenic emissions of carbon dioxide, global climate may depart significantly from natural behaviour for many millennia to come. It seems appropriate to assign the term "Anthropocene" to the present, […] human-dominated, geological epoch, supplementing the Holocene, the warm period of the past 10-12 millennia. (23)

In both articles, the term Anthropocene is used to mark the increasing human impact on the planetary systems, especially in the atmospheric composition, and to rename the Holocene describing the Earth's geological time as the Anthropocene, in which many key processes are dominated by human activities. This neologism quickly entered the scientific circles as a pertinent expression of the degree of environmental change on Earth caused by humans, and has long been discussed as "a potential formal phase of the Earth's geological timeline" (Zalasiewicz et al, "The Anthropocene" 835).

Etymologically, the Anthropocene is derived from the Greek word "anthropos" [man] and the suffix "-cene" [recent]; hence it means "the recent age of man" (Peters 265). Conceptually, the term suggests human intervention into the natural course of the Earth's geological timeline, as well as humans emerging as a new geological force. In other words, the term Anthropocene refers to the impact of collective human activities on biological, physical and chemical processes on the Earth's land surface, atmosphere, and oceans. The Earth with its planetary ecosystems has always been under the influence of various factors that are both human and nonhuman, and thus has been under constant change. So, what makes humanity at this historical moment such a unique force? In the Anthropocene context, humans have been "modifying physical, chemical and biological systems in new ways, at faster rates, and over larger spatial scales than ever recorded on Earth" (Speth 1). As Clive Hamilton argues, because of the unpredictability of the consequences of current human activities and the immeasurability of their extensions, "modern technological humans should be seen not as a new force to be *added* to the pre-existing natural ones, but as a unique power that in some sense now *infuses* the natural ones and *interferes* for good or ill, with their operation" ("Human Destiny" 33, emphasis in the original). This definition of the Anthropocene prioritizing human species among other species is further elaborated in two frequently referenced articles, "The Climate of History: Four Theses" (2009) and "The Anthropocene and the Convergence of Histories" (2015) by the environmental historian Dipesh Chakrabarty. Chakrabarty claims that human beings are not only social beings who are dominating the planet and massively exploiting its natural resources, but also just another biological species who are affected by the consequences of the environmental imbalances they create. Chakrabarty's emphasis on the collective identity

of humans as yet another biological species repositions humans in their nonhuman environments. In this respect, Chakrabarty suggests a historical "collision" of human history and geological history of the planet, arguing that the stories of "our human lives" need to be supplemented by the stories of "our collective lives as a species" ("The Anthropocene" 49). That is to say, the Anthropocene suggests that the geological timeline of the Earth and the chronology of human histories collide in such a way that they should no longer be treated as two different concepts.

On the other hand, the Anthropocene is proposed as a hypothetical subdivision to the current geological timeline to replace the epoch we live in called the Holocene, which is said to have started 11,700 years ago when the last Ice Age came to an end when the Earth started to warm. Prior to the debates on the Anthropocene as a new epoch, the essential question should be this: Why is another geological subdivision needed? The Earth is approximately 4.5 billion years old, which covers a vast span in the geological timeline. In their articles "The Anthropocene: A New Epoch of Geological Time" and "Stratigraphy of Anthropocene," geologist Jan Zalasiewicz and his colleagues explain that to cope practically with this vast span of time, the Earth scientists subdivide it into smaller units. It is important to note that, in geological terms, these so-called smaller units might mean millions or billions of years, hence they still encompass a long period of time. The geological timeline is subdivided into "aeons," which are hierarchically subdivided into "eras," which are subdivided into "periods," which are further subdivided into "epochs" and "ages" ("Anthropocene" 837; "Stratigraphy"1037). Prior to the formalisation of the Anthropocene as a new epoch, according to the last confirmed geological timescale, the position of the Earth was hierarchically as follows: "the Cenozoic Era" (65.5 million years ago to the present), which was subdivided into "the Quarternary Period," which was subdivided into "the Holocene Epoch," denoting a warmer, interglacial period, which began approximately 12.000 years ago, around 10.000 BCE" (Zalasiewicz et al., "The Anthropocene" 837).

These names for geological eras and ages are basically the geological coordinates of our planetary history and the global-scale changes on Earth are the major determiners of such geological divisions. Especially since the end of the last ice age, the Holocene,

human activities have become the primary factors of such global scale alterations in planetary ecosystems, triggering new geological subdivisions in the geological timeline, such as the Anthropocene. Although the introduction and popularisation of the Anthropocene as a scientific term belongs to Eugene F. Stoermer and Paul Crutzen, the efforts to name the recent geological epoch after humans date almost three centuries back. From the eighteenth century onwards, a number of scientists have suggested that the contemporary age should be named as human age, or epoch. One of the earliest attempts to define the latest geological epoch as a human epoch was made in 1778. In *Buffon's Natural History*, the French geologist Georges Louis Leclerc, also known as the Count of Buffon, argued that the "human epoch" that they live in is "the seventh and the last epoch" (Lewis and Maslin 172). The nineteenth century, when human industrial activities increased, was also quite rich in references to a human era. But in terms of the usage of the word "anthropos" (human) in the naming process of a geological epoch, two important figures can be mentioned: Reverend Haughton, who described "the epoch in which we live" as "the Anthropozoic" in *Manual of Geology* in 1865, and the Italian priest and geologist Antonio Stoppani, who used the same term, "the Anthropozoic," ten years after Haughton (Zalasiewicz et al., "The Antropocene" 835). In the twentieth century, the first two scientists who described the present age as human age was the Ukrainian geochemist Vladimir Vernadsky and the French Jesuit priest and scientist Teilhard de Chardin, who coined the term "the Noösphere," which is derived from the Greek word "noö" for "mind" or "thought" to describe the current age as a combination of biosphere and human cognition (Crutzen, "Geology" 23).

Chronologically speaking, the latest scientists proposing to name the current age as the human age are Crutzen and Stoermer. Technically, before he cooperated with Paul Crutzen for their well-known article published in 2000, Eugene F. Stoermer has already been using the term "the Anthropocene" since the 1980s. In his article "Confronting the Anthropocene," Andrew Revkin, quotes Stoermer's statement: "I began using the term 'anthropocene' in the 1980s, but never formalized it until Paul [Crutzen] contacted me" (1). The term "Anthropocene" was first uttered orally by Paul Crutzen in a geology conference[1] held in 2000. In his book *The Anthropocene: The Human Era and How It Shapes Our Planet* (2014), the German journalist and environmental writer Christian

Schwagerl describes this historical moment with the sentences of the Australian climatologist Will Steffen, who is the eyewitness of this moment:

> Scientists from IGBP's paleo-environment project were reporting on their latest research, often referring to the Holocene, the most recent geological epoch of Earth history, to set the context for their work. Paul, a Vice-Chair of IGBP, was becoming visibly agitated at this usage, and after the term Holocene was mentioned again, he interrupted them. "Stop using the word Holocene. We're not in the Holocene any more. We're in the … the … the… (searching for the right word) … the Anthropocene!" (9)

Remembering that day years later, sixty-seven years old Crutzen narrates this moment:

> The Chairman mentioned the Holocene again and again as our current geological epoch. After hearing that term many times, I lost my temper, interrupted the speaker and remarked that we are no longer in the Holocene. I said that we were already in the Anthropocene. My remark had a major impact on the audience. First there was silence, then people started to discuss this. (qtd. in Schwagerl 9)

In the same year, shortly after its first mentioning at this conference, the term "Anthropocene" appeared in Crutzen and Stoermer's article, "The Anthropocene." Unlike the previous references to a human age, Stoermer and Crutzen clearly explain that the rationale behind their radical proposition is the remarkable change in the chemical structure of the atmosphere, which dates back to the late eighteenth century.

According to scientific authorities, although for three centuries the human impact on Earth have been discussed in scientific circles, the reason why the term "Anthropocene" did not gain popularity before Crutzen and Stoermer was that the usages of the references to a human age were either casual, out of context, or not supported by adequate scientific proof and satisfying explanations. However, the presence of the word "human" in every suggestion to name the new geological age proves the fact that human beings have always been an important environmental factor. Thus, many scientists agree on the role of the human as a geological force and as a powerful shaper of the environment. Yet, two issues about the Anthropocene continue to be discussed today: the starting date and the official position of the Anthropocene in the geological timeline.

Despite the available scientific data and the technological advances used to process them, the start of the Anthropocene epoch is still a controversial issue. Crutzen and Stoermer mark the 1800s, referring to James Watt's improvements on the first steam engine in 1784, as the beginning of the Anthropocene, and suggest that it is the modern technology that initiated the transformation of Earth-system behaviour and changed environmental processes: "To assign a more specific date to the onset of the Anthropocene seems somewhat arbitrary, but we propose the latter part of the eighteenth century, although we are aware that alternative proposals can be made" ("The Anthropocene" 17). Thus, Crutzen and Stoermer claim that the onset of the human ability to significantly shape the Earth's environment became notable with the Industrial Revolution. In "Geology of Mankind" Crutzen states that

> the Anthropocene could be said to have started in the latter part of the eighteenth century, when analyses of air trapped in polar ice showed the beginning of growing global concentrations of carbon dioxide and methane. This date also happens to coincide with James Watt's design of the steam engine in 1784. (23)

Lori A. Ziolkowski also explains in "The Geologic Challenge of the Anthropocene" that the invention of steam engine was ground breaking because it "allowed for ancient geologic carbon to be reintroduced into the contemporary carbon cycle through its conversion of coal to carbon dioxide" (36). By this way, it accelerated the increase in the atmospheric carbon dioxide concentrations. So, in the eighteenth century the use of coal that helped the British economy flourish, gradually triggered the fossil fuel use worldwide, and for the next hundred years, coal remained as "the world's primary fuel" (McNeill and Engelke 9). Therefore, the late eighteenth century can be marked as a crucial period in which the global energy regime changed towards highly demanded fossil fuels. As the increased coal use accelerated industrialisation, it also began to inflict damage on the atmosphere, hydrosphere and biosphere due to extensive release of carbon dioxide and methane into the atmosphere, and dumping of industrial waste in nature degrading the water and soil quality, and contaminating the environment.

Other scholars argue that anthropogenic environmental changes date further back when humans abandoned hunter-gatherer lifestyles for long-term settlements. For instance, environmental historian Dipesh Chakrabarty marks "the beginnings of agriculture, the

founding of cities, the rise of religions" ("The Climate" 208) as the turning points when our planet moved from one geological period -the last ice age [Pleistocene[2]]- to a warmer geological period called Holocene[3]" ("The Climate" 209). This radical change from nomadic cultures to settled cultures led to the foundation of towns, animal domestication, and cultivation of land, and redefined human-nature interactions. Nature and culture interaction has, therefore, a long history, and thus the idea of the mutual relationship between humanity and the environment is not a new issue. However, the Anthropocene concept is fundamentally different from the older geological approaches since it refers not to a "symbiotic relationship" (Autin and Holbrook 60) between nature and culture but to human interference into the planetary systems. Human beings interfere with earthly processes, modify planetary ecosystems, and influence all other species on Earth. Today, human beings have become the major determinants of environmental changes and the initiators of a new geological age altering the planet on a geological scale.

For other scholars, the second half of the twentieth century can also be marked as a critical period for human-induced environmental transformations. McNeill and Engelke are among those who propose a more recent date for the beginning of the Anthropocene than Crutzen and Stoermer's proposed date on the grounds that human activities in the twentieth century have become "the most important factor governing the crucial biochemical cycles; […] the carbon cycle, the sulphur cycle and the nitrogen cycle" (4). These biochemical cycles form the Earth systems, which are composed of "a set of interlocking global-scale processes" (McNeill and Engelke 4). In other words, any human intervention into the inner workings of these planetary ecosystems causes irreparable breaks in these cycles. It is the post-Second-World-War period, especially from the 1950s onwards, when the volume and frequency of human activities affecting the planetary systems dramatically increased. This critical period is called "the Great Acceleration." Some of the critical anthropogenic developments, which have accelerated in the second half of the twentieth century, are "global increase in greenhouse gasses, human population explosion, fertilizer use, land surface alterations, global transportation networks, freshwater consumptions, damming of rivers, development of genetically modified crops, [use of] new materials from plastic to

industrially produced chemical pollutants" (Braje 14). These human-induced stressors heavily suppress the planetary ecosystems. Yet, according to Jan Zalasiewicz and his colleagues, the most remarkable marker of this period is the nuclear bomb tests that continued until the 1960s, creating "the global spread of radioactive isotopes released from atomic bombings in the 1960s" ("Are We Now" 7). According to the authors, this can be accepted as "a possible stratigraphic marker" ("Are We Now" 7) of the Anthropocene. In the Cold War period, the unresolved political issues and the anxieties of the so-called super powers of the world triggered the nuclear competition among the USA, the USSR, the UK, France, and China, and motivated them to invest more in nuclear weapons industry. After the 1950s, uranium mining around the world, "especially in the United States, Canada, Australia, central and southern Africa, East Germany, Czechoslovakia, Ukraine, Russia and Kazakhstan" (McNeill and Engelke 160) increased since uranium and plutonium are required to build nuclear warheads. So, humans' engagement with nuclear energy in the 1950s and 1960s in the form of the testing of nuclear warheads in the oceanic coastlines of Australia and New Zealand, and the accidental explosions in nuclear power plants in Russia, let serious amount of nuclear waste enter the biosphere. Earth scientist Erle C. Ellis writes that with the Great Acceleration "the terrestrial biosphere" ("Anthropogenic" 1029), which was primarily shaped by natural processes, has gone under a radical structural transformation towards being "an anthropogenic biosphere" ("Anthropogenic" 1029) shaped by human activities. Thus, the human role in the environmental transformations is the basic distinctive feature of this climatically challenged period. Also, Will Steffen and his colleagues underline the fact that many of the trends established during the Great Acceleration continue today, such as "the growth in fossil fuel use in China and India, oil production by OECD countries, and the use of fertilisers (Steffen et al, "The Anthropocene" 853-854). This shows that the effects of the Great Acceleration in the 1950s extend to the end of the first decade of the twentieth century.

The second controversial issue is the position of the Anthropocene in the geological timeline. Any remarkable shift in the geological timeline of the Earth leaves traceable prints on the planet's surface. Due to the technological advances today, the carbon prints of the past human activities can easily be traced backwards and detected in rock

sediments, and in layers of glacier ice. Then, those stratigraphic archives can be used to determine geological units of time. In other words, the geo-chronological time units traditionally have parallels in rock sediments that represent the rock record formed during those geological time units. So, the boundaries between the time units are decided on fundamental changes in the Earth system, recorded in "the rock record" (Zalasiewicz et al, "The Stratigraphy" 1037). In this respect, to recognize the Anthropocene as a formal geological epoch, the geologists need to observe particular signs on rocks. Zalasiewicz and his colleagues further explain these criteria:

> Rocks are subdivided on a number of criteria, such as their physical character (lithostratigraphy), fossil content (biostratigraphy), chemical properties (chemostratigraphy), magnetic properties (magnetostratigraphy) and patterns within them related to sea-level change (sequence stratigraphy). The sum total of this evidence is used in the dating and correlation of rock successions, and in continued refinement of the geological time scale. ("The Stratigraphy" 1038)

It is, thus, clear that if the Anthropocene is to take its place as a distinctive geological epoch, there must be observable markers in the stratigraphic materials. Those global stratigraphic markers indicating major shifts in the planetary systems are formally called "Global Stratotype Section and Point (GSSP), popularly known as "golden spikes" (Lewis and Maslin 173). In other words, the GSSPs (certain stratigraphic markers) must be detected and documented in order to define the Anthropocene as a formal geological epoch, as well as to determine its starting date. The scientists supporting the Anthropocene hypothesis emphasize the connection between human activities and the appearance of those markers. For instance, the change in the composition of rocks can occur due to the alteration of rivers and coastlines by humans, and even a totally new rock strata can be created as a result of urban and transportation infrastructures, mines, wells, excavated or in-filled grounds. Similarly, geochemical composition of the Earth's surface and of the oceans can be altered due to industrialisation and nuclear activities. Even farming activities, in the long term, can lead to the widespread replacement of natural vegetation with agricultural monocultures. A similar change on water can manifest itself in marine life as well. Also, in the long term, cross-species interactions may lead to "increased rates of species extinction, species migration and invasive species" (Szerszynsky, "The End" 4), and trigger anthropogenic changes on planetary ecosystems. Referring to the human activities constantly altering the strata of the Earth,

environmental sociologist Bronislaw Szerszynsky interprets the appearance of those stratigraphic signals metaphorically as opening a new chapter in "the stone book of the Earth" ("The End" 1).

The evaluation of the GSSPs, global stratigraphic markers that point to a radical change in the geological timeline of the Earth is a serious business. The International Commission on Stratigraphy is authorised "to monitor the geological timeline of the Earth and to confirm any geological shift officially" (Vanderheiden 5-6). In 2008, a proposal was presented to the Stratigraphy Commission of the Geological Society of London insisting that the Anthropocene be accepted as a formal unit of geological time, since humans have been affecting the rest of the ecosystem and drastically intervening with the planetary processes. A working group on the Anthropocene (The Anthropocene Working Group, AWG), which is formed by the ICS (International Commission on Stratigraphy), composed of 35 internationally acclaimed Earth scientists, including the University of Leicester geologists Jan Zalasiewicz, Mark Williams, the British Geological Survey geologist Colin Waters, and archaeologist Matt Edgeworth, have been collecting stratigraphic data and analysing them since 2009. The members of the Anthropocene Working Group (AWG) have since been gathering evidence for the Anthropocene as a distinctively new epoch in the Earth's evolutionary timeline. Finally, at the 35th International Geological Congress held in Cape Town, South Africa, between August 27 and September 4, 2016, this international scientific body, AWG, presented the sum of their preliminary findings based on the collected geological evidence, and provided recommendations on the formalisation of the Anthropocene as a new geological time interval. The "Media Note: Anthropocene Working Group (AWG)" published by University of Leicester Press Office after the congress, highlights three important and highly controversial issues related to the Anthropocene: the scientific validity of this environmental phenomenon, its place in the geological time scale, and its starting date. According to the details shared via the media note, the AWG agrees that the Anthropocene hypothesis, as proposed by Paul Crutzen and Eugene Stoermer in 2000, is "stratigraphically real" ("Media Note" 1). Secondly, relying on the available stratigraphic evidence, the Anthropocene phenomenon is accepted to be "of sufficient scale to be considered as part of the International Chronostratigraphic Chart" ("Media

Note" 1). The majority of the AWG members accepted the Anthropocene to be positioned within the Quaternary Period and Cenozoic Era as a new "epoch" instead of an "age" referring to a subdivision of the Holocene. That means the Anthropocene is hierarchically at the same level as the Holocene and the Pleistocene epochs. So, the Holocene is terminated with the formalisation of the Anthropocene as the next epoch. Lastly, the AWG unanimously agreed on the mid-twentieth century as the starting date of the Anthropocene on the grounds that "the clearest and most distinctive array of signals imprinted upon recently deposited strata" dates back to the Great Acceleration of the mid-20th century when "the substantial and globally synchronous changes to the Earth System most clearly intensified" ("Media Note" 2). The primary signal of this suggestion is unanimously accepted as "plutonium fallout" ("Media Note" 2) found in rock sediments. Hence, the 1950s mark the optimal beginning of the Anthropocene Epoch.

So, after years of careful examination, the Anthropocene Working Group (AWG) has recently accepted the Anthropocene as a formal geological time unit. Yet, even before the scientific authorities proved its scientific validity and formally recognised it as a new geological time interval, the Anthropocene continued to be used as a descriptive term for its practicality, even though it created problematic divisions in the academic and non-academic circles. For instance, in their article entitled "Is the Anthropocene an issue of stratigraphy or pop culture?" ecologists Whitney J. Autin and John Holbrook emphasise the increasing popularity of the term especially in the non-scientific circles as follows: "Social commentators and environmental activists benefit from the term, and it is gaining momentum among the media and writers of popular scientific literature" (60). Autin and Halbrook find the popular usage of the Anthropocene useful on the grounds that its acknowledgement creates public awareness about "the human-induced environmental change" (61). The Anthropocene gradually began to attract the attention of environmental historians, philosophers, social scientists, journalists, politicians, activists, artists, and ecocritics. Publications not only by leading Earth scientists but also by environmental humanities scholars and theorists collaboratively constitute the critical foundations of the Anthropocene concept. In this respect, the scientific and non-scientific narratives of the Anthropocene led to the production of many stories that

"matter for the Earth" (Bonneuil, "The Geological Turn" 17), as historian Christopher Bonneuil puts it. Bonneuil interprets these collaborative narrative contributions of environmental humanities scholars and Earth scientists in the Anthropocene as "a geological turn" (17) in the environmental historical timeline.

In the light of visible signals of a new geological epoch, the concept of the Anthropocene continues to provide a powerful framework for discerning the environment as an important part of human life and for depicting the impact of human-induced climate change in a variety of forms and practices. But how to characterize the Anthropocene may change depending on the way one looks at the concept. Just like many scientists who see the Anthropocene as a "boundary" in the geological timeline of the Earth, many environmental humanities scholars treat the Anthropocene as a "threshold" concept, which is expected to "blur and even scrambles some crucial categories by which people have made sense of the world and their lives" so far (Clark 9). Timothy Clark, one of the representatives of this conceptualisation, states that "as a concept transferred from geology, the Anthropocene enacts the demand to think of human life at much broader scales of space and time" (13); the Anthropocene, he continues, "manifests itself in innumerable possible hairline cracks in the familiar life-world, scale of each individual life," and "puts in crisis the lines between culture and nature, fact and value, and between the human and the geological or meteorological" (9).

Just like the determination of the official position of the Anthropocene in the geological timeline, the official naming process of a geological age is also a long and complex process. Yet, the aftermath of the official naming can be more complex and problematic since the name of this new geological epoch can pose discursive problems. The "anthropos" ["man/human"] of the Anthropocene is particularly problematic. Underlining "human dominance of biological, chemical, geological processes of the Earth," and stating that the planet is "being anthroposized at high speed" in their article "Living in the Anthropocene," Paul Crutzen and environmental journalist Christian Schwagerl argue that "mastering" such a "huge shift" (1) may change how we, humans, perceive ourselves. They warn us that the naming of a geological era after humans may

turn into “another sign of human hubris” (1). Thus, overemphasising the role of the human as a geological force and exaggerating the capacities of humanity through such statements as “the immense power of our intellect and our creativity” and “the opportunities they [humans] offer for shaping the future” (Crutzen and Schwagerl 2) is highly criticised and could be dangerous. Similarly, in “On Poverty of Our Nomenclature,” environmental sociologist Eileen Crist contends that the debates on the outcomes of labelling a geological age as human age have already contributed to the creation of a new anthropocentric discourse. Such a discourse, Crist states

> delivers a Promethean self-portrait: a genius if unruly species, distinguishing itself from the background of merely-living life, rising so as to earn itself a separate name (anthropos meaning “man,” and always implying “not-animal”), and whose unstoppable and in many ways glorious history […] has yielded an “I” on a par with Nature’s own tremendous forces. (131)

Focusing on a similar human hubris in the construction of an Anthropocene discourse, the Italian physicist Guido Visconti maintains that rather than challenging human domination on nature and the ecological situation that humans have created, the Anthropocene develops “a false pride in humans and champions human-centeredness” (390). Promoting humans as exceptionally powerful forces interfering with the internal workings of the planetary systems is a hubristic perception of human species, which may lead to the belief that technologies can “make human domination sustainable” (15) as long as possible, and that “nature will continue to serve for the well-being of humanity” (15), as anthropologist Todd J. Braje explains. In other words, as environmental political theorist Derrick Jensen also claims in “The Age of the Sociopath,” naming the new geological age as human age only creates “human narcissism,” which he defines as “attempts to naturalise the murder of the planet” (1). Accordingly, in his words, it is

> supreme narcissism that has characterized this culture from the beginning. Of course members of this culture would present their behavior as representing “man” as a whole. The other cultures have never really existed anyway, except as lesser breeds who are simply in the way of getting access to resources. Gilgamesh destroyed a forest and made a name for himself. This culture destroys a planet and names a geologic age after itself. What a surprise. (1-2)

Like Visconti and Braje, using the term Anthropocene, for Jensen, too, will only feed anthropocentric narcissism further. Seen in this perspective, the term Anthropocene reinforces anthropocentric attitudes. Therefore, the question is, should the "branding" of our new geologic era as a human era be taken as "a celebration of our final victory over nature?" or should we see it as a gateway to "planetary sensibility -a new consciousness of ecological citizenship and stewardship?" (Speth 1).

Although framing the Anthropocene as "an event to be celebrated rather lamented and feared" (Hamilton, "The Theodicy of" 233) is continually debated, geographer Erle C. Ellis adopts an optimistic view toward human capacities to reshape the future, and introduces a new phrase, "the good Anthropocene," in his article "Planet of No Return." With this optimistic term, Ellis suggests that the capacity of the human to open up a new epoch should be taken as an opportunity to create a future by "going beyond fears of transgressing natural limits and nostalgic hopes of returning to some pastoral or pristine era" (1-2). Therefore, we must not see the Anthropocene as a crisis like most people do, but view it "as the beginning of a new geological epoch ripe with human directed opportunity" (2). According to environmental historian Clive Hamilton, Ellis' concept of the "good Anthropocene" echoes the theological phrase "theodicy," which is a belief promoting the ultimate benevolence of God, and the idea that good will eventually prevail. The argument of the good Anthropocene suggests a belief "in the ultimate benevolence of the whole, the order of things, a goodness that in the end transcends and defeats the structural obstacles, sufferings, and moral lapses that seems to threaten it" (Hamilton, "The Theodicy of" 234). When interpreted from such an idealistic perspective, the Anthropocene suggests that our fate is in our own hands, and even the worst circumstances can be redirected towards a positive path.

According to environmental philosopher Kathleen Dean Moore, however, the words should be chosen carefully, and the Anthropocene is the "wrong word" (1) from the very beginning. Since humans are introduced as destructive forces in the Anthropocene, the practice of naming a geological age "after the destructive force that ended the epoch that came before" (1) is not a usual practice. Here, Moore claims that otherwise we would have named "the Tertiary Period the Asteroidic [age], even if an asteroid is

suspected of having ended the Cretaceous" (1). Instead, she proposes that a geological period should be named after "a prominent feature of its fossil record," or after "the characteristics of the layers" (1) formed within that period.

Donna Haraway is another eminent environmental humanities scholar who chooses not to use the term Anthropocene at all. Although she does not reject the fact that "the anthropogenic processes have had planetary effects in inter/intra action with other processes and species," she sees the Anthropocene as a "boundary event" ("Anthropocene, Capitolocene" 159-160) rather than a new geological epoch. For Haraway the current geological age as a period in which inter-species processes intersect and all biological species have to confront the same environmental threats. At this point, Haraway proposes a new term, "Chthulucene," as an alternative to the Anthropocene. Borrowed from Sci-Fi writer H.P. Lovecraft to suggest "the diverse earth-wide tentacular powers and forces and collected things," Chthulucene concept refers to a multispecies "assemblage" and to the symbiotic life of humans and nonhumans. Haraway imagines a planet in which human beings make kin with nonhuman beings, and all "critters" [living creatures] lead a sustainable life despite the "discontinuities" in the geological timeline ("Anthropocene, Capitalocene" 160-161).

Another alternative to the Anthropocene is proposed by the Finnish digital media and techno-culture scholar Jussi Parrika. Parikka intentionally distorts the spelling of the Anthropocene as "Anthrobscene" and describes the current geological epoch as an age in which corruption and obscenity prevail: "The addition of the obscene is self-explanatory when one starts to consider the unsustainable, politically dubious, and ethically suspicious practices that maintain technological culture and its corporate networks" (6). So, the Anthropocene is, in fact, an age in which technology-driven, consuming, and greedy humans activities come to the surface. Similarly, sociologist Jason W. Moore proposes "Capitalocene" as an alternative to the Anthropocene due to the economic, and social networks of capitalism that dominate the priorities of the world today.

As it can be seen from all these discussions, the official confirmation of the Anthropocene hypothesis will entail various redefinitions and reconfigurations in

various fields. As Dipesh Chakrabarty notes in "The Climate of History: Four Theses," "the crisis of climate change is a crisis of many dimensions" (215), which requires scholars from various disciplines to leave their prejudices behind, and reconsider their definitions and mind-sets. In this respect, the anthropogenic environmental changes, which have been most visible in the present day as climate change, biodiversity loss, and species extinctions, should invite humanity as a whole to rethink many concepts, definitions, aspirations and ideals that have been central to our understanding of the world. Obviously, the most important redefinition will be of the human. According to Chakrabarty, labelling humans as "geological agents" rather than merely "biological agents" is a radical challenge to the concept of "man having an interactive relation with nature" ("The Climate" 207). Surely, the Anthropocene is a transitional period in many ways. As political scientist Jane Bennet states, "there was never a time when human agency was anything other than an interfolding network of humanity and nonhumanity; today this mingling has become harder to ignore" (24). In this new context where nature has turned into postnature and humans into posthumans, the Anthropocene and the role of humans in the environmental processes need to be studied in multiple perspectives, and in transdisciplinary contexts. In short, the Anthropocene concept invites us to rethink the human, which is in the purview of the field of the environmental humanities.

The arguments in the environmental humanities mostly focus on the need to "unmask the idea of the unlimited, autonomous human," as Deborah Bird Rose and her colleagues underline, calling "for a radical reworking of a great deal of what we thought we knew about ourselves and the humanities as fields of enquiry" ("Thinking Through" 3). Thus, in order to meet the new challenges, "our accumulated knowledge and practice, built up over centuries, should be refashioned" (Rose et al., "Thinking Through" 3). The new task here is to draw the humanities, social sciences and the natural sciences, such as anthropology, philosophy, cultural and literary studies, science and technology studies, geography, biology, ecology, and numerous other sciences, "into dialogue, in new and exciting ways […] to develop a research practice that is not confined to human but is concerned with the effects of our entanglements with other kinds of living selves" (Rose et al., "Thinking Through" 4).

Similarly, feminist ecocritic Greta Gaard proposes a multi-vocal approach to the Anthropocene on the grounds that "a one-sided approach or a single perspective to the Anthropocene" ("From Cli-Fi" 170) is no longer enough to understand, and to explain the Anthropocene discourse properly. She criticizes the dominance of environmental sciences, or the Earth sciences in defining climate change and other ecological problems, controlling the discourse around them. Gaard underlines the inadequacy of the Earth sciences saying that

> these enviro-science analyses offer incomplete descriptions without the perspective of the environmental humanities: fields such as ecopsychology, public health, environmental philosophy, environmental politics, environmental economics and ecocriticism provide critical information that augments and often transforms our understanding of environmental problems –particularly in the case of climate change. ("From Cli-Fi" 170)

The environmental humanities perspectives, as Gaard claims, are indeed crucial in understanding climate change and the Anthropocene quandaries. For example, unlike the geologists, the environmental humanities scholars do not consider the "anthropos" of the Anthropocene as a homogenous, all-embracing, and generalising title, or as an adequate umbrella term, to categorize billions of human beings. They think that if human activities are so influential to open a new geological age and name it after the human, then the term "human" needs to be considered both in scientific and social contexts as a geological as well as a social actor, and must be analysed from transdisciplinary angles. However, this must be done without generalizing all humanity under a single title, the "anthropos" of the Anthropocene, which is too vague a term. According to environmental historian Jean-Baptiste Fressoz, discussing the Anthropocene as a social driver in a non-scientific context requires "historicising the Anthropocene" (71) in the first place. This process requires writing "a proper history of this new epoch, replacing the rather vague 'anthropos' with the nations and companies, institutions and imaginaries, technologies and ideologies that are true drivers of the Anthropocene" (Fressoz 71). In other words, what is criticised by Fressoz is the use of the human as a collective force. We must remember that not everyone is equally responsible in harming the planetary ecosystems. Moreover, there is no equal distribution of natural resources, environmental risks, and their impacts in the world. So, the contributors to and the victims of environmental threats cannot be grouped

under the same label of the *anthropos*. Therefore, generalising humanity under a single title, *the anthropos*, is the main problem in the discussions of the Anthropocene.

Like Fressoz, feminist ecocritic Stacy Alaimo criticizes the emphasis on the anthropos in her chapter "Your Shell on Acid: Material Immersion, Anthropocene Dissolves" in *Anthropocene Feminism* (2017) with this crucial question: "Who is the 'anthro' of the Anthropocene?" (89). Alaimo is not quite sure if this prefix suggests "a subject position that anyone could inhabit" ("Your Shell" 89). Although all human beings inhabit the same planet, their contributions to the ecocidal activities vary to a great extent. Moreover, as we conduct a kind of damage control for humans to survive in the Anthropocene, non-human entities are usually neglected. But the Anthropocene, contrary to what the title suggests, is not merely about humans. At this point, Alaimo gives a striking visual example for such a hubristic negligence. She writes that when you visit *Globaia* website[4] and click on the "Cartography of the Anthropocene" section, you will see a series of globe images:

> each [decorated] with patterns formed by lines marking roads, cities, railways, transmission lines, and underwater cables. The patterns of bright blue or shimmering gold lines that span the planet demonstrate the expansiveness of human habitation, commerce, and transportation networks, marking human travel, transport, and activity against a solid background that obscures winds, tides, currents, and the travels of birds, ceteceans, or other creatures. Nonhuman agencies and trajectories are missing. (Alaimo, "Your Shell" 91-92)

In this cartography of the Anthropocene designed by Felix Pharand-Deschenes, anthropologist and data visualizer, "the liveliness of all creatures, except for humans, vanish" (Alaimo, "Your Shell" 91). Yet, the stories of the nonhuman agents also need to be narrated.

In essence, the Anthropocene is a multi-layered concept with various suggestions and possible applications. Its scientific validation by the International Stratigraphy Commission as a formal geological time unit needs further stratigraphic evidence. But even if the process of scientific evaluation had concluded negatively, the environmental scholars assume that the Anthropocene term would continue to be used in its other connotations "based on other data and norms of proof from a wider array of scientific

disciplines" (Hamilton et al., "Thinking the Anthropocene" 3). Even in that case, the Anthropocene would provide a broader scope than being just a geological phenomenon. The large-scaled human impacts across the Earth, which are impossible to ignore, will inevitably invite human beings to reconsider their activities on the planet, such as urbanisation, waste dumping, and overuse of natural resources. So, the Anthropocene continues to form a "threshold marking a sharp change in the relationship of humans to the natural world" (Hamilton et al. "Thinking the Anthropocene" 3), demanding more transdisciplinary examinations of the anthropogenic environmental transformations.

Human-induced environmental changes can be observed in various forms. Based on their area of influence, those environmental changes can be categorised as the changes related to "air" including atmospheric imbalances and their effects on the ozone layer, the changes related to "soil" referring to soil degradation and infertility, the rise in land surface temperatures, and the changes related to "water," which can be exemplified as the oceanic acidification and the loss of marine biodiversity. Although changes in land surface and water cycles were under discussion, it was the unusual change in the atmospheric compositions that attracted Crutzen and Stoermer's attention and provided them with the starting point for their Anthropocene hypothesis. The radical anomalies in air are due to industrial emissions of harmful gases, such as the use of chlorofluorocarbons (CFCs) in refrigerators that harm the Earth's ozone layer enormously. The ozone layer serves to protect the planet's surface from the most harmful forms of ultraviolet radiation that come from the sun. The industrial use of CFCs increased especially after World War II. As a result, the depletion in the ozone layer reflects back not only into human life, but also into the lives of many other species on Earth. As Mark Whitehead, the environmental scholar specialised on urban geography, explains in *Environmental Transformations: A Geography of the Anthropocene*, ozone depletion can be directly connected to the increase of skin cancer in human beings as well as "terrestrial plant damage and dwindling levels of oceanic plankton populations" (44). In addition to the CFCs, heavy industrialisation leads to the emission of sulphur dioxide released from the burnt fossil fuels and poses a serious threat to the air quality. In the long-term, the atmospheric concentration of greenhouse gases, such as carbon dioxide, methane, and nitrous oxide can alter the energy balance

of the atmosphere. The physical reflections of this atmospheric imbalance are known collectively as greenhouse effects with inevitable consequence of a global scale climate change. Due to the circulations of these gases on the atmospheric level, the symptoms and effects of climate change are everywhere on Earth. What is more horrifying is that "global biogeochemical interactions among planetary systems make the consequences and extensions of climate change less predictable" (Warf, "Symptoms and Effects" 3).

In addition to air quality, land surfaces are also affected by human activities in the Anthropocene. Describing the geography of the Anthropocene, Mark Whitehead underlines a scientific fact that has recently been declared: "globally measured surface temperatures have increased rapidly since 1979" (69). According to Whitehead, this is the most visible impact of climate change. Generally, the temperature increases are more severe at higher latitudes, as the atmosphere moves excess energy toward the poles. Ice melts globally under warmer temperature, especially in the polar regions. Meltdowns on the polar ice caps can trigger unexpected floods. Another important consequence of the floods underlined by Whitehead is the physical degradation of the soil. The flooded pieces of land lose their "capacity to provide ecosystem goods and services and [their] functions over a period of time for the beneficiaries of these" (69), and are no longer fertile. Warming air leads to greater occurrence of heat waves and this trend is mostly visible in the polar regions. Extreme high temperatures affect all living beings, because "the cardiovascular system must work so much harder to regulate temperature" (Warf, "Symptoms and Effects" 4). Heat waves threaten food and water supplies both for the human and non-human population's survival, and may lead to mass species extinctions. Climatic disturbances in natural systems can also increase fire risks. Climatic changes, which cause hotter daytime temperatures, increase the possibility of drought and may lead to more violent fires. Barney Warf**,** the editor of *Encyclopaedia of Geography*, observes that "increases in fire frequency have already been documented in North America, Africa, and Australia" ("Symptoms and Effects" 6).

Environmental changes in water and air are closely linked. As the majority of the world's surface is covered by water, warmer air temperatures are warming the oceans as

well. Annual reports show that global sea level rise is more than 3 millimetres per year in the past decade. Oceanic thermal expansion, and the melting of the world's ice caps and glaciers cause sea-level rise (Warf, "Symptoms and Effects" 3-6). Due to the layered nature of the ocean, with little mixing of surface and deep water, ocean warming is a slow process. However, an increase in water temperature also lowers the ability of water to retain dissolved oxygen and carbon dioxide so that biological systems are stressed due to less oxygen for fish and other marine organisms. Warm water releases even more carbon dioxide into the atmosphere, and gradually ocean warming leads to increased acidification of the oceans and threatens the marine species. Changes in the chemical structure in the oceans can "drastically alter the marine biocultures in particular oceanic regions" (Warf, "Symptoms and Effects" 3). Furthermore, those changes in the depths of oceans can lead to unpredictable weather events in oceanic regions, such as "the increased frequency of tropical ocean storms -called hurricanes[5] (Atlantic Ocean), typhoons (Pacific Ocean), and cyclones (Indian Ocean)" (Warf, "Symptoms and Effects" 4).

Moreover, the rapid increase in human populations and the economic activities developed in order to meet the growing needs of the population for basic supplies cause massive environmental changes. Those human activities, which will result in wide ranging consequences for the planet in the long term, have long been neglected especially by the climate sceptics, those denying the existence of anthropogenic climate change and the carbon prints of humanity on various planetary systems. However, the undeniable fact of the Anthropocene is that our planet does not have infinite natural resources, nor is it an invincible natural body untouchable by human actions. When its natural dynamics are redirected by human intervention, the planet reacts in various ways. Global warming, glaciations, permafrost, flood, drought, melting of polar ice caps, ocean acidification, and species extinction are some of these ways. They all point to the fact that human actions trigger a series of ecological and evolutionary changes that will affect human and nonhuman life in the long term. In the case of climate change, what humans do to life support systems of the planet will inevitably affect the entire biosphere and cause metamorphosis in other species. Novels discussed in this dissertation provide examples of such changes: the appearance of various insects in

unusual sizes, the growth of giant tropical plants in non-tropical climates, and the emergence of new biological species.

The debates on the Anthropocene contributed to the construction of a totally new context. With the newly recognised anthropogenic carbon prints, today climate does not simply refer to weather conditions. Triggering other changes in human life, the changes in climate need to be interpreted in a larger context in the Anthropocene. As environmental scholars Adam Trexler and Adeline Johns-Putra put it in "Climate Change in Literature and Literary Criticism," climate change "occupies a primary position not just on political and scientific agendas but in the wider cultural imagination" (185). The most popular product of this cultural imagination inspired by climate change is the novel genre. In her online *New Yorker* magazine article "Writers in the Storm," American journalist and author Kathryn Schulz writes that although "weather is widely regarded as the most banal topic in the world," and thus, any reference to weather would add only "banality and dullness to the literary work" (1), this situation has begun to change recently. Weather facts have been transformed from being "banal symbols of divine punishment, reflections of the characters' psychological moods to scientific proofs for fictional narratives" (2). Shultz underlines this shift, saying that "these days, the atmosphere really does reflect human activity, and, as in our most ancient stories, our own behavior really is bringing disastrous weather down on our heads" (2). The human activities shaping the climate, and creating climatically challenged environmental settings can be observed in contemporary fictional narratives. In the twenty-first century, the changes in the climate are almost impossible to be excluded from the fictional narratives, but they are discussed in a totally different context. As Shultz explains it:

> Today, it is, if anything, even more difficult to imagine an end of the world that is not driven by a change in the weather. We speak of a "nuclear winter," of the firestorms and the radical temperature drop that would follow an asteroid strike, of global climate change nudging planetary temperatures out of the range of the habitable. (1-2)

Since climatic problems are literally a part of our lives nowadays, they increasingly shape our dreams about the future, which "nobody wants to talk about for too long"

since it is just “too depressing” (xvi), as environmental scholar McKenzie Wark underlines in *Molecular Red* (2015). According to Wark, the effects of too much contemplation on climate change and the other anthropogenic ecological threats observable in the Anthropocene can produce what he calls “the melancholy paralysis” (xx) as well as “the popular sentiment toward purely romantic visions of a world of harmony and butterflies” (xx). Such mood swings are especially observed in the readers of a new genre called “climate change fiction,” or “climate fiction,” often abbreviated as “Cli-Fi.” Despite its various affective impacts on the reader, Cli-Fi contributes to increase the interest in climate change problems.

Climate change fiction is thus born out of the growing literary interest in pressing environmental issues. Hence, many North-American, European, Australian and British contemporary novelists have also chosen to explicitly focus on the current and/or future environmental problems, predominantly aiming to create heightened ecological awareness, and to provide cautionary tales for the future generations as well as their contemporary readers who already experience the symptoms of climate change. This newly emerging literary genre has begun to move from science fiction towards the literary mainstream acquiring the label “climate change fiction.” Although earlier examples of fictional narratives taking climate change as their subject matter can easily be found in science fiction, the label “Cli-Fi” as a new literary term is coined by Dan Bloom, an American freelance news reporter based in Taiwan. Bloom contributed to the worldwide popularisation of the term “Cli-Fi.” He first used “Cli-Fi” (or “climate change fiction,” or “climate fiction”) in 2007 in his blog, and later on, through web sites and social media groups that he formed focusing on Cli-Fi, he has gathered together scholars and students who are interested in visual and printed media dealing with climate change issues. These sources provide a hot zone to share ideas about the latest news and arguments about climate change and its literary and artistic reflections.

Considering their treatment of the human-induced environmental catastrophes in their novels, Richard Jefferies, J.G. Ballard, and George Turner can be labelled as the earliest representatives of Cli-Fi in British literature, followed by contemporary Cli-Fi authors, such as Maggie Gee, Liz Jensen, Sarah Holding, John Burnside, Adam Nevill, Marcel

Theroux, and Saci Lloyd. American and other non-British Cli-Fi authors, such as Margaret Atwood, Michael Crichton, Kim Stanley Robinson, Barbara Kingslover, Paolo Bacigalupi, Nathaniel Rich, John Barnes, and Peter Heller are also widely read today.

Two of the various outcomes of climate change are particularly popular Cli-Fi themes. The first theme, melting ice caps and rising sea levels due to global warming are extensively portrayed by Cli-Fi novelists, such as Richard Jefferies in *After London* (1885), J.G. Ballard in *The Drowned World* (1962), and *The Drought* (1965), Maggie Gee in *The Flood (2004)*, Margaret Atwood in the second book of her *MaddAddam* trilogy: *The Year of the Flood* (2009), as well as by Hollywood films, like Roland Emmerich's *The Day after Tomorrow* (2004), Benh Zeitlin's *Beast of the Southern Wild* (2012), Darren Aronofsky's *Noah* (2014), and Al Gore's documentary *The Inconvenient Truth* (2006), among many others. The second popular theme is global freeze. The return of a second ice age is thematically visualised in the British Cli-Fi novels, such as John Christopher's *The World in Winter* (1979), in Maggie Gee's *The Ice People* (1998), and in the second book of Jason Ayres' *Time Bubble* series, *Global Cooling* (2014), as well as in the examples of American eco-cinema and animations, such as Joon-ho Bong's movie *Snowpiercer* (2013), and co-directors Chris Wedge and Carlos Saldanha's animation series, *The Ice Age* (2002, 2006, 2009, 2011, 2012, 2016).

Genealogically, Cli-Fi is akin to Sci-Fi, but despite the close connection between these two genres, and hence the still controversial roots of Cli-Fi, there are some differences between these two literary genres. According to Dan Bloom, one of the distinctive characteristics of post-apocalyptic Cli-Fi novels compared to other dystopian Sci-Fi examples dealing with ecological catastrophes is their capacity to "go in different directions" ("Climate Friction" 2) in temporal and spatial terms. In the environmental humanities, climate change fiction is treated not as a sub-genre of science fiction but as an independent genre, even though Cli-Fi's close connections to Sci-Fi frequently confines it to the futuristic narratives which take place in dark, distant futures. However, climate change is not the problem of a distant future, but of the present day with roots reaching back to the past. As Dan Bloom states in an interview with C. Derick Varn, "Cli-Fi can take place in the past, the present, or the future (near future or distant future)

and it can go either way, towards dystopian themes, or towards utopian themes. So, Cli-Fi novelists can write where their imaginations and worldviews take them" ("Climate Friction" 2). Envisioning dark, futuristic representations is only one of the characteristics of climate change fictions. Not all Cli-Fi novels are supposed to be "doomsday stories set in dystopian worlds, although many of them will be, perhaps the majority. Some will be hopeful and optimistic about how humans might fix the current problems we are facing and end on notes of hope" ("Climate Friction" 2). Yet, "looking back [retrospectively] to a change that has already begun to occur and to which humans and other species must adapt […], Cli-Fi rarely allows its protagonists a chance to mitigate those effects" [of these dire environmental conditions], let alone alter the conditions for their occurrence" (Irr 7). Despite the fact that most Cli-Fi examples are apocalyptic, or post-apocalyptic, hence dark and gloomy, their aim is not to push the reader into pessimism, but to warn them against these dark possibilities, and to motivate them to take action beforehand. This is definitely a necessary feature of Cli-Fi, as Bloom states in the same interview. For him, Cli-Fi should "warn readers of the perils of climate change and global warming and the future perils of not doing anything about it before it is perhaps too late," and he hopes to see this newly emerging genre to serve as a "warning sign, an alarm bell, a wake up call for humankind" ("Climate Friction" 3).

Moreover, Cli-Fi narratives need to be descriptive about the prevailing environmental conditions to create awareness. Discussing the mission of climate change narratives in "Cli-Fi: Birth of a Genre," environmental journalist Rebecca Tuhus-Dubrow observes that Cli-Fi novels "refashion myths for our age, appropriating time-honored narratives to accord with our knowledge and our fears. […] The novels [Cli-Fi novels] must both grapple with the particulars of their setting and use these particulars to illuminate enduring truths of the human condition" (61). According to Tuhus-Dubrow, although they mention those "enduring truths of human condition," climate change narratives should not necessarily be apocalyptic, because "climate change is unprecedented and extraordinary, forcing us to rethink our place in the world." (61). "[I]n looking at its [of climate change] causes and its repercussions," Cli-Fi novels make human beings understand the situation they are in, and show them their options since "in the end, as ever, we [humans] survive the storm, or drown" (61). Therefore, Cli-Fi is highly

explanatory about environmental phenomena like climate change and prepares people for an unpredictable future since the consequences of climate change are hard to anticipate. The unknown always feeds anxieties and fears, and Cli-Fi "truly faces the unknown" (Tonn, "Cli-Fi" 1). It must be noted that although some of these fictional stories are futuristic, they have roots in the present day especially with emotional and psychological roots. In this respect, Cli-Fi provides a secure playground in which human beings can express their innermost anxieties and fears, and it also gives them a chance to confront their fears. As American ecocritic Stephanie LeMenager defines it, Cli-Fi is "a new literary genre that will help us prepare, psychologically, for global climate change" (34).

In most of these futuristic scenarios, in which the worst fears of humans come true, the doomsday of the planet is caused by environmental disasters represented by climate change as the major triggering event. As it is underlined by the American ecocritic Ursula K. Heise in *Sense of Place and Sense of Planet*, "in their portrayal of climate change as a global risk scenario, most examples of the climate change fiction fall in apocalyptic narratives of natural disasters, which either destroy or reshape the surface of the Earth and affect the lives of the human masses deeply" (206). One of those effects may be classified as mass immigrations towards more habitable parts of the planet for survival. As a result of such displacements, social breakdowns become inevitable which the novels depict as global risk scenarios. Regardless of being pessimistic or optimistic in their portrayal of the future of humanity, ecological themes, such as biochemical pollution, acid rain, ozone depletion, and the greenhouse effect are used frequently in contemporary Cli-Fi narratives, both as utopias and dystopias. Since most ecological imbalances and/or environmental disasters have long-term effects, and thus, their causes can only be detected only through retrospective scientific investigations, using futuristic fictional stories is more practical to explain the connection between the present and the future. As Trexler and Johns-Putra point out in "Climate Change in Literature and Literary Criticism," it was "almost natural to turn first to science-fiction for the literary representations of climate change since science-fiction was providing limitless opportunities in the construction of other-worlds" (187). Despite their fictional distance, those other worlds in climate fiction novels present stronger probabilities in real life that

the fictional worlds portrayed in science fiction novels. Thus, narratives about the climatically changed worlds are now read as cautionary tales for the future.

Besides, the novel genre, ecological themes and global risk scenarios also appear in short stories, plays, graphic novels, and poetry. For example, two highly acclaimed short story collections have been published recently: *I am with the Bears*: *Short Stories from a Damaged Planet,* and *Loosed upon the World: The Saga Anthology of Climate Fiction*, both of which contain short stories by renowned authors such as Margaret Atwood, Paolo Bacigalupi, Nathaniel Rich, and Kim Stanley Robinson. Also, graphic novels, such as *IDP: 2043: A Graphic Novel* on sea level rise by Scottish writer Mary Talbot, as well as plays like *Arctic Requiem* by American playwright Sharmon J. Hilfinger, *AD2050* by British playwright Gurpreet Kaur Bhatti, and many more also thematise climate change and its consequences. Even the British poet laureate Carol Ann Duffy curated a series of 20 original poems by various authors on the theme of climate change in 2015. So, literary and cultural texts in the form of novels, poems, and plays show "complex networks of ideas, history, scientific ideas, political discourse, cultural rituals, imaginative leaps, and the matter of everyday life. Interpreting such texts can be understood as a way of describing the patterning of enormous cultural transformations, such as the Anthropocene" (Trexler 5).

Among all literary genres, the novel holds a distinguished position in portraying climatically challenged worlds in the Anthropocene. For example, Adam Trexler sees the novel as the best literary tool to represent the Anthropocene context above all other literary genres. Trexler also argues that the "novel has become an essential tool to construct meaning in an age of climate change since it expands the reach of climate science beyond laboratory or climate modelling, turning abstract predictions to subjectively tangible experiences of place, identity and culture" (1). Hence, Trexler's *Anthropocene Fictions: The Novel in a Time of Climate Change* (2015) analyses over 100 Cli-Fi novels written about the Anthropocene complexities. Contextualizing the climate change novel, discussing the treatment of ecological issues in exemplary fictional narratives, and exploring the ways in which hard-core scientific facts can be inserted in literature, Trexler's book provides a landmark study in climate change

fiction, or Cli-Fi. Trexler's starting point for the *Anthropocene Fictions* project is this question: "How can a global process [the Anthropocene], spanning millennia, be made comprehensible to human imagination, with its limited sense of place and time?" (5). The answer to this question also sheds light on the rise of Cli-Fi in the Anthropocene.

Especially from the last decades of the twentieth century onward, Cli-Fi gained increasing popularity and critical attention in the academia, and is studied within the Anthropocene contexts. Positioning Cli-Fi in the Anthropocene context also allows us to explore socio-cultural transformations since the Anthropocene also involves social, political, and economic quandaries. Describing climatically reshaped societies and individuals, most Cli-Fi novels resort to cultural stereotypes, such as climate change sceptics, or abusers of climate change, pessimists and/or fatalists, and corrupt politicians and scientists who create problems for heroic scientists who try to save the Earth, all set in dystopian or apocalyptic scenarios. These scenarios "focus on near-future environmental disasters such as devastating flooding or desertification, or on future eco-fascist regimes," as the Wicca world in Maggie Gee's *The Ice People*, the corporate tyrannies exemplified in McEwan's *Solar,* and the UN exploration units in Ballard's *The Drowned World* (Trexler 78). If Cli-Fi novels portray "the crises and metamorphoses undergone by political and social institutions in response to the crisis of sudden climate change" (Trexler 79), then, climate change becomes more than a theme in fictional narratives. The novels highlight a highly probable future.

Although Cli-Fi novels seem thematically similar to one another, they are surprisingly multi-layered, and more complex than they seem on the surface. Since environmental changes entail inevitable cultural transformations, the subtext of most Cli-Fi novels is about how environmental disasters lead to widespread social changes in the future. As Timothy Clark argues, the Anthropocene provides a very large context for Cli-Fi novels to discuss all these social and cultural transformations, but "no finite piece of writing can encompass a topic that seems to entail thinking of almost everything at once - climate, culture, politics, population dynamics, transport infrastructure, religious attitudes" (78). Yet, Clark appreciates the capacity of climate fiction "to conceptualize complex, heterogeneous systems" (179). Moreover, the fictional narratives of the

Anthropocene represent in a realistic way how the changing climate, changing diet, species loss, flooding, permafrost, and consequently social and political collapse shape ways of life in the not so distant future, and provide "representationally accurate model of the multiple realities of the Anthropocene" (Clark 179). In this respect, Cli-Fi novels "dramatize the hot ecological issues" and put them into the form of "a confrontation or a conflict between the stance of the characters and the opposing views" (Clark 181).

Significantly, then, the Anthropocene fictions provide "new ways of knowing the planet and new ways of organizing human responses to it" (Trexler 236). But their mission does not end here. According to Trexler, such fictions need to realistically address "energy sources, global industrial production, legal issues, health issues, environmental justice, transportation, as well as agriculture, animal welfare, biodiversity, genetically modified organisms, petro-culture, nuclear power, [and] clean energy" (237). Trexler wants novelists to engage with these material practices in the Anthropocene believing that such engagements will be helpful "to examine the current and future effects of these issues on human life and to situate the changes in these abovementioned areas in the context of the Anthropocene" (237). The literary representations of environmental issues can also help develop "productive relationships not only with the ecological but also with the economic and political systems of the Anthropocene" (Trexler 237). In this way, climate change novels can play an important role in creating a comprehensive mental picture of the Anthropocene described with its possible effects. In this respect, Trexler reminds us that climate change novels can shed light on the "transformation of human culture" in the Anthropocene (233). After all, the novel genre itself is capable of making a change in our perceptions. So, the effects of climate change portrayed in Cli-Fi novels, can open new perspectives for the people living in the Anthropocene.

Despite its various constructive capacities, however, some scholars criticize Cli-Fi novels on the grounds that they repeat similar patterns in terms of setting, characterization, and topics; thus, they become boring. These scholars think that Cli-Fi remains ineffective in convincing even the learned readers to take ecological threats seriously. The Indian-American novelist Amitav Ghosh, for example, argues in *The Great Derangement: Climate Change and the Unthinkable* (2016) that "climate change

casts a much smaller shadow within the landscape of literary fiction than it does even in the public arena" (7). He further states that "fiction that deals with climate change is almost by definition not the kind that is taken seriously by serious literary journals" (7). If, as Amitav Ghosh claims, "climate crisis is also a crisis of culture, and thus of imagination" (9), how, then, can Cli-Fi be made more instrumental in raising ecological awareness? The question here is, whether these novels, as Trexler puts it, are "read as more or less factual representations of the scientific phenomena of climate change, or … as cultural texts that represent the collective imagination about global warming" (34). Do they convincingly represent serious environmental problems and people's responses to them? Maybe the first perspective suggested by Trexler can be stressed in favour of Cli-Fi to answer Ghosh's criticism, as the majority of novels about climate change include at least one scientist, either "providing scientific data for the reader, foretelling what is to come, [or] giving credibility to speculations about ecological disaster scenarios" (Trexler 31). For instance, Robert Kerans in J.G. Ballard's *The Drowned World* is a biologist and his friend Bodkin is a psychologist on their mission to map out the inhabitable parts of the submerged Europe, and to rescue the last refugees of the flooded Europe. Also, Saul in Maggie Gee's *The Ice People* is a nanotechnology engineer and a representative of techno-science developing robots to replace humans' duties. Michael Beard in Ian McEwan's *Solar* is a Nobel-Prize winning physicist and a climate scientist, the pseudo-developer of an artificial photosynthesis project, which is expected to eliminate the need for oil and coal in the future. So, while fiction creates representations of science, scientific facts given in the fictional narratives provide "a factual grounding" (Trexler 20) for these fictional representations.

In the light of these discussions, choosing the correct narrative technique to describe the Anthropocene becomes important. Stephanie LeMenager emphasizes the significance of a suitable "narrative form with which to combat this unsettling era of climate shift and social injury" ("Climate Change" 220) in an era of screen culture. In the end, LeMenager reads the rise of Cli-Fi in the Anthropocene as "a symptom of social need," and as a "relatively new structural response to changing social and ecological conditions ("Climate Change" 222). Thus, Cli-Fi novels point to "another way of living in the world –a world remade profoundly by climate change" (LeMenager, "Climate Change"

222). If written well, Cli-Fi narratives can make the reader "pay attention to what it means to live, day by day, through it [the everyday Anthropocene]" (LeMenager, "Climate Change" 225). Caren Irr also states that "if its authors are responsive to provocations from critics," Cli-Fi novelists can "develop new temporalities, moods, and locations, and new stylistic variations as well as new subject matter that will energize the genre" (16).

Acknowledging Cli-Fi as a serious literary tool to represent the effects of the Anthropocene, this dissertation discusses different possible risk scenarios related to the effects of climate change in the selected novels. The first chapter critically analyses J.G. Ballard's *The Drowned World* (1962) as one of the earliest examples of British climate change fiction, and discusses the visible changes on the Earth's surface with melting ice-caps and the rise of sea levels submerging the continents, as well as the rise of the Earth's temperature metamorphosing the flora and the fauna. In this framework, the first chapter examines the geographical and morphological changes on Earth in parallel with their psychological reflections, focusing thus on the psychological dimension of climate change in the Anthropocene. *The Drowned World* depicts a submerged London as a result of floods caused by an intense heat wave, which melts the polar ice and causes the world to drown. The protagonist is a scientist, Dr. Robert Kerans, who works as the head of a UN (United Nations) funded biological research station established for observing and recording the changes in this mostly submerged and partly inhabitable world. Here, London has turned into a tropical swamp in which plants outnumber the human population, and dangerous animals in unusual sizes pose additional and unpredictable dangers to the survivors. The remaining humans have to adapt to these new circumstances. As the novel recounts the experiences of Kerans and his fellow scientists during their expeditions to discover inhabitable regions for human survival, it presents a possible visual description of the planet in the age of the Anthropocene. In this regard, *The Drowned World* is a cautionary tale. Through the experiences of its protagonists, it holds a mirror to the fact that by disturbing the natural balance of the planet, people inevitably change themselves in terms of behavioural patterns, ways of living, thinking, and nourishment. The novel illustrates not only the physical changes on Earth but also the parallel psychological changes experienced in such a climatically

challenged world. It dramatizes how the suppressed primitive urges, which once belonged to earlier geological ages, are reactivated when the planet itself is thrown into pre-historic times. With references to its characters' negative psychological experiences, this chapter analyses *The Drowned World* eco-psychologically, discussing it as the story of the loss of control both in inner and outer worlds.

The second chapter analyses Maggie Gee's *The Ice People*, which presents a different face of the Anthropocene as it explores the social and cultural transformations in the Anthropocene. Here, Maggie Gee imagines a globally warmed world, which is slowly falling into a global freeze. Gee's novel portrays a world set in the near future, and depicts how the global warming eventually triggers a new ice age. Using this novel as an exemplary case, the second chapter discusses the social and political effects of climate change affecting the relationships between individuals as well as nations when existing socio-political systems totally collapse. The reactions of humans encountering ecological catastrophes and their ways of coping with the new circumstances constitute the main focus of the chapter. The social and political chaos created by the change in the Earth's climate also changes human relations drastically. This novel epitomizes the social dimension of the Anthropocene by successfully demonstrating how the environmental problems are simultaneously social problems. The protagonist of *The Ice People* is a black man named Saul who has lived two different geological ages. The Earth in his youth was hot as a result of global warming, whereas the Earth in his old age has turned into a frozen planet. The reflections of this global climatic phenomenon on human relationships indicate how massive ecological changes can easily alter and then destroy the social order. The novel also sheds light on how socially constructed dichotomies also dissolve under such circumstances; such as human/nonhuman, and man/woman, and especially First World countries/Third World countries when the changed climate disrupts international relations with mass migrations from the once wealthy nations to Africa. Saul and his son at the end become climate refugees.

The third chapter focuses on the economic reflections of the Anthropocene and discusses how the climate crisis can be abused by the contemporary capitalist economy. Since Ian McEwan's *Solar* (2010) portrays this dark possibility, this last chapter

analyses it to illustrate the economic entanglements in the Anthropocene. *Solar* also brings a political perspective to the Anthropocene discussions. McEwan's protagonist is a Nobel Prize-winning physicist named Michael Beard who is an anti-hero trying to make economic profit out of the situation. Beard steals a young scientist's plans for stopping global warming through a project on solar energy, and tries to turn this project into a big, moneymaking machine. This corrupt scientist embodies the perspective of greed, hypocrisy, and the selfish refusal to think about the future consequences of climate crisis. As a member of prestigious scientific boards and panels, and the titular head of a government-funded institute devoted to fight global warming with innovative technologies of green energy, Beard is actually enjoying expensive lectures and abusing his position. In *Solar*, the portrayal of the planet in the age of the Anthropocene is not presented as vividly as in *The Drowned World*, a world under water, and in *The Ice People*, a world partly frozen. However, McEwan underlines the fact that the Anthropocene is a long and slow paced process, thus showing how in the absence of the striking visible proofs of climate change, the majority of people ignore the threat and remain unaware that the Earth has already entered a new geological era. This chapter considers the economic dimension of the Anthropocene.

As it can be seen, Gee's *The Ice People* (1998), Ballard's *The Drowned World* (1962), and McEwan's *Solar* (2010) share a common theme; how changes in the climate are reflected on human life in the Anthropocene. Representing various dimensions of the Anthropocene, they present different portrayals of the Earth affected by natural and/or anthropogenic climate changes as well as their aftermath. Although these novels take place in the near future with dark and apocalyptic nightmares about our planet, they hold up a realistic mirror to our contemporary lives. Therefore, they are taken as cautionary tales that present opportunities to understand the entanglements between nature and culture, humans and nonhumans, and technology and the environment.

This dissertation concludes with the understanding that the human and nonhuman entanglements are the essence of ecological understanding and ecocritical concern, and considers the environment not just as a stage upon which human story is enacted, but as an actor in the drama. That is to say, nature has the capacity to react against human

activities in its own way. So, nature and culture always shape one another reciprocally, and the Anthropocene discourses provide a fertile ground to make humans confront their actions, beliefs, and attitudes to their home, the Earth.

CHAPTER I

PSYCHOLOGICAL REFLECTIONS OF THE ANTHROPOCENE: J. G. BALLARD'S *THE DROWNED WORLD*

Despite his various novels, such as *The Atrocity Exhibition* (1970), *Vermilion Sands* (1971), *High-Rise* (1975), *Cocaine Nights* (1996), *Millennium People* (2003), and *Kingdom Come* (2006), which explore the capitalist system, heavy consumption, and the increasing role of technology in human life, the British novelist James Graham Ballard is best known for his post-apocalyptic climate change novels set in the future. His dark futuristic Cli-Fi quartet composed of *The Wind from Nowhere* (1961), *The Drowned World* (1962), *The Drought* [a.k.a. *The Burning World*] (1964), and *The Crystal World* (1966) presents dramatic accounts of climatic change and environmental transformations. The quartet also introduces striking visual portrayals of nature which has either been destroyed, or modified and reshaped by human activities. Ballard's pessimistic descriptions of natural and anthropogenic disasters include global drought and warming, sea level rise, and unexplainable extreme winds that cause visible morphological changes on the Earth's surface, such as crystallization of tropical forests, submerged cities and continents, desertification, or glaciations that cover the Earth with masses of ice.

Written in the 1960s, the four novels of J. G. Ballard's Cli-Fi quartet depict individuals who try to survive after climatic apocalypses. The first novel of the quartet, *The Wind from Nowhere* (1961), portrays the Earth's surface swept away by unexplainable extreme winds and storms. The second novel, *The Drowned World* (1962), presents a dark prophetical vision of global warming, foreshadowing a geophysical transformation that leads to rise in the Earth's temperature and the consequent melting of the ice-caps, which result in a deluge with oceanic floods washing the fertile topsoil away. The changes in the climate remake the geo-morphological structure as well as the biological diversity on the planet. Eventually, these radical changes cause life-threatening psychological disturbances in humans. The third novel of the series, *The Drought* (1964), depicts a dry and scorched Earth due to the absence of rainfalls and the

consequent scarcity of fresh water on global scale. *The Drought* traces the anthropogenic causes of this disaster back to the reckless dumping of industrial waste in the seas. The last novel in the series is *The Crystal World* (1966), which describes a state of *stasis,* motionlessness, or inactivity of all beings in a virus-induced crystallization process in which the whole forest with all its animal inhabitants is mummified under the cover of crystals that look like shiny frozen jewels.

The main concern shared by all four novels is climate change related environmental transformations, or metamorphoses. Yet, especially in two novels of the quartet, *The Drowned World* and *The Drought*, these environmental transformations trigger psychological disturbances in humans. The post-apocalyptic dystopian narratives in these two novels focus on how human psychology undergoes a change along with climatic changes. In this regard, Ballard brings a new perspective to the ecological crises by connecting threats posed by the Anthropocene to human psychology. Since especially these two novels of the quartet reflect the inner worlds of the characters in their struggle to adapt to the extreme environmental challenges, the psychological depth added by Ballard to his Cli-Fi novels carries the projections of the Anthropocene to the psychological field. Thus, this chapter aims to add a psychological dimension, which is usually neglected in the Anthropocene discussions, by exploring human beings' inner struggle in confronting the environmental catastrophes induced by their collective activities. The chapter analyses the process of adaptation and survival in the aftermath of environmental catastrophes and the psychological imbalances individuals undergo in this process in *The Drowned World.* This is the most suitable novel in Ballard's Cli-Fi quartet to depict the parallel transformation of the Earth's climate and human psychology. This parallel development of environmental and psychological transformations is examined from the ecopsychological perspective, which focuses on the connection between the individual's psychological changes and the environmental transformations. The argument is that environmental changes, especially catastrophic climate change, directly influence the characters' unconscious minds causing psychological distress. In this sense, *The Drowned World* has visible psychological depth with clearly drawn connections between climatic changes and their immediate psychological projections.

The Drowned World is about an environmental catastrophe that happens due to an unexplainable hyperactivity of the sun with a catastrophic impact on the earth's climate, morphology, and biodiversity, as well as on human psychology. The setting of the novel is a testing station floating on the tropical lagoons where London was once located. A group of scientists is assigned a cartographic mission, which aims to prepare maps of the flooded parts of the planet for the future re-colonization of these areas. The team is composed of Dr. Robert Kerans, a biologist running the testing station, his assistant Dr. Alan Bodkin, the eldest member of the group who can vaguely remember London before the disastrous floods, Colonel Riggs, the director of Kerans' team who is responsible for the security of the mission with the help of a group of soldiers under his command, and Hardman, the helicopter pilot. In addition to the research team of scientists, the other characters in the novel are Beatrice Dahl who is Kerans' girlfriend and the daughter of a wealthy family, and Strangman, the white (albino) leader of a group of black African looters who visit the submerged areas of London for leftover trophies. As the mission continues, one by one the characters suffer from psychological disturbances and nervous breakdown due to the extreme environmental conditions. They find themselves alienated from each other and distracted from their mission. Ballard, thus, links the inner disturbances in his characters' psyches to the outer disturbances in the physical environment. In other words, when nature changes, losing its balance, humans also change and become equally unbalanced. *The Drowned World* describes how the mission fails when the members of the team begin suffering from nervous breakdown. This process is deftly explained by social ecologist Stephen R. Kellert in "The Biological Basis for Human Values of Nature:"

> […] the existence of a biologically based, inherent human need to affiliate with life and life like processes. It suggests that human identity and personal fulfilment depend on our relationship to nature. The human need for nature is linked not just to the material exploitation of the environment but also the influence of the natural world on our emotional, cognitive, aesthetic, and even spiritual development. (42)

As Kellert reminds us, there is a direct relationship between the disturbed emotional balance of humans and the irreversibly disturbed nature especially when industrialisation, urbanisation, mechanisation, and technology-driven isolated life styles became dominant. This is the focus of attention in ecopsychology, a sub-field of

psychology dealing with the psychological problems when human beings are physically disconnected from nature and/or estranged from natural environments. Ecopsychology is an ecologically oriented study of psychology which explores the negative impact(s) of environmental changes on the interlinked physical and psychological well-being of human beings. Paul Shepherd, Robert Greenway, Alan Shapiro, Theodore Roszak, and Andy Fisher can be named among the pioneers of ecopsychology.

Before the term "ecopsychology" gained currency among the researchers, ecological connections of psychology and/or psychological extensions of ecological concerns were discussed under various names, such as environmental psychology, conservation psychology, ecological psychology, human ecology, eco spirituality, and green psychology. The initial study of the connection of ecology and psychology can be traced back to the 1960s, to the American psychologist Robert Greenway who used the term "psychoecology" during his lectures in 1968 at Sonoma State University. These lectures later led to the formation of the Berkeley Group by Greenway's graduate students including Elan Shapiro, Mary Gomes, Alan Kanner, and Fran Segal. As Mark A. Schroll explains in "Remembering Ecopsychology's Origins," and in "Wrestling with Arne Naess: A Chronicle of Ecopsychology's Origins," in the late 1980s, Theodore Roszak, who is also a scholar of history and culture, and the author of many fictional and non-fictional works on the bondage between humans and nature, was invited to participate in the psychoecology discussions. He was so inspired by this group that in 1992 he published a pioneering book called *The Voice of the Earth: An Exploration of Ecopsychology,* which was revised and republished in 2001. Roszak is often given credit for coining the term "ecopsychology" because he used the term for the first time and explained its principles (29-30) in this book. Robert Greenway himself acknowledges Theodore Roszak's contribution to the rise of ecopsychology following his joining the Berkeley Group in his 2000 essay "Ecopsychology: A Personal History." Roszak's other books on ecopsychology are *Where the Wasteland Ends* (1972), *Person/Planet* (1978), and *Ecopsychology* (1995), a collection of essays edited by Roszak himself, Mary E. Gomes, and Allen D. Kenner.

In the late 1990s and early 2000s, the scholarship about ecopsychology expands with the publication of new thought-provoking volumes. Among them are David Abram's *The Spell of the Sensuous: Perception and Language in a More than Human World* (1996), Laura Sewell's *Sight and Sensibility: The Ecopsychology of Perception* (1999), Deborah Winter's *Ecological Psychology* (1996), Ralph Metzner's *Green Psychology: Transforming Our Relationship to the Earth* (1999), and Andy Fisher's *Radical Ecopsychology: Psychology in the Service of Life* (2002). Moreover, today, *European Journal of Ecopsychology*, *Gatherings: Journal of the International Community for Ecopsychology*, and *The Trumpeter: Journal of Ecosophy* provide the largest selection of articles with ecopsychological content. In addition to the new publications on ecopsychology, the establishment of The Bay Area Ecopsychology Group, The Ecopsychology Institute at California State University at Hayward in 1994, and the foundation of the Ecopsychology Roundtable at the Centre for Psychology and Social Change in the same year, which became The Ecopsychology Institute in 1996, can also be regarded as other important developments in the field (Hibbard 28-27).

The essential principles of ecopsychology can be found in the epilogue of *The Voice of the Earth*, where Roszak lists them to provide a "guide" (320). He underlines ecopsychology as "a matter of listening to the whole person" (320) including "the submerged, unborn, in hiding, the infant, the shadow, the savage" (320) sides of the self. He suggests eight principles in defining ecopsychology. The first principle is based on the acceptance of the fact that "the core of the mind is the ecological unconscious" (320), the repression of which, according to Roszak, lies at the roots of "collusive madness in industrial society" (320). In other words, if the individual embraces his/her ecological unconscious, this will lead to "the path to sanity" (320). With the second principle of ecopsychology, Roszak elaborates on the concept of ecological unconscious stating that ecological unconscious represents "the living record of cosmic evolution, tracing back to distant initial conditions in the history of time" (320). The second principle underlines the co-evolution of "life" and "mind," and Roszak treats them as "culminating natural systems within the unfolding sequence of physical, biological, mental and cultural systems we know as universe" (320). So, ecopsychology accepts evolution as a multi-layered process instead of exploring the evolution of single systems

separately. Roszak's third principle of ecopsychology sets the goal of ecopsychology; that is, "to awaken the inherent sense of environmental reciprocity that lies within the ecological unconscious" (320), and thus, he puts ecopsychology to a position capable of healing "the alienation between the person and the natural environment" (320). The fourth principle of ecopsychology underlines "the child's innately animistic quality" and "the newborn's enchanted sense of the world" (320), and with this he celebrates this sense as the path to functioning as "sane adults" (320). In the fifth principle, Roszak hopes that "the ecological ego" (321) will "mature towards a sense of ethical responsibility with the planet" (321), and such an ethical responsibility will be effective in reshaping "social relations and political decisions" (321). The sixth principle of ecopsychology recommends the rejection of "masculine character traits" that "drive us to dominate nature" (321). In this respect, Roszak underlines the connection between ecopsychology and ecofeminism in their mutual effort to "demystify the sexual stereotypes" (321). The seventh principle of ecopsychology questions "the essential sanity of our gargantuan urban-industrial culture" (321), yet it "does not reject the technological genius" (321) of human species. In this respect, ecopsychology is "postindustrial but not anti-industrial" (321). The eighth principle of ecopsychology emphasizes the "synergistic interplay between planetary and personal well-being" (321).

In *The Voice of the Earth*, Roszak also argues that if environmental abuse is considered as a "psychopathology of everyday life" (328), ecopsychology may help us understand the reason behind this behaviour, and may offer possible solutions to change this behavioural pattern, which continues increasingly across generations. Ecopsychology achieves this solution by revealing "the sympathetic bond" (328) between humans and the natural world, in other words, by delving into "the ecological unconscious" (328), which Roszak introduces as a new phrase to describe an aspect of human psyche that "has been most cruelly suppressed by industrial culture" (328). So, Roszak invests in the long-term role of ecopsychology believing that it "has a promising role to play in the environmental policy" making processes (330).

Essentially, ecopsychology is based on the notion of interconnectedness of mind and body, of humans and nature, of inner world and outer world, and individual and society.

Any change in one side of these dichotomies is reflected on the other. For example, naturalist John Scull in "Ecopsychology: Where Does It Fit in Psychology" (2009), argues that "the unitive experience of being an essential, interconnected part of a larger reality" (79) occupies the core of ecopsychology, and ecopsychology presents the individual "an experience of interdependence with the rest of the universe" (79). Andy Fisher, one of the later representatives, attempts to underline "radical philosophical and experiential foundation for ecopsychology" (Greenway 1). In his *Radical Ecopsychology: Psychology in the Service of Life*, Fisher describes ecopsychology as "radical" on the grounds that ecopsychology suggests a new perspective "regarding our collective problems as deeper, or more thoroughgoing than the mainstream view appreciates, or is willing to recognize" (197). According to Fisher, this new perspective emphasises ecological crises that have "deep cultural, social, economic, political, historical, philosophical -and psychological- roots" (197). According to Deep Psychologists, this so-called harmony with nature, as the name of this field of psychology suggests, is rooted in the depth of the individual's inner self. Ecological crises that have been triggered by the anthropogenic activities cause breaks in this harmony. So, by definition, ecopsychology explores the psychological dimension of ecological crises, and thus "ecopsychology is about relating or integrating psyche and nature" (Fisher 198). Fisher, further emphasizes the role of ecopsychology in combining the objective realities of the ecologically damaged planet with their subjective reflections on its human inhabitants:

> Ecopsychology suggests that the psyche cannot really be understood as a distinct dimension isolated from the sensuous world that materially enfolds us, and indeed that earthly nature can no longer be genuinely understood as a conglomeration of objects and objective processes independent of subjectivity and sentience. (ix)

Fisher believes that the restoration of the connection between psyche and nature will also help the development of bio-centric perspectives for the solutions of environmental problems and for the adoption of eco-friendly alternatives. In this respect, "ecopsychology is best thought as a psychological politics aimed at creating the subjective conditions for an ecological society" (Fisher 198). Yet, Fisher does not expect a miraculous touch from ecopsychology to restore the broken balance between humans and nature, and to provide immediate solutions for contemporary environmental

problems. Instead, he believes that ecopsychology is "not about solving environmental problems but rather understanding how psyche and nature internally relate, how they are the interior and exterior of the same phenomenon" (205). For Fisher, ecopsychology's main pivot is "refusing all dualisms or splittings of reality" (205) and connecting human consciousness to nature to break the dichotomy between inner and outer realities.

Similar to Fisher, archetypal psychologist James Hillman in "A Psyche the Size of the Earth: A Psychological Foreword," explains the connection between environmental degradation and the parallel disturbance in human psychology stating that human psyche remains "sympathetically bonded" to the Earth that "mothered us into existence," and thus, an individual's harmony with his/her own "deep self" (xix) requires not merely a journey to the interior but a harmony with nature. Thus, in the Anthropocene, like any other field of study, psychology cannot be discussed by disregarding the contemporary ecological concerns. As Hillman emphasises, "psychology, so dedicated to awakening human consciousness, needs to wake itself up to one of the most ancient human truths: we cannot be studied, or cured, apart from the planet" (xxii). The human awareness of sharing mutual consciousness with nature can be the key to solving environmental problems, but how and why these problems have been created is equally significant.

Thus, in the Anthropocene, the focus is on the creator of these problems: humans. To understand the inner workings of the mind may help us understand the destructive side of humans. One of the important names in the field, Paul Shepherd, who is promoted by Theodore Roszak as the first ecopsychologist, asks a crucial question in his 1982 book *Nature and Madness*: "Why do men persist in destroying their habitat?" (1), and his suggested answers are "lack of information, faulty technique, or insensibility" (1). Shepherd states that human species once lived "in stable harmony with the natural environment" (3). Yet, things began to change "five and ten thousand years ago" and [human beings] became more destructive and less accountable with the progress of civilization" resulting in the increasing "economic and material demands of growing villages and towns" (3). Observing the collective symptoms, Shepherd suggests that having lost its "intuitions of the interdependence of all life" (3), the society got "sick"

(4). To be more precise, this situation is "psychopathological" (Shepherd 5); in other words, an "irrational (though not unlogical) and unconscious, a kind of failure in some fundamental dimension of human existence, an irrationality beyond mistakenness, a kind of madness" (3-4), an "ecological madness" (4) caused by the loss of harmony between human and nature. According to Shepherd, the loss of this harmony, which he argues "once existed between precivilized people and their habitat" (128), can also be seen as part of human beings' and nature's co-evolutionary process. That is to say, it is a pattern of psychological development responding to various pressures. Yet, this is a two-way process; Shepherd believes that the traces of our original ecological harmony may remain latent within us as "an inherent possession […] a legacy of the evolutionary past in which human and nonhuman achieved a healthy rapport" (128). In other words, this lost harmony may be retrieved from the collective unconscious.

The concept of a collective unconscious, which psychiatrist Carl Gustav Jung explains as inherited from our prehistoric ancestors and shared by all human beings, refers to the idea that "in some way or another we [humans] are part of a single all-embracing psyche" (*Collected Works Vol. 10*, 175). Theodore Roszak, too, acknowledges the practical and theoretical value of Jung's notion of collective unconscious in the development of ecopsychological approaches. Roszak states that "of all the theoretical apparatus we inherit from mainstream modern psychology, Jung's often allusive and always controversial notion of a collective unconscious may prove to be the most serviceable in the creation of an ecopsychology [and…] the ecological unconscious" (*The Voice*, 301-302). In this respect, the Jungian concept of the collective unconscious, now reformulated by Roszak as "ecological unconscious," is like "a repository for the compounded evolutionary history of our species" (*The Voice*, 302). This is not too far from what Jung himself had already anticipated when he wrote, "just as the body has its evolutionary history and shows clear traces of the various evolutionary stages, so too does psyche" ("Two Kinds" 29).

This notion of "ecological unconscious" as the fusion of internal drives and external reality appears frequently in Ballard's novels[6] including *The Drowned World* in which Ballard deliberately blurs the boundary between the mental and the physical realms, and

transgresses the borderline between landscapes and mindscapes. This is especially evident when the narrative focuses on Surrealist paintings by Paul Delvaux and Max Ernst. The disturbed psyches of the characters, and their primitive impulses surfacing afterwards are visualised through these Surrealist paintings. Ballard is indebted to Surrealism[7] because, as Ballard scholar Colin Greenland puts it:

> [t]he Surrealist techniques that Ballard has used involve deliberate dissociations and mystifications. The object is taken from its usual context and dismantled, or put in a new context, or confused with other objects. But the result of the process is not mere nonsense, but a revaluation. The elements acquire new significance from the reorganization, so that we sense more about the object than we knew or felt before. Surrealism can thus be said to have both a synthetic and analytic aspect; it consists not only of inspiration, but also of inquiry. (104)

Ballard believes that Surrealism is the key to the 20th century experience in which mindscapes and landscapes are interrelated. As he states in an interview: "I thought […] these [paintings] were the real landscapes of the 20th century" (qtd. in Laing 165). In his 1966 article "The Coming of the Unconscious," Ballard describes "the images of Surrealism [as] the iconography of inner space" (84). Since some of the images in the Surrealist paintings reflect the characters' unconscious fears and vague memories from a mysterious past, Ballard uses them in *The Drowned World*, such as the paintings on the walls of Kerans' girlfriend Beatrice's apartment that Ballard portrays at the beginning of the novel for the first time and revisits throughout the novel as the characters' psychologies change. Actually it is Beatrice's grandfather who decorated the family residence with the paintings of Max Ernst and Paul Delvaux.[8] Since her parents' death shortly after her birth, Beatrice had been raised under the supervision of her wealthy grandfather who was an admirer of art, and especially a patron of Surrealist painters. After her grandfather's death, Beatrice continues to live in the same apartment. To check on Beatrice on a day when the sea-rise reaches a dangerous level, Kerans and Riggs visit her apartment, which Kerans describes:

> Over the mantelpiece was a huge painting by the early 20th century Surrealist [Paul] Delvaux, in which ash-faced women danced naked to the waist with dandified skeletons in tuxedos against a spectral bone-like landscape. On another wall one of Max Ernst's self-devouring phantasmagoric jungles screamed silently to itself, like a sump of some insane unconscious. (29)

So far, the paintings seem to be used just for decorative purposes, but soon, Kerans gets irresistibly drawn into these paintings.

> For a few moments Kerans stared quietly at the dim yellow annulus of [Max] Ernst's sun glowering through the exotic vegetation, a curious feeling of memory and recognition signalling through his brain. Far more potent than the Beethoven, the image of the archaic sun burned against his mind, illuminating the fleeting shadows that darted fitfully through its profoundest deeps. (29)

As he looks at the images, which seem to be borrowed from an archaic past, something in Kerans mind is triggered. Suddenly, those images look familiar to him, as if he had actually lived in these landscapes. This is the moment of his connection to the ecological unconscious as he really feels the scorching warmth of the archaic sun in the painting on his skin, and he feels like burning. Then, the narrator explains how Kerans becomes aware that "[…] however brief and imperceptible, a moment of significant time had elapsed, carrying him [Kerans] forward with its passage into a zone of commitment from which he would not be able to withdraw" (30). At this brief moment, Kerans's unconscious intersects with his conscious mind, and the past leaks into the present. The image of the scorching sun and the feeling of burning are revisited towards the end of *The Drowned World* to reflect Kerans's disturbed mind and fears: "The archaic sun in his mind beat again continuously with its immense power, its identity merging now with that of the real sun visible behind the rain-clouds. Relentless and magnetic, it called him southward, to the great heat and submerged lagoons of the Equator" (161). Like each concrete image in Ballardian wilderness, the images of tropical landscape can be treated as an allegorical reflection of wildness in his characters' inner worlds. According to Andrej Gasiorek,

> The Delvaux canvas offers a proleptic glimpse of the violent, scapegoating carnival that will later pit Kerans against Strangman in "The Feast of Skulls," Ernst's hallucinatory painting provides a visual counterpart to Ballard's atmospheric prose and functions as a gateway [passage] into Kerans's submerged mind. (31)

As Gasiorek argues, *The Drowned World "*follows the journey of a man [Kerans] seeking to re-establish contact with the deepest archaic memories of the human race" (32). Moreover, according to him, both artworks referred to in the novel, of Delvaux and of Ernst, are "metonymic representations of *The Drowned World's* desire to meld

different kinds of reality so as to escape the constraints of a worldview based on rationalism" (31). In this respect, Gasiorek is right in stating that *The Drowned World* provides "a surrealist textuality in which inward dreams are superimposed onto outward realities" (31).

Another Ballard scholar Janette Baxter, on the other hand, emphasizes the connection between the Surrealist landscapes in the paintings and the real landscapes of the Anthropocene. She interprets the unnatural brightness of the Sun image revisited frequently in Ernst's art, appearing at the background of his paintings, such as *Forest and Sun* (1927), *The Large Forest* (1927), and *Petrified Forrest* (1927), as representing a nuclear explosion. Considering *The Drowned World*'s year of production, 1962, being the post-nuclear age, the sun with its "shimmering rings of lights which glow out from the golden core embody the movement of denotation, the far-reaching effects of [nuclear] apocalypse" (Baxter, "Mapping a Surrealist" 35). In an interview, Ballard himself states "I have always wanted really to be a painter […] I have said somewhere else that all my fictions consists of paintings. I think I always was a frustrated painter. They are all paintings, really, my novels and stories" (Goddard and Pringle 9). Similarly, in another interview with Andrew Bishop for the special web site dedicated to Ballard's literary works (www.ballardian.com), Ballard further explains his references to Surrealist paintings in his novels as follows:

> In many ways, my novels and short stories are a series of described paintings. Had I had the technical ability, I would have become a painter. I had just enough skill, draughtsmanship, as a boy to lead me to think that I could become a painter. I never had the flair. I did have a certain flair for writing, so I became a writer. I very much see my novels and short stories as I write. ("A Temporarily" 2)

In other interviews, Ballard notes how Surrealism and its greatest practitioners, such as Max Ernst, Magritte, Salvador Dali, and Paul Delvaux, played a crucial role in forming his view of the world. Ballard also explains the motivation behind his particular interest in Surrealism as being the dreamlike nature of this artistic movement. That is to say, what attracted him in Surrealism is "the surrealist dream of remaking the world" ("An Appreciation" 1). That is why the Surrealists are among Ballard's favourite painters. Moreover, the Surrealists were the first artists to use psychological reality "as a guide to

the realm of dreams, fears and obsessions" (Oramus 61). Another example of Surrealist painters given in the novel to reflect the characters' inner anxieties is Salvador Dali. When Kerans wanders around the flooded areas, he passes by a half-submerged clock tower, and stares at the two clock towers "jutting up like white obelisks above the fern fronds" (62). This landscape is stored in his memory, and during some nights it leaks into his unconscious. So, Kerans begins having strange dreams in which he finds himself struggling in a surrealistic world, just like the Surrealist paintings of Salvador Dali [9]:

> Several times, before they abandoned one of the drowned cities, they [Kerans and Riggs] had wound the two-ton mechanism of rusty-cathedral clock and they had sailed off to a last carillon of chimes across the water. For nights afterwards, in his dreams Kerans had seen Riggs dressed as William Tell, striding about in a huge Dalinian landscape, planting immense dripping sundials like daggers in the fused land. (63)

Although Ballard himself accepts the advantages of using paintings in his novels as visual aids to underline his message, the most common way to observe the "archaic" and the "primitive" in human unconscious is found in dreams, fantasies, and hallucinations, which come to the surface every time the rational part of human conscious is loosened. Considered in the ecopsychological context, the relationship of humans with their natural environment, which is observable in their way of using or abusing the planetary resources, can be read as projections of the unconscious needs and desires. These unconscious needs and desires reveal themselves in dreams and hallucinations. Under normal conditions, these primitive urges are repressed, or at least kept under control by our "ego," to use Sigmund Freud's terminology. Yet, under extreme conditions like global ecological crises, they come to the surface, and the Earth turns to a blank screen on which the human unconscious projects its repressed fantasies. In this sense, Ballard wants to show that descending into the human psyche is also descending into human prehistory. For Ballard, humans have lost contact with their collective heritage, but it resurfaces in dreams especially during moments of ecological catastrophes.

Dreams are actually a gate to our "phylogenetic" roots, as Meredith Sabini claims re-interpreting the Jungian use of dreams.[10] According to Sabini, the human psyche of the

present day includes traces of the archaic self that she describes as "the bedrock of what we are as a species" (99), also known as "the prehistoric unconscious," or "the phylogenetic unconscious," which is the Pleistocene psyche (99). The archaic or primitive mind of the modern humans is studied by evolutionary psychologists, who think that we share a million-year-old heritage that connects us to our primordial roots. Like them, Ballard also questions how human psychology undergoes a parallel change with the globally destroyed ecosystems. In other words, the psychological dimension in Ballard's novel deals with human beings' responses to environmental catastrophes, emphasising the process of adaptation to and survival of the environmental challenges. Ballard dramatizes how this process contributes to the identity formation and psychological development of individuals. In an interview he says that

> my characters behave in a paradoxical way. In many cases, they embrace Death, but that does not mean I am pessimistic. In fact, they find fulfilment. I think that all of my fiction is optimistic because it's a fiction of psychic fulfilment. […] The characters find after a long journey of self-discovery, gradually, the truth about themselves. They find a logic with this running. They realize that to find themselves, they must follow that logic, even if it means their own death. (Goddard and Pringle 23-24)

Already in the first page of *The Drowned World*, Ballard introduces his pessimistic vision that he underlines in this interview, showing how the totally damaged atmosphere has radically altered the climate, metamorphosed the flora and fauna, and left only few human survivors. The whole world is submerged due to the melting ice caps. The mobile scientific testing station where Robert Kerans works as a biologist is responsible for preparing an updated geomorphological map of the Earth with its emergent land masses and lagoons after the floods. Together with a group of scientists in the testing station, Kerans also examines the newly formed ecosystem and helps to evacuate the remaining refugees on their way to safety as they move northwards away from the life-threatening heat of the submerged south. The primary cartographic function of the testing station, however, is to record the changed morphology of the Earth and to collect scientific data, which will help the survivors of the drowned world adapt to the new environment and climate. It also functions as patrol force acting on behalf of the administrative government to bring order to civic life by controlling the rebellious

refugees and looters. Under these conditions, climatic changes bring along demographic changes on a global scale:

> The majority of tropical areas rapidly became uninhabitable, entire populations migrating north or south from temperatures of a hundred and thirty and a hundred and forty degrees. Once-temperate areas became tropical, Europe and North America sweltering under continuous heat waves, temperatures rarely falling below a hundred degrees. Under the direction of the United Nations, the colonization began of the Antarctic plateau and of the northern borders of the Canadian and Russian continents. (21)

At the beginning of the novel the reason behind the tropical climate and the loss of polar ice that cause the continents to submerge is explained as solar radiation, which suggests a highly probable depletion in the ozone layer:

> A series of violent and prolonged solar storms lasting several years caused by a sudden instability in the Sun had enlarged the Van Allen belts and diminished the Earth's gravitational hold upon the outer layers of the ionosphere. As these vanished into space, depleting the Earth's barrier against the full impact of solar radiation, temperatures began to climb steadily. […] All over the world, mean temperatures rose by a few degrees each year. (21)

The sudden and extreme increase in the solar radiation released by unexpected, extreme solar storms have caused structural damages on the Earth's Van Allen Belts, making the Earth's temperature rise drastically over the last seventy years. To understand the reference to the enlarged Van Allen Belts[11] in the novel, it is necessary to explain here that these belts "are a collection of charged particles, gathered in place by Earth's magnetic field. They can wax and wane in response to incoming energy from the sun, sometimes swelling up enough to expose satellites in low-Earth orbit to damaging radiation" (Fox, "NASA's Van Allen Probes" 1). The Van Allen Radiation Belts function as a protective shield, and/or "a nearly impenetrable barrier to high-energy electron [particles], keeping them from hitting Earth" (Howell, "Van Allen" 2). After their first discovery, scientists have learned that the two known Van Allen Belts can occasionally change shape, merging, or even separating into three belts. For example, "the inner belt stretches from 400 to 6,000 miles above Earth's surface and the outer belt stretches from 8,400 to 36,000 miles above Earth's surface" (Fox, "NASA's Van Allen Probes" 2). Today, scientists at NASA continue to study the Van Allen Belts to predict

any changes in their size and structure that can help them protect satellites in the area from solar radiation.

In *The Drowned World*, due to the damaged Van Allen Belts the absence of a resilient ozone layer to filter the radioactive rays of the Sun makes Earth vulnerable against powerful radiation waves, the temperature rises rapidly, polar ice melts, and especially the continents in the Southern hemisphere are submerged. After the floods, the whole planet eventually turns into a huge lagoon. Several decades have already passed over the first floods, and people are in preparation of re-colonizing the habitable parts of the planet. Robert Kerans summarizes the situation: "In response to the rises in temperature, humidity and radiation levels, the flora and fauna of this planet are beginning to assume once again the forms they displayed the last time such conditions were present –roughly speaking, the Triassic Period" (42).

As the climatic conditions change and temperature climb up, becoming tropical, the plants are the first organisms that start to transform and adapt to the new environmental conditions followed by the animals that also learn to adapt. Thus, all living organisms undergo structural transformations except for humans who struggle to adapt but in the end fail to do so. In time, a totally different flora and fauna emerge on Earth. Kerans and other biologists on deck observe the "backward journeys of so many plants" (42), as "countless mutations completely transforming the organisms to adapt them for survival in the new environment" (42). At the very beginning of *The Drowned World*, Ballard gives detailed descriptions of the altered flora and fauna. For example, the first change is the "momentous return of the age of the giant reptiles" (9), such as "large sail-backed lizard with a gigantic dorsal fin […] indistinguishable from the Pelycosaur" (9), "a giant Anopheles mosquito [at] the size of a dragon fly" (10), "huge predator insects [coming] out of their lairs due to the mounting heat" (10), "gymnosperms; intruders from the Triassic past" (10), "huge flies rotting animal carcasses" (10), "the snakes gliding softly among the damp, fungus-covered settee" (16), "a large hammer-nosed bat" (17), "the labyrinth of giant web spun across the inlet by the colonies of wolf spiders" (18), "the iguanas and basilisks" (18). It looks as if "the reptiles had taken over the city. Once again, they become the dominant form of life" (18), as in the Triassic prehistoric period.

So, as part of their forced "preparation for a radically new environment" (14), almost all animal forms [went, or] are about to go a major metamorphosis" (14). As for the flora, the first change is observed in the jungles, which are the most remarkable feature of tropical climatic zones. In addition, the other observable changes in flora are "the rings of massive plants" (17), such as "the orange-sized berries" (24), "giant bamboo groves" (25), "drastic upsurge of all lower plants and animal forms" (22), "freak botanical forms, giant tree-ferns of the Carboniferous Period" (22), which lasted from about 359.2 to 299 million years ago during the late Paleozoic Era. This prehistoric period is best known for its vast swamp forests. In their web site, the University of California Museum of Palaeontology shares the scientific evidence they preserve about the Triassic Period as well as the palaeontologists' observations based on comparisons between fossil and modern-day plant morphology:

> The beginning of the Carboniferous generally had a more uniform, tropical, and humid climate than exists today. Seasons if any were indistinct. The Carboniferous plants resemble those that live in tropical and mildly temperate areas today. Many of them lack growth rings, which suggests a uniform climate. This uniformity in climate may have been the result of the large expanse of ocean that covered the entire surface of the globe, except for a localized section where Pangea, the massive supercontinent that existed during the late Paleozoic and early Triassic, was coming together. Shallow, warm, marine waters often flooded the continents. (1)

As seen in the assumptions of the scientists based on the geological findings, the geological and ecological descriptions in Ballard's *The Drowned World* match perfectly with the contemporary scientific assumptions. With all these metamorphosed life forms, the lagoon in the novel looks like "a garbage-filled swamp" (13), or a hybrid of a "voodoo jungle" (17) and "confounded zoo" (17). These are the environmental changes observable only nearby the testing station in *The Drowned World*. Yet, the whole world is under a radical transformation. As "permafrost liquefied into gigantic rivers" (22) due to global warming, and like the rest of the world, "Europe became a system of giant lagoons" (22). So, the geomorphology of the Earth totally changes. Moreover, giant reptiles and other aggressive species inevitably pose threats for human survival. Yet, the possibility of being attacked, bitten, stung, or poisoned by these animals and/or insects is not the only danger. "Enormous clouds of mosquitos" (85) also suggests the possibility of contagious diseases like malaria. However, as the novel progresses, it is

seen that other human beings become an equally life threatening danger for the characters.

Triggered by changing climatic conditions, and the re-appearance of the prehistoric climate, the flora and fauna of the prehistoric times re-emerge, which in turn trigger the repressed primitive urges of humans to re-surface. In other words, changes in the landscape lead to changes in the mindscape: "Everywhere there's been the same avalanche backwards into the past… Everywhere in nature one sees evidence of innate releasing mechanisms literally millions of years old, which have lain dormant through thousands of generations but retained their power undiminished" (43).

When the balance between the rational and the instinctive is lost, this transgression becomes more clearly observable in the dreams leaking into real life. As the climatic conditions return to the prehistoric geological times, the characters gradually lose their ability to distinguish their dreams from their real lives, so reality and illusion become indistinguishable. As the eldest member of Kerans' team, Dr. Bodkin observes: "just as the distinction between the latent and the manifest contents of the dream had ceased to be valid, so had any division between the real and the super-real in the external world" (74).

The inhabitants of the station find themselves in an internal dilemma; first, they begin to listen to their instincts more often than their reason; then, they totally lose control over their rational side, and in the end, they go insane by displaying violent and irrational behaviours. The first symptoms of their disturbed psyche are insomnia, aggression, sleepwalking, and uncontrollable sexual urges. In time, the scientists in the testing station begin to suffer either from insomnia or from strange dreams that make them constantly exhausted, and their nervous systems collapse. The dreamlike visions predominated by prehistoric landscapes, images, and sounds coming from giant reptiles and amphibians gradually turn into nightmares, which are impossible to handle. It is as if they are trapped in the ecological unconscious, re-living what Roszak calls the "record of cosmic evolution, tracing back to distant initial conditions in the history of time" (*The Voice* 320). For instance, Kerans, in his nightmares, is continuously pulled under water by giant amphibians, and is almost drowned. When he tells about this

nightmarish dream to his close friend and fellow scientist Bodkin, he comments on the content of these phylogenetic dreams stating that "however selective the conscious mind may be, most biological memories are unpleasant ones, echoes of dangers and terror" (43). According to Andrzej Gasiorek, this psychological state suggests that "the peace to be found in *amniotic sac*[12] cannot be dissociated from archetypal fears" (36). So, Kerans' almost drowning in these nightmares represents "his last attempt to evade the challenge of confronting the transformed world" that he lives in (Gasiorek 36). When other characters in the station begin to have similar prehistoric nightmares, Bodkin provides a scientific explanation for what is happening, arguing that the massive rise in the Earth's temperature has reversed the evolution, driving the planet back through geological time until it has reached the Triassic period. This is a process accompanied by "a parallel transition in the human mind that has returned it to the very origins of human consciousness" (Gasiorek 36). This parallel transition of the Earth's environment and the unconscious of its inhabitants in the novel also exemplify the third principle of ecopsychology stated by Theodore Roszak; "to awaken the inherent sense of environmental reciprocity that lies within the ecological unconscious" (320). Re-surfacing through phylogenetic dreams, the environmental reciprocity suggested by Rozsak is awakened in the characters' mind, and they reconnect with their ecological unconscious. Thus, in the novel, Bodkin defines Kerans' nightmares dominated by prehistoric images as "phylogenetic dreams," and interprets them as reflections of the "biological memories" that we share with our ancestors: "we all carry within us a submerged memory of the time when the giant spiders were lethal and when the reptiles were the planet's dominant life form [The Triassic Era]" (43). This is how and why Kerans can have dreams about a remote past; in fact, he does not fantasize about those prehistoric times, but remembers them. That is the reason behind his feeling of "déjà vu" (43). Bodkin asks: "I am really thinking of something else. Is it only the external landscape, which is altering? How often recently most of us have had the feeling of déjà vu, of having seen all this before, in fact of remembering these swamps and lagoons all too well" (43). The psychological and physical experiences of the individuals clearly reflect a regression in geological time:

> I am convinced that as we move back through geophysical time so we re-enter the amnionic corridor and move back through spinal and archeopsychic time,

> recollecting in our unconscious minds the landscapes of each epoch, each with a distinct geological terrain, its own unique flora and fauna, as recognisable to anyone else as they would be to a traveller in a Wellsian time machine. Except that this is no scenic railway, but a total reorientation of the personality. If we let these buried phantoms master us as they re-appear we'll be swept back helplessly in the flood-tide like pieces of flotsam. (44-45)

This is the most striking argument of *The Drowned World* about the psychological impacts of the Anthropocene. That is, by repeating the biological and ecological conditions in a particular period recorded in the geological timeline of the Earth, the new environment triggers human beings' ancient and repressed unconscious memories. As the voice of science in the novel, Dr. Bodkin further explains this process:

> The innate releasing mechanisms laid down in your cytoplasm millions of years ago have been awakened, the expanding sun and the rising temperature are driving you back down the spinal levels into the drowned seas submerged beneath the lowest layers of your unconscious, into the entirely new zone of the neuronic psyche. This is the lumbar transfer, total biopsychic recall. We really remember these swamps and lagoons [in the Triassic Period]. (74)

Bodkin's explanations of the psychological changes in the members of the research team are based on the science of neuronics which Dominika Oramus, another Ballardian scholar, describes as understanding of past reality coded in the hindbrain:

> Based on the theories of Freud and Darwin, *neuronics* describes reality as a product of mindscape pyschically born in the brain. Memories from the turn of the Paleozoic and Triassic era are coded somewhere in the hindbrain. These long-latent genetic recollections of our ancestors, the first air-breathing amphibians, are now awoken by the external stimuli resembling those from millions of years ago. (196)

The members of the research team were born at Camp Byrd in Northern Greenland, except for Dr. Alan Bodkin. When people decided to migrate towards the secure areas in the North, Bodkin was at the age of six. So, Bodkin is the only person who is old enough to remember the condition of Europe and of London before the whole continent was submerged. As the novel proceeds, Bodkin is haunted by his childhood memories, and he, too, gets gradually trapped in his mindscape. Thus, he is usually described wandering around the lagoon and spends almost all his time outside indulged in himself instead of working in the station.

One by one, the characters in the novel begin to be haunted by strange dreams dominated by recurrent images from prehistoric times. Jungle is one of these repeated motifs in the characters' nightmarish dreams. The jungle dreams experienced by the characters dig up the repressed memories and primitive urges stored in human unconscious. These dreams embody the primordial fears in the physical forms of giant reptiles. The inevitable outcome is trauma, and the solution, according to Ballard, is to confront the fears aroused by these archaic demons, which necessitates a psychological metamorphosis. According to Ballard scholar Samuel Francis, such a confrontation is a reification of the Freudian concept of "uncanny;" that is, the return of "something which is familiar and old-established in the mind and which has become alienated from it only through the process of repression" (76). So, *The Drowned World* portrays "the return of the repressed in both biological and geological terms triggered by a trauma of archaic psycho-chemical crises" (Francis 76). In other words, re-living the past is one of oldest and the most common coping mechanisms with traumas. As Dominika Oramus explains: "The very embryo of every animal is obliged in its development to repeat structures of all ancestral forms without the possibility of taking any short-cuts. Our evolutional descent is imprinted on every cell of our organisms: they all 'remember' previous conditions" (53). Hence the connection between the present problems and their roots in the distant past links the psychic discomforts of characters to what had happened thousands of years ago, which they are experiencing again in the ecological unconscious. Emphasizing the psychic connection between the present and the past, Ballard "identifies the past of the human race with the mysterious depths of contemporary psyche" (Oramus 53).

As particular visions and recurrent motifs continue to dominate the dreams/nightmares of the characters, psychological breakdown starts with the most vulnerable one, the old Dr. Bodkin who is haunted by the childhood memories of half submerged London. The last character who is affected psychologically is Dr. Kerans. The psychotic swings between "phylogenetic" dreams and insomnia causing a disturbed psyche is not unique to Kerans and Bodkin. Hardman, the helicopter pilot, is also psychologically disturbed, and loses connection with the principle of reality. Hardman first starts imagining things, and feels the threat of an invisible danger. As his survival instincts are activated, he

steals a riffle and escapes from the station, and tries to abduct Beatrice on his way out, but returns after a while and tries to sabotage the evacuation and blows up the station. When they find Hardman about a month later, Kerans notices a clear imbalance in his psychology: "Kerans felt that Hardman's real personality was now submerged deep within his mind, and that his external behaviour and responses were merely pallid reflections of this, overlayed by his delirium and exposure symptoms" (173). Unable to resist the psychological disturbance of his nightmarish dreams and hallucinations, he escapes from the testing station again towards the scorching heat of the South instead of leaving for the relatively secure and cooler North, or Greenland to be more precise, with others, as planned, when the cartography mission is completed.

Hardman's attempts to escape is indicative of the fear that he would lose his identity if he connects with his evolutionary memory which is explained in the novel as follows:

> These are the oldest memories on Earth, the time-codes carried in every chromosome and gene. Every step we've taken in our evolution is a milestone inscribed with organic memories […] Each is a record of a thousand decisions taken in the face of a sudden psycho-chemical crisis. Just as psychoanalysis reconstructs the original traumatic situation in order to release the repressed material, so we are now being plunged back into the archeopsychic past, uncovering the ancient taboos and drives that have been dormant for epochs. (43-44)

Such a perception connects human beings to other human beings who lived before us and will live after us, not only in physical terms but also in mental terms. For example, Dr. Bodkin says that "the brief span of an individual's life is misleading. Each one of us is as old as the entire biological kingdom, and our bloodstreams are tributaries of the great sea of its total memory. The uterine odyssey of the growing foetus recapitulates the entire evolutionary past" (43-44). This is what happens to Hardman when he starts yielding to this ancient stimulation on the unconscious level, which increases his fears and he feels compelled to escape.

After Hardman's escape, Colonel Riggs decides to leave the testing station to go north with the rest of the team, except for Kerans, Bodkin, and Beatrice. In the meantime, a gang of looters led by a "corpse-white," probably an albino man called Strangman, and accompanied by thousands of alligator watchdogs, arrive at the lagoon located in the

submerged London area. Having approached the station with a depot ship, they are "engaged, like most of the other freebooters, still wandering through the Equatorial lagoons and archipelagos, in pillaging the drowned cities, reclaiming the heavy specialized machinery such as electrical power generators and switchgear that had been perforce abandoned by the governments" (89). To discover the possible sunken valuables under water, Strangman and his fellow looters organize a diving mission. They even construct a dam, and try to pump out the lagoon located exactly on Leicester Square. Around that time, Kerans, who has been feeling strange and psychologically disturbed, begins to act abnormally. On one occasion, when he seems to be under the influence of an inner voice telling him to dive into the "womb-like" lagoon he leaves his body into the "soothingly warm" water that resembles the uterine liquid surrounding the fetus in the mother's womb. Caught up in the illusion of the moment, he cuts the oxygen cable and in a way attempts to commit suicide. As he is under water, Kerans loses consciousness and starts hallucinating. He claims that he has seen the star map of the ancient world:

> […] as his consciousness faded, he could see the ancient nebulae and galaxies shining through the uterine light, but eventually even their light was dimmed and he was only aware of the faint glimmer of identity within the deepest recesses of his mind. Quietly he began to move towards it. Epochs drifted. […] He drifted from one pool to another, in the limbos of eternity, a thousand images of himself reflected in the inverted mirrors of the surface. Within his lungs an immense inland lake seemed to be bursting outwards, his rib-cage distended like a whale's to contain the oceanic volumes of water. (110)

Before it is too late, Kerans is saved by Dr. Bodkin who has seen what has just happened assuming that the oxygen cable must be hooked around some obstruction, and Kerans lost consciousness due to lack of oxygen. Yet, Strangman intervenes in Bodkin's attempt, saying that "he anchored the cable himself, quiet deliberately. […] Because he wanted to become part of the drowned world" (111). Kerans' attempted suicide and his tendency towards self-annihilation is in fact a desire to descend into the ecological unconscious; that is to dissolve in the interconnected elements of the world, in the past and the present. It is as if Kerans has retained all archaic memories, returning to the inscriptions on his genes in a moment of trauma. Dominika Oramus defines this regressive state of mind as "evolution in reverse" (197), and explains that "the will to die is innate and true to nature and Ballard's characters are conditioned to fulfil their

destiny. [Thus] instead of saving their lives and coming back to Greenland, one by one they decide to go south when their time comes, to the places too hot for humans. Unconsciously knowing that, according to some global design, they are doomed to extinction" (197).

This sheds light on the unexplainable instincts of the characters in *The Drowned World* driving them to act in a particular way, as if they were repeating a predetermined pattern. Moving towards the warmer South, or diving into the depths of the lagoon for psychic comfort, attacking anyone on their way, are some of the examples of instinctual responses of the characters. Towards the end of the novel, just like Hardman who disappears without notice, Kerans feels an irresistible internal drive to leave the others behind and start his own odyssey towards the tropical South: "So he left the lagoon, and entered the jungle again, within a few days was completely lost, following the lagoons southward through the increasing rain and heat, attacked by alligators and giant bats, a second Adam searching for the forgotten paradises of the reborn sun" (175). The urge of isolation from the others on the mission, delving into self-contained, self-sufficient inner world, and withdrawing from one's usual external contact zone are the direct results of these characters' phylogenetic dreams which push them towards the primordial past they share with their ancestors, even if they know that they will die in the end.

All the characters in *The Drowned World* choose to escape instead of staying and trying to adapt to the changed environment. According to Peter Brigg, in his 1979 article "The Drowned World," this is the distinctive difference in the portrayal of *The Drowned World*'s survivors, and in the description of their responses to environmental catastrophes: "Ballard's characters are not scientific heroes who try to modify the inexorable progress of nature towards a world that disturbs and endangers man. Man can only react to the changes, attempting to modify the way in which he lives in order to survive" (3). Since the environmental damage is presented to be irreversibly severe in the novel, and there is no hope of rectifying the situation, the characters choose to escape, instead of finding ways to adapt to the transformed environment. Thus, Kerans

and his team are only recording the scale of the damage, and are there to help the remaining survivors migrate towards the secure areas in the North.

The failure of the characters in *The Drowned World* to adapt to the changing climatic and environmental conditions, according to Brigg, lies in the fact that "he [human] cannot adapt quickly enough, and that his archaeophysic [*sic*] impulses destroy the body even as they produce a sense of unity with the changed world" (3). In other words, as humans try to adapt to the climatic changes they "tap the same archaeophysic [*sic*] pool as do other animals and plants" (Brigg 3). Yet, whereas animals and plants can adapt by regressing to their prehistoric natures, humans fail, especially on the psychological level, as "[their] mind and its complex cultural and technological by-products attempt to adapt for survival" (Brigg 3). Humans fail, because they cannot synchronically evolve backwards to adapt to the reversed evolutionary environmental metamorphoses. Robert Kerans' attempted suicide is the outcome of a similar failure; he cannot mentally cope with the changing environmental conditions. Simply, his mind refuses to be part of a radically changed environment.

It is important to note here that the interaction between mind and the environment is quite complex. As neuroscientist Antonio Damasio observes, "the organism interacts with the environment as an ensemble: the interaction is neither of the body alone nor of the brain alone," which is why "mental phenomena can be fully understood only in the context of an organism's interacting in an environment" (xxvii). Similarly, in *Affective Ecologies: Empathy Emotion and Environmental Narrative*, Alexa Weik von Mossner describes the human mind as "embodied, embedded, enactive, and extended" (4), and thus suggests a new understanding of the mind as "both *embodied* (in a physical body) and *embedded* (in a physical environment)" (4). According to von Mossner, "the content of our thoughts is determinable by features of the environment, and that the proper faculties of cognition are not limited to the brain and neuronal system, or even the body as a whole, but that they are spread out into the environment" (5). Thus, the radical changes in the characters' physical environment trigger serious mental traumas. As traumatised subjects, they develop a psychological withdrawal or regression as a defence mechanism to be able to cope with the extreme external conditions. In other

words, human consciousness returns to its phylogenetic roots at the times of crisis. Those evolutionary stages and the psychological traces of the experiences in those stages are never erased during the evolution process, but are stored in human subconscious. In this respect, the human mind is like a palimpsest, which is a piece of parchment used in ancient Mesopotamia where paper is extremely valuable. When the earlier manuscript on the parchment is no longer needed, it would be scraped or erased so that the palimpsest can be reused for new inscriptions many times. However, as time passes, the faint remains or traces of the earlier inscriptions may reappear and become readable once again. Similarly, the supressed residues of the past may resurface in the future when the conditions are suitable.

Like in a palimpsest, the residues of the past resurface at the end of the novel as the characters' psychological disturbances reach a climax when the changing climatic conditions become totally catastrophic. In the end, the inhabitants of the testing station, despite their nervous breakdown and hallucinations, deduce that the lagoon itself is hallucinogenic, so colonel Riggs, the leader of the military troop assigned to protect the mobile testing station and its residents, orders the drainage of the submerged city of London. Kerans, Beatrice and the other reluctant spectators of the procedure witness "the passing of the illusion and the disclosure of reality" (Baxter, "Mapping a Surrealist" 30). The narrator describes Beatrice's face as "the spell of the lagoon is broken" (Baxter, "Mapping a Surrealist" 30): "She gazed out at the emerging city […] Veils of scum draped from the criss-crossing telegraph wires and tilting neon signs […] turning the once limpid beauty of the underwater city into a drained and festering sewer" (121). Beatrice, however, is disappointed: "It's like some imaginary city of Hell […] I need the lagoon" (123). No matter how dangerous and hostile it is, the inhabitants of the lagoon develop an emotional and psychological attachment to the lagoon and even find it comforting. As Baxter argues, especially Beatrice finds "comfort" in this "illusory environment" ("Mapping a Surrealist" 30). This paradoxical state of mind can be explained as a vague attempt on the part of the characters to adapt to the situation; but it does not last long.

Could the psychologically disturbed characters in the novel have survived somehow? This question hangs in the air as the novel ends. Can they recover from the psychological disturbances that have been haunting them? Extending this question to the general condition of humanity in the Anthropocene, and questioning the vulnerability of human psychology under contemporary global ecological threats, the Australian scholar of psychiatry, philosophy and anthropology, Roger Walsh asks in "Psychology and Human Survival:" "Can humankind survive?" (59). Walsh poses the question of human survival through environmental threats in the long term as "the most important question of our time," (59), and he underlines the gap in contemporary environmental literature. Despite the seriousness of this question for the people of the Anthropocene, the answer is not adequately addressed in the mainstream psychological literature. According to Walsh, "this [psychological] deficiency in the literature becomes all the more remarkable when it is realized that all the major global threats to human survival and wellbeing are now primarily human caused. That is, they stem directly from our own behavior and can therefore largely be traced to psychological origins" (59). Walsh argues that today almost every aspect of Earth's ecosystems is in "an accelerating deterioration" (59), and they pose serious ecological threats for human beings. These global threats are malnutrition, desertification, population explosion, resource depletion, pollution, greenhouse warming, and nuclear weapons (Walsh 59-60). Addressing these problems, ecopsychology, however, fills a significant gap in literature. If "the current threats to human survival and well-being are *actually symptoms* of our individual and collective mindset" (Walsh 59), ecospychological research gains even more significance. As Walsh states, "to cure or at least significantly improve them may therefore demand not only symptomatic treatment, such as feeding the starving, and reducing nuclear stockpiles, but also understanding and treating their psychological roots" (60). For Walsh, "developing and applying such understanding" (60) is one of "the most urgent tasks facing our generation" (60). Ballard's novel provides such an understanding by addressing environmental threats from an ecopsychological perspective, and thus cautioning us against the future ecological risks in the Anthropocene psychologies.

In conclusion, *The Drowned World* highlights the significance of ecopsychology in dealing with ecological threats. Like *The Drowned World,* ecopsychological novels can shed light on human beings' general attitude toward climate change and make us think seriously why we respond with ignorance and indifference, why we are so stubborn on not changing our ways despite knowing the seriousness of the ecological threats. If this continues, we might be reduced to the condition of the characters in *The Drowned World* becoming passive agents facing the strike-backs of nature after long time exploitations of its resources, and "having no control over either the outer and the inner world" (Brigg 3). Thus, with *The Drowned World* we learn that Cli-Fi is an effective tool in making us aware of "the social and psychological problems of tomorrow" (Oramus 30).

CHAPTER II

SOCIAL TRANSFORMATIONS IN THE ANTHROPOCENE: MAGGIE GEE'S *THE ICE PEOPLE*

Born in Poole, Dorset, British novelist Maggie Gee's literary career actually began in 1981 with her first novel *Dying, in Other Words*. Next year, she was chosen as the best young British novelist by *Granta*, a prestigious literary magazine since 1889. Her literary career continued with the publications of other novels, such as *The Burning Book* (1983), *The Light Years* (1985), *Grace* (1988), *Where are the Snows* (1991), *Lost Children* (1994), *The Ice People* (1998), *The White Family* (2002), *The Flood* (2004), *My Cleaner* (2005), *The Blue* (2006), *My Driver* (2009), *My Animal Life: A Memoir* (2010), and *Virginia Woolf in Manhattan* (2014). Throughout her career Gee was awarded with various prizes including Orange Prize for Fiction in 2002, International IMPAC Dublin Literary Award in 2004, and OBE Prize in 2012. Her novels illustrate individuals surrounded by wide social, political and economic issues, such as economic injustices, migration, class conflicts, racial issues, and terrorism. Three of her novels, however, are particularly focused on ecological problems: *The Light Years* (1985), *The Flood* (2004), and *The Ice People* (1998).

This chapter focuses on *The Ice People* as a successful fictional representation of the Anthropocene in its social context. Many climate change fictions are often based on the scenarios of climatic disasters to draw attention to the ongoing ecological devastation and its socio-cultural consequences. Two themes particularly dominate these scenarios: They either describe the Earth falling into global cooling (or global freeze) due to anthropogenic pollutants stored in the atmosphere that result in a remarkable reduction in the surface temperature of the Earth, or the Earth suffering from global warming and turning into a huge greenhouse. In the second scenario, as the Earth gets warmed, due to excessive amount of solar energy kept stored within the atmosphere without being reflected back into the space, the polar ice caps melt leading to sea level rise and the countries located at the south of the Equator submerge. This chapter discusses these two

different climatic phases of the Earth, global warming and global freeze and the resulting social transformations, as presented in Maggie Gee's *The Ice People*.

When humans act as geological agents in the Anthropocene, making radical changes in the ecosystems of the planet, they also face the consequences of these changes in the social sphere. That is, when humans re-shape the physical environment around them, they also create social problems for themselves. As Serpil Oppermann and Serenella Iovino state in their "Introduction" to *Environmental Humanities: Voices from the Anthropocene* (2017), "the wounds of the natural world are also social wounds" (4). The Anthropocene in this sense refers to the "interdisciplinary combination of geological and socio-economic history that focuses both on the planetary factors and on the cultural changes has been jointly recording the history of humanity" (Braidotti 160). Hence, the Anthropocene is a transitional period the effects of which are experienced not only in the physical environments, but also in social, economic, and political domains. Within this context, this chapter focuses on the socio-cultural transformations in the Anthropocene, including the redefinition of gender roles, the reconfiguration of social systems, and re-consideration of technology in Maggie Gee's *The Ice People.* Gee's novel presents the Anthropocene not only in terms of the physical environmental transformations, which are clearly observable on air, soil and water, but also as a social driver that exacerbates the already existing social polarisations in an environmentally challenged society's adaptation process to the new climatic conditions.

Ecophilosopher Carolyn Merchant explains this process by pointing to the reciprocal relationship between humans and nature, and states that "humans adapt to nature's environmental conditions, but when humans alter their surroundings, nature responds through ecological changes" (*Ecological Revolutions* 5). In her view, nature is a "historical actor" with the capacity to "challenge the discursive constructions through which it is understood" (*Ecological Revolutions* 3). In the long term, these ecological changes project into many parts of human life and pose various social and cultural challenges. Considering the irreversible changes in the planetary ecosystems and other environmental transformations, Carolyn Merchant further argues in *Autonomous Nature* (2016) that living in the twenty-first century entails the necessity of "living within a

new paradigm" (150) based on the idea of an "autonomous nature," which is "unpredictable and potentially uncontrollable" (150). She marks climate change, which is one of the most visible signals of the Anthropocene, as an example of nature's unpredictable and uncontrollable responses to the excessive use of fossil fuels and greenhouse gases produced by humans:

> The burning of fossil fuels by humans triggers an increase in carbon dioxide, thus increasing its concentration as a dominant "greenhouse gas" in the upper atmosphere. That in turn radiates increased heat back to the earth causing the air, oceans, and land to warm. Nature as an autonomous actor responds through thermodynamic feed- back loops, tipping points, and often unanticipated cascading effects. Here *natura naturans* (nature's creative forces) and *natura naturata* (the created world) interact in complex, dynamic processes, many of which are beginning to have potentially irreversible effects on life on earth. (*Autonomous Nature* 150-51)

In other words, "the way in which nature as an autonomous system behaves depends on how humans behave in relationship to it" (*Autonomous Nature* 150). Merchant's argument is that if humans continue "to alter and destroy it permanently" (*Autonomous Nature* 152), they will inevitably face a social decline. Instead, they should learn from their mistakes so that they "can alter current directions and save both the human and nonhuman worlds from deteriorating and collapsing" (Merchant, *Autonomous Nature* 152). To do so, Merchant suggests a new ethics, which she calls "partnership ethics" that emerges from an acknowledgement of the interdependence of ecological relations and socio-political systems. In her explanation, "nonhuman nature as an autonomous organization of ecological relationships affects human social, economic, and political systems. Likewise human systems impact the functioning and indeed the very existence of the organic and inorganic elements of natural systems" (Merchant, *Autonomous Nature* 153). Similar to Merchant who sees climate change as an unpredictable response of nature, Jessica K. Weir, environmental scholar and contributor to *Manifesto for Living in the Anthropocene*, describes climate change as "the most profound expression of the earth's agency" (17). She thus underlines "the capacity of this world to act, to show its power in all our lives" (17). Climate change, with its observable scale effects, according to Weir, is "the cumulative result of intertwined human and nonhuman agencies" (17). In this context, the Anthropocene stands as a challenge making it necessary to acknowledge the closely-knit connections between the nonhuman

environments and the social, political, economic, and cultural domains, or the built human environments.

The complex consequences of the changes in climate systems, ecosystems, and social systems are interlinked and extremely difficult to predict. Among the anticipated outcomes of climate change are the sea-level rise that makes many coastal and island areas uninhabitable, droughts that cause crop failures, famines, and desertification, and finally permafrost that leads many biological species, including humans, to migrate to inhabitable parts of the Earth to survive; otherwise they will face extinction. Such environmental transformations always cause social changes. Environmental politics scholar John S. Dryzek and his colleagues claim that climate change "presents perhaps the most profound challenge ever to have confronted human social, political and economic systems" (3). Encompassing multiple domains, climate change then occupies the centre of the Anthropocene discourse. In *Why We Disagree about Climate Change* (2009), Mike Hulme, the British environmental scholar of climate and culture, argues that climate change is "an idea to be debated, adapted and used," as much as he treats it as "a physical phenomenon that can be observed, quantified and measured" (12). So, climate change is a physical phenomenon with concrete, observable, measurable outcomes, but it is also a social problem that demands to be investigated in social, economic, and psychological contexts. Hulme further argues

> engaging with climate change takes us well beyond the physical transformations that are observed, modelled and predicted by natural scientists and assessed by the authorities such as the IPCC [the Intergovernmental Panel on Climate Change]. We need new ways of looking at the phenomenon of climate change -circulating and mutating through our social worlds - and new ways of making sense of the many different meanings attached to the idea of climate change. (12)

Agreeing with Mike Hulme's views on the extensions of climate change ranging from scientific context to non-scientific contexts, environmental scholar McKenzie Wark notes that in the Anthropocene, "human and natural forces are so entwined that the future of one determines the other" (i). Thus, climate change is also a driver of various social and cultural changes. During this slow-paced process, cultural, social, political, ethical practices and the discourses woven around them are also reinterpreted.

Exploring the global effects of anthropogenic climate change, *The Ice People* (1998) is one of the most suitable climate change novels to illustrate the social changes in the Anthropocene. Gee's novel portrays two different climactic phases of the Earth: a globally warmed world under the threat of melting ice-caps with the consequent sea-level rise, and its transition into a globally frozen world where the Northern hemisphere becomes totally uninhabitable, and the temporarily inhabitable Southern hemisphere is distressed by mass migrations from the North. Hence, with its focus on the difficult relationships between individuals, nations and governments under dire circumstances, Gee's *The Ice People* is an exemplary case to analyse the large-scale effects of climate change in the Anthropocene. In this respect, *The Ice People* sheds light on how geological forces reflect in social life and intergovernmental relationships, and thus fits the purpose of this chapter to discuss socio-cultural changes in the Anthropocene. While exploring the reflections of global climatic phenomena on social relations and politics, *The Ice People* depicts the ways in which an ecological change can alter the pre-existing social order and dismantle all established political structures. The novel also shows how technology is not always the solution to planetary ecological crises as it fails in restoring the lost balance in nature and in human relations. In short, *The Ice People* treats climate change both as a driver of collective global environmental changes and as a driver of social transformations that reshape the personal lives of its main characters. Gee explores the traces of climate-generated problems in the Anthropocene in two spheres; first, the social effects of climate change in the private sphere, as seen in the personal relationships and individual conflicts, and secondly, its more extensive trajectories in public sphere and international affairs.

It must be noted here that the common problem of fictional narratives dealing with a real life problem is persuasiveness. This problem comes to the foreground more frequently especially in the futuristic fictional narratives, or in the post-apocalyptic dystopias. To this handicap, Maggie Gee seems to find quite a logical solution. Before she introduces the fictional portrayal of the Anthropocene in *The Ice People,* Gee reserves two full pages of the novel to scientific and historical sources, including extracts from real newspaper articles, and interviews, which discuss the possibility of returning to a second Ice Age after thousands of years. These references include John

and Mary Gribbin's *Watching the Weather*, Anthony J. Stuart's *Life in the Ice Age*, Windsor Chorlton's *The Ice Ages*, Andrew Sherratt's *Climatic Cycles and Behavioural Revolutions*, Adrian Berry's *The Next Five Hundred Years*, Nigel Hawkes and Nick Nuttall's report in *The Times* on 28 November 1997. According to these sources, during the geological evolution of the planet, some minor and major scaled global cooling incidents, or, as popularly known, "ice ages," have been observed on Earth, and documented by geologists. But the last major glacial epoch, or ice age, ended 11.500 years (Zalasiewicz et al, "The Anthropocene" 836) ago, and since then the Earth has been in an interglacial, warm climatic period, called "the Holocene," now renamed as the Anthropocene.

However, discussions on the possibility of a second ice age were particularly popular in the 1970s. As the environmental researcher Justin Neuman underlines in "Anthropocene Interruptions," the global cooling hypothesis claiming the Earth is gradually falling into a global freeze gained popularity after the publication of a scientific article in *Science* in 1971. This article written by S.I. Rasool and S.H. Schneider is entitled "Atmospheric Carbon Dioxide and Aerosols: Effects of Large Increases on Global Climate," and it argues that the increase in the concentration of aerosols, a kind of anthropogenic pollutant stored in the atmosphere, is capable of reducing the surface temperature on Earth down to "3 to 5 degrees Kelvin" (138) which is "sufficient to trigger an ice age" (138). Like a snowball effect, an avalanche of similar articles[13] heralding a global ice age began to be published one after another in the 1970s. The 1970s media also promoted a global cooling alarmism and connected the recent extreme weather events to the approaching apocalypse putting the blame on anthropogenic pollution.

Although returning to another ice age is quite speculative, the scientific documents that Gee references at the beginning of *The Ice People* also suggest that a second ice age is a scientific possibility, and should not be taken as what Neuman calls "the global cooling myth" (150). Other contemporary scientists, such as Keigwin (1996), Hoyt and Schatten (1997), Sorokhtin (2002), Sorokhtin and Ushakov (2002), Gerhard (2004), and Khilyuk and Chilingar (2004 and 2006) also argue that they are observing global cooling trends, which will accelerate in the following decades, and they anticipate that the Earth will be

entering just another global cooling period, a new ice age, in the second half of the twenty-first century. Thus, Gee revives the scenarios of global freeze, and the return to the ice age due to human-induced climate change. Considering these views, Gee's intention can be regarded as an effort to prove the plausibility of her fictional scenario in the present.

Structurally, *The Ice People* is composed of two parts divided in accordance with the climatic shifts on Earth portrayed in the course of the novel. The first part of the novel, which is narrated from the perspective of the black male protagonist Saul in his young age, depicts a globally warmed world and the problems it brings. As a result of the anthropogenic changes in the biosphere, the sea levels dramatically rise leading to shortage of food and fresh water, plagues, and to the sudden appearance of dangerous viruses like a new type of Ebola virus. In this dystopian setting, ecological problems pose serious challenges to human survival as well as to animals and plants whose preservation becomes increasingly difficult. So, to find inhabitable climatic zones for their survival, people begin to migrate from Europe to Africa. These mass migrations cause worldwide demographic changes. The protagonist Saul and his son Luke are among those environmentally displaced nomadic people who are forced to take shelter in more ecologically secure regions. In other words, they are *climate refugees*. These massive population movements also trigger important changes in the existing political climate turning the First World countries like the UK into the Third World, and the Third World countries like Ghana, into the First World, thus reversing the roles of the coloniser and the colonised, and creating political conflicts between them. In the second part of the novel, Saul, in his old age, depicts the condition of the Earth in the Ice Age. Now, the whole Earth is experiencing a global freeze with dramatically worsening conditions on people who try to cope with the new ecological circumstances (Özyurt Kılıç 101-103).

Adapting to changing climatic conditions requires re-organisation of social life. For instance, the priorities in Gee's globally freezing fictional world are totally different from the earlier warmer times. The socio-political adjustments triggered by climatic changes in the novel include implementing new political decisions on heat conservation,

food management, finding new funding to spend on climate studies, and solving the problem of sharp decline in fertility rates that poses a threat for the future of human race. Also, protecting homeless people exposed to extreme weather conditions and suffering from hunger and preserving public order becomes increasingly difficult when looting and theft become pervasive with street gangs roaming the city. Therefore, establishing a new police force becomes an urgent matter for the government. More importantly, however, the ongoing mass migration causes global scale political conflicts, calling for urgent intergovernmental action.

In this context, mass migrations towards climatically less challenging geographical locations, such as Africa, seem to be the most urgent social problem giving rise to new social terms and labels, like the ***c****limate refugees* or e*nvironmental immigrants* who leave their homelands to survive. Refugee is simply a person who has been displaced from their home by some set of political events. The word "refugee" usually refers to the "victims of political violence or dictatorship" (Dun and Gemenne 10). But today, the word "refugee" is used in a larger context. With the increase in the frequency and intensity of disasters associated with climate change, it is anticipated that the number of the displaced people will rise. The issues, such as "the relocation of people at risk, the need for adaptation to the effects of climate change and the legal challenges around people displaced by climate-related threats" (Dun and Gemenne 10), are being widely debated and researched. In such a context, the term "refugee" is reformulated as climate refugees, environmentally-induced migrants, environmental refugees, and environmentally displaced people. Environmental analyst and the founder of the Worldwatch Institute, Lester R. Brown used the term "climate refuge" for the first time in 1976 when it was proposed in a report entitled **"**The Twenty-two Dimensions of the Population Problem" prepared for the Worldwatch Institute by Brown and his colleagues. Yet, alternative terms, which have been later introduced, developed, and circulated by environmental researchers and policy-makers, continue to be coined.

The common ground for being labelled as a political and environmental refugee is that both categories have been created by a situation beyond the victim's control. In the case of environmental refugees, the reasons are environmental disasters, floods, hurricanes,

fires, land loss, and the lack of capacity to grow food due to soil degradation. Climate change is the factor behind all these environmental disasters. The IPCC (The Intergovernmental Panel on Climate Change), the leading international body for the assessment of climate change established by the United Nations Environmental Programme, proposes three categories for the climate change related human migration, or population displacement: "drought incidence, increased cyclones (hurricanes and typhoons) intensity, and sea-level rise to initially describe how this phenomenon is usually presented and categorized" (Doyle and Chaturvedi, "Climate Refugees" 278). The problem of climate refugees encompasses more people every day.[14] According to the latest data of *Forced Immigration Review* conducted in May 2015, sudden environmental disasters, such as earthquakes, floods, landslides and tropical storms, "displaced some 165 million people between 2008 and 2013" (Brende and Burkhalter 4) worldwide. The experts are anxious that when these climate-related anthropogenic disasters are combined with "rapid urbanisation, population growth and pre-existing social vulnerabilities, such as poverty," the numbers will be rapidly increasing, and it is likely that there will be increase in "climate-related displacements and migrations in the future across international borders" (Brende and Burkhalter 4-5). According to Lester R. Brown, among all environmental refugees, the environmentally displaced people escaping from the flooded areas hold the majority. Brown anticipates that in the long-term, "rising-sea refugees will likely dominate the flow of environmental refugees," as the sea-level rise will threaten "many low-lying cities, major river deltas, and low-lying island countries" (169). The earliest refugees in this group will probably be "millions of rice-farming families from Asia's low-lying river deltas," who will "watch their fields sink below the rising sea" (Brown 169).

Just like the anticipations in real life, in *The Ice People* mass migration movement creates a new group of people who leave their homelands because of impending ecological threats, and are forced to take shelter in more ecologically secure regions. In the second part of the novel, the black male protagonist, Saul, his white Scottish wife Sarah, and their half-caste son Luke are among the large numbers of displaced people, who are now called "the Ice People." Saul's portrayal of the freezing world is quite gloomy. As the Earth gradually gets cooler, the life becomes harsher:

> The Wicca World [the political arm of the separationist women in the novel] decided to evacuate the Hebrides [islands on the western coast of Scotland] after the supply ships couldn't get through [the ice-covered sea] for three months. […] cruisers bringing would-be immigrants from Sweden. […] There had been reports from the Hebridean netters that some elderly islanders were freezing to death, while others were bringing their cattle or horses into the house and sleeping with them in a desperate attempt to keep warm. […] Lochs on the mainland began to freeze over, rivers stopped flowing, food crops failed, orchards whitened and weakened with frost, cars wouldn't start, there were endless power cuts from the grids that couldn't cope with the surge in demand, deliverymen died in exposed country places, and there was a spate of suffocations in cities among people who had over-insulated [staying indoors for a long time] their houses. (119)

Since the Northern part of the world is too busy with their internal conflicts, and social and ecological problems caused by climate change to extend any help, the poor victims everywhere else are on their own. As Saul narrates: "In the meantime the Indonesian volcano exploded, [but] Sumatra got very little international aid though half of its population stifled or starved" (120).

When it is too late to take preventive measures against ecological disasters, adaptation to new environmental conditions seems to be the best option for the Ice People. In order to cope with the changing climatic conditions and to survive under these conditions, they develop alternative solutions. For instance, Saul narrates how "farmers switched their crops to frost-resistant kinds, computers built to withstand low temperatures" (120). These temporary and local solutions enable certain groups of people to stick to their homelands a little longer, but not for long. Despite people's efforts to develop alternative, temporary solutions for the increasingly harsh climate, certain parts of the world become impossible to live in. Thus, people are forced to migrate:

> The Hebridean islanders were sticking to their homes but elsewhere in the world people felt less rooted. A great movement of human beings began from north to south from the poles to the equator, slowly at first, like the first leaves falling, then more and more like an autumn storm, like the sky darkening into winter, and the noise was thousands of running feet, panicking voices, massed birds wheeling. […] I watched them on the screen, great swirls of black ants, crowding the airports, overloading the boats… They were real people, though they looked like insects. (120)

Although his wife Sarah decides to stay in her home country, Saul and their son Luke leave England for Ghana, and thus join other environmental refugees. Saul underlines the fact that not only people but also animals migrate to warmer climates to survive, otherwise the world may confront yet another biological extinction. This is in fact not too far-fetched from what the experts are stating today. Considering the scale of the consequences of human actions, many scientists and environmental scholars expect another mass biological extinction, which will be the sixth in the known geological history of the Earth, as Elizabeth Kolbert claims in *The Sixth Extinction: An Unnatural History* (2014). The chair in Global Governance and Ethics Programme at UCL (University College London), Audra Mitchell also explains in *Gender: Nature* (2016) that although humanity is on the brink of a mass biological extinction globally, the effects "are not likely to be shared equally. Rather, like most forms of insecurity, these effects are likely to have a disproportional impact on the Global South, poor and displaced communities, marginalized ethnicities, people of colour, and, crucially, they will be distributed differently based on gender" ("Extinction" 187). Yet, in the novel, contrary to the inhabitants of the Southern hemisphere, the people in the North are depicted in an insecure position, and they have to migrate to the relatively secure South. Commenting on the climate migrations, Saul underlines an irony; that is, the reversed direction of migration as follows:

> Then I remembered. When I was little, the scenes on the screen that had scared me to death, showing hordes of black people pouring into Britain, coming to take away all we had, with the brave white soldiers holding them back. Only this time, it was all happening in reverse, the negative image of the long-forgotten photo. This time the desperate people were white. This time the people with the power were black. And a long-lost art of me started to laugh: it was *my* turn now. *Our* turn now! *Black man's turn*! (121)

Due to the second ice age, the hot climate of Africa has cooled enough to make it a suitable place to live and to cultivate land. But all climatically inhabitable countries in the South are under heavy pressure of requests of asylum seekers by the citizens of the climatically uninhabitable countries in the North, which causes severe political conflicts between the countries in the Northern and the Southern hemispheres. Therefore, the African countries close their national borders for security reasons, which is an ironically reversed account of today's Western measures taken against the refugees from Africa

and the Middle East. The novel narrates how, in order to handle the high number of refugees, African countries decide to ask for visas, and bring on strict regulations to apply for a refugee's visa. As Saul explains, "you couldn't fly to Africa without a visa, so my plan was to drive down through France and Spain and make a sea-crossing to Africa" (127). The criteria for the qualification vary from country to country:

> Each African country was doing things differently, though all were overwhelmed with requests of asylum. Ghana was intending to close its borders within six months to those special cases allowed to immigrate because they had Ghanaian blood. The Cameroons, by contrast, had set no time limit. Sierra Leone would accept no one with any admixture of European blood. A phrase recurred: 'the ice people.' We cannot take in all these ice people… the ice people are coming here in ever greater numbers… a growing concern that we shall be swamped.. thousands maybe millions of ice people… ice people, ice people…So now Europeans were ice people. (122).

Being black African descendants, Saul and his white son Luke have no problem of qualification for visa. As Saul explains, "I could go there. Though no one suspects it, I have black blood, I could just walk in and claim my kingdom. He [Luke] had Ghanaian blood, his grandfather's blood. He was part-Ghanaian. […] If you had one Ghanaian great-grandparent, you are qualified" (122).

Though his ancestors have been discriminated due to their skin colour and race for centuries, now Saul is somehow relieved and happy to be black:

> Now Samuel's [Saul's father, Luke's grandfather] blood was going to save Luke's life. Opening the gates of Africa. Giving us the key to the last warm places, the retreating deserts where fruit would grow, the great grassy plains that had once been sand, the blueing hills, the returning streams, the sapling woods of the new green Sahara. (157)

Relocating people is, however, a serious issue, which will bring along various conflicts, such as religious, cultural, and economic conflicts. Saul's son Luke hesitates to migrate to Africa saying that, "I don't want to go to Africa. In any case Africans hate white people. They won't let us in" (141). Despite the genetic traits he partly shares with his black father, Luke is still anxious about being treated as an unwelcomed intruder by the Africans. The reason for his anxiety is his cultural upbringing. He was born in England and raised like a white person, and naturally he feels and thinks like a white person. No

matter how genuinely he feels black, he is only partly black. Thus, such a forced displacement inevitably causes cultural conflicts.

Yet, when an environmental threat is confronted, finding alternative places for people to move is not the proper solution. Considering the conditions of the environmental refugees, not only their lives but also their entire cultures are in jeopardy, which creates identity crises. In his documentary *Climate Refugees* (2010), Andrew Simms**,** the director of New Academic Foundation and the author of *Ecological Debt*, asks what really means to move into a different country, and he comments on the probable answers: "If you ultimately lose your nation, if your nation goes underwater or become uninhabitable, you're not just a temporary refugee; you are permanently relocated. And those people would eventually want to settle on a different corner of the world and recreate their nation there" (*Climate Refugees*). So, we need to rethink about climate change and stop treating it as "some remote environmental issue that scientists will work out" in their laboratories, "because it's going to touch our lives" (*Climate Refugees*). Apart from the possible social conflicts it may cause, seeing hoards of environmentally dislocated people on the borders is alarming enough for any country. As Paul J. Smith writes in "Climate Change Mass Migration and the Military Response," as the number of environmental refugees in various parts of the world, especially in the Global South, grows, many countries in the Global North, and the southern border neighbours of those low-lying countries in the Global South have already began to consider these international migration movements as "a threat to [their] territorial integrity and national security" (617). This contemporary situation mirrors the political anxieties of the Ghanaian government in *The Ice People* confronting the waves of mass migration from the North, and legitimizes the military measures it takes.

In addition to migration issues, *The Ice People* explores the reflections of environmental and climatic changes on the relationship between individuals, raising questions about the reconstruction of gender roles and stereotypical social behavioural patterns. The novel shows that when the Earth falls into global freeze, the first area of influence is the social life of the individuals, which can be observed most clearly in the changes in men's and women's life styles and mutual relations. Moreover, as the climate changes,

and the ecosystems collapse, many species go extinct, which becomes a major crisis in the social order. In fact, this fictional scenario is not so far from the truth. As the scholar of International Relations, Audra Mitchell explains, "the plants, animals, and other organisms that humans eat, trade, use as medicine, and relate to culturally" (Mitchell 187) gradually disappear, we are bound to face risks in "physical security, food security, economic security, environmental security, health security, political security, and cultural security" (Mitchell 187). She explains in detail how species extinction would produces severe social and political problems:

> [a] mass extinction event or major acceleration in species extinctions would produce massive shortages in food. This could ultimately lead to riots or wars, which would compromise physical, political, and cultural security. Health security would be compromised by the destruction of species from which humans derive medicines and by a diet significantly reduced in variety and nutrition. he security of distinctive cultures would be undermined by the elimination of species with whom their unique histories and lifeways are entwined. Moreover, economic security would be jeopardized by the loss of species that are traded as food, medicine, commodities, or materials for production processes. (187)

So, nonhuman species' extinction poses a significant threat to human survival, and the poor, the marginalized ethnicities, such as people of colour and minorities, and women and children living in poverty are likely to suffer the impacts of such a crisis in the first place.

Encompassing all these risk groups but reversing the process, Gee, in *The Ice People,* relates the threat of human's extinction especially to gender and sexuality, which is not merely the fictional product of Gee's imagination. In *Why We Disagree about Climate Change* (2009), Mike Hulme argues that "the human experience of climate releases powerful emotions" (13), including anxiety and fear, and he mentions various studies showing the "correlation between climate fluctuations" and "sexual activity, or suicide rates" (13). Similarly, in Gee's novel, as the climate crisis climbs and the impact of environmental threats accelerate, men and women gradually fall apart. As a result of the gender segregation between men and women, fertility rates critically decrease. It is implied in the novel that the deterioration in the ecological balance leads to deterioration in reproduction, fertility, and human health. The direct connection between climate change and the decline in fertility rates is the major concern especially in the

first part of the novel. Focusing on the experiences of Saul and his wife Sarah, who have difficulty in having a baby and are gradually falling apart, Gee describes the freezing man-woman relationships along with the cooling climate. Characters in the novel begin to trust their same-sex partners more than their families and spend time in gender-segregated communes. Saul explains this gender segregation quite effectively:

> The kids had been the glue that held us together. When babies stopped coming, the men got the blame. The women felt thwarted and abandoned us. And so we moved further and further apart and turned into parodies of ourselves – the shaven-headed, giggling, machine-loving men, the short-haired, short-fused, furious women, shriving themselves with nature-worship. (102-103)

In other words, when the relationship between sexes is challenged by climate change, men turn to technology and women turn to nature. This gender segregation manifesting on severe hostility toward the opposite sex brings an end to heterosexual relationships. Thus, all gender-based, socially constructed, and somehow allotted, roles of men and women dissolve to be replaced by same-sex partnership. What is ironic here is that women associate themselves with nature while men with culture in the form of technology. The tendency of associating women with nature simply due to their reproductive ability, and men with the technology-dominated culture due to their reason is actually quite essentialist and problematic. But ironically, in the novel, both men and women are quite content with their gender-based allotments. Putting an end to gender-based roles, women segregate themselves from men, but associating themselves with nature is a problematic issue heavily criticized by ecofeminist scholars that Gee seems to avoid. As ecofeminist philosopher Val Plumwood argues, women's inclusion in the sphere of nature is a major oppressive tool generated from traditional patriarchal sources, which see woman as a "violent and uncontrolled animal" (19). To be defined as nature in this context is to be defined "as passive, as non-agent and non-subject, as the environment, and in this respect, it is opposite to reason or culture provided typically by the white, western, male expert or entrepreneur" (Plumwood, *Feminism and Mastery* 4). This passive position is defined as a "terra nullius," according to Plumwood, meaning "a resource empty of its own purposes or meanings, and hence available to be annexed for the purposes of those supposedly identified with reason or intellect, and to be conceived and moulded in relation to these purposes" (*Feminism and Mastery* 4). That

is to say, as being part of "lower realm," nature and women lack purpose and free will and thus, their domination and exploitation is "simply natural" (Plumwood, *Feminism and Mastery* 4). So, in the patriarchal discourse, being associated with nature is a sign of inferiority and causes various abuses. In the novel, however, this is never mentioned when women turn to nature for solutions. As a result, gender segregation shuts men and women into distant isolated circles in which both sexes prefer cooperating with their same-sex partners. Reversing the conventional dichotomies of gender, men and women begin to pursue androgynous ways of life. Women abandon their stereotypical female duties, such as giving birth or taking care of their babies, and instead some of them adopt masculine traits and start to come together in the same sex communes, whereas men spend their time with other men, isolated from women. As a result of "segging," to use Gee's term, the heterosexual social structure gradually gives way to an increasingly queer society, which can be defined as "outside of, or not recognized by heteronormativity" (Stephens and Sprinkle 316). Various homosexual communities appear and start to dominate people's lives and sexual orientations, such as "Gay Scientists Club," an educated group of technophiliac men, "sheroes," a gang of girls composed of muscled, motorcycle riders, and "mannies," a group of gay babysitters and male nursemaids. Saul, being a nano-engineer, can be regarded as the mouthpiece of science and technology. Besides, considering the heterosexual life he pursues and the heterosexual norms and values he supports ardently, he can be seen as a representative of the old patriarchal discourse. Yet, under the changing social conditions, even Saul adopts a queer life style gradually and joins the Gay Scientists Club. Although the government in the novel tries to interfere with the queer practices, it is not successful since the members of this new social structure refuse to re-adopt the old conventional gender roles and the sexually restrictive world order of previous time.

When the social system disintegrates and finally collapses in their freezing world, men, like Saul, seek solutions in high technology, which is integrated into the everyday life of male characters before they are forced to leave the country. This can be interpreted, in terms of what the British sociologist Bronislaw Szerszynsky says about the increasing role of technology in redefining human/nature relationships. He first asks a crucial

question: “Is this the epoch of apotheosis […] of the human as the master and end of nature?” (“Reading and Writing” 11). If so, he warns us that “the final victory of human civilisation over nature seems to threaten the human –not just ontically, but also ontologically” (“Reading and Writing” 11). Szerszynsky sees society and nature as a co-evolving metabolism, and technology as a new factor changes the course of their mutual evolutions. With the intervention of technology into human-nature relationships, the relations between societies and their environments alter gradually but radically. The changing “metabolic regime” (“Reading and Writing” 10) of the Earth, to use Szerszynski’s phrase, reflects into nonhuman life as well as human life in various ways. We see this process of technological interference into the natural processes also in the novel, but with dire consequences in the end. Saul, for example, sees technology as a remedy, the only hope left for environmental recovery and a solution for fertility crisis. But, “techfix” interventions do not entirely resolve the fertility problem in the novel. Fertility clinics distribute hope, and access to the “eggboxes,” also known as “the Batteries,” and “anxious couples” flock “to the Batteries every day” (34). Although the solution seems brilliant, techfix conception is a long and painful process. It has some negative side effects in practice, such as the relatively high rate of deformity in techfix births. Also, there is a low possibility of double survival in twin pregnancies, and a high possibility of premature deliveries, as in the case of Sarah and Saul’s prematurely born son Luke. Sarah describes their newborn son as “thin creature with tubes in his arms” (41). From that perspective, the baby Luke looks hardly human. Various postnatal complications are also highly probable, such as heart beat problems, need for blood transfusion, and possible infections. Techfix deliveries also have some negative psychological effects on parents, such as stress, anxiety, and paranoia. Despite all the possible risk scenarios, the only explanation that couples are given by the doctors in fertility clinics is the repetition of that same sentence: “It’s common with the techfix conceptions” (41). Although the whole process promises very low success rate, unfortunately the system continues to abuse desperate couples. Thus, the couples do not hesitate when they are asked to sign consent forms and allow their story to be used in the advertisements in case of a successful conception. The supervisors of the fertility clinic, especially Dr. Zeuss, conduct medical experiments on semi-fertile Saul. In the fertility clinic, Saul’s son Luke is also given medical treatments, including hormone

inducement in the form of high dose oestrogen shots. This process, which is based on reshaping of Luke's body, prevents his entrance into adolescence, and as a side effect it results in his developing "feminine characteristics" (164); that is, a softer, gentler, non-aggressive, more sensitive personality.

Like any technologically intervened biological process, *in vitro fertilisation*[15] technique, in which technology intervenes into the natural process of conception, has serious health risks, both on the mother and on the infant. As the mothers may experience physiological side effects of this process, such as miscarriages, there may be possible psychological consequences as well, such as sinking into depression. In the novel, Sarah miscarries one of her twins and develops paranoia. However, the important thing is the end of the process; namely the control of reproduction through techfix newborns and the economic profit gained through desperate couples. Moreover, the risks are not only limited to women's bodies, they extend to the babies. The technologically shaped bodies of the techfix babies**,** just like the body of the techfix baby Luke, suffer from weak eye-sight, defective heart, and other problems which make them vulnerable to organ failures and pursue a life dominated by illnesses from the moment they were born. Luke had various postnatal health problems; he was born with weak eyesight, a defective heart chamber, and a pale skin, which is described by his mother as "thin and pale as a child of glass" (49). Luke also develops asthma and allergies. On the other hand, Dr. Zeuss, who is the mouthpiece of technology that provides the so-called remedy for the fertility problems, seems uninterested in those health-related consequences of the process; in other words, in the human part of the problem.

When Saul's wife Sarah experiences the medical tests and procedures of *in vitro fertilisation*, she feels objectified with her body under constant surveillance. Thus, she feels trapped in a kind of patriarchal control system. Saul describes the physical and psychological effects of the experimentation process in Dr Zeuss's office as follows:

> We whizzed through the tunnels nearly every morning before five a.m. To be injected or tested, making changes of plan at a split second's notice if the doctors told us they needed us, if eggs could be harvested or sperm donated or any other bits of us removed and twizzled. We said 'Yes' to everything. We'd held out too

> long, and now we yielded our bodies completely, our private parts, our selves, our money. (34)

Since techfix babies in *The Ice People* are an alternative solution to the human race on the brink of extinction, technology seems to have saved the day. But as Anne Balsamo reminds us in *Technologies of the Gendered Body*, the use of reproductive technologies is a means of exercising power on women's bodies:

> Reproductive technologies provide the means for exercising power relations on the flesh of the female body. These power relations are in turn institutionalized in several ways –not only through the development of medical centres that offer reproductive services, but also through the establishment of reconstructed legal rights and responsibilities of parents, donors, fetuses, and resulting children. Specific technological practices further augment such institutionalization. […] In this way, material applications of new technologies are implicated in, and in part productive of, a new discourse on maternal identity, parental responsibilities and the authority of science. (82)

Balsamo further argues that this procedure claims a control over "cultural narratives about motherhood, the family and the role of techno-science" (83). So, the body turns into a phenomenon, which has been approached, defined, and shaped in various ways. During this process of redefinition, as sociologist Chris Shilling underlines, sometimes, the body image becomes "a marker of commercial value and an object of consumer culture," sometimes it is abused as "a subject to theoretical fashions of the day," or used as "a means of justifying women's subordination for the feminists" (5). The body image illustrated in *The Ice People,* on the other hand, can be seen as a subject of relentless medical procedures used by the high-tech fertility clinics. Using unpredictable technological fixes to solve the problems of infertility leads to a backlash and creates a gender-segregated society in Gee's novel. The novel demonstrates that "controlling nature through science and technology" can only bring about what Carolyn Merchant warns us against: "the earth as we know it today might be radically altered in the future" (*Autonomous Nature* 150). As seen in Sarah's case, technological fixes come with the unpredictability and uncontrollability of their outcomes.

It is important to note that the reproduction issue described in *The Ice People* and anticipated by Gee is not a remote, fictional possibility. The negative impact of climate

change crisis on reproduction, and on women's hesitations to become mothers is a serious contemporary concern. For example, the Canadian journalist and writer Naomi Klein in *This Changes Everything: Capitalism vs. the Climate* (2014) shares her personal dilemma as a twenty-first century woman whether to give birth to children in such a climatically challenged world:

> this ecological despair was a big part of why I resisted having kids until my late thirties. For years I joked about giving birth to a Mad Maxian climate warrior, battling alongside her friends for food and fuel. And I was fully aware that if we were to avoid that future, we would all have to cut down on the number of super-consumers we were producing. (420)

Despite her ecologically-driven hesitations, Klein narrates how she has eventually decided to be a mother believing that "maybe, just maybe, there was a future where replacing our own presence on earth could once again be part of a cycle of creation, not destruction (420). Unlike the women in *The Ice People* who totally refuse to be primarily associated with motherhood and reproduction, Klein embraces her reproductive side. However, Klein, just like Sarah in *The Ice People*, has to resort to technological solutions to become a mother. Klein narrates her first visit to one of these "fertility factories" in her own words:

> In its [fertility clinic's] of rooms in a downtown office building, drugs, hormones, and day surgeries were dispensed as liberally as toothbrushes at a dentists's office. The working assumption was that any woman who steps through the door will do whatever it takes to land a newborn in her arms, even if it means seriously compromising her own health with risky drugs and poorly regulated medical procedures in the process. (421)

This process of conception via technological means is both physically and psychologically exhausting for Klein. As she states in vivid detail:

> I did try to be a good patient for a while, but it didn't work. The last straw was a doctor telling me, after my first (and only) round in vitro fertilization (IVF) that I probably had "egg quality issues" and I should consider an egg donor. Feeling like a supermarket chicken past its best-before date, and with more than a few questions about how much these doctors were driven by a desire to improve their own "live birth" success rates, I stopped going. I tossed the pills, safely disposed of the syringes, and moved on. […] [On top of that] informing friends and family that I had given up on technological fix to my apparent inability to conceive was surprisingly difficult. (421)

This shows that the real life experience of women living in the twenty-first century and the fictional descriptions of their experiences in the futuristic setting of *the Ice People* are not too different. Naomi Klein and Sarah share almost the same negative experiences that leave similar psychological wounds on them.

In the post-natural society portrayed in *The Ice People*, when they are abandoned by women men turn to robots to share their loneliness and to meet their material, sexual and emotional needs while women develop hostility towards men and to all the technological products invented by them. Divided by gender segregation, the society then begins to develop two different attitudes towards technology: technophobia and technophilia, which make the "segging" between the sexes more severe. The media studies scholar Daniel Dinello defines technophobia as "dislike, or suspicion of technology, […] or of its godlike power, rather than an irrational, illogical or neurotic fear" (8). According to Dinello, the clash between technophobia and technophilia is the result of the clash between science and fiction. As the scientists continuously introduce new technologies and explore their applications in everyday life, "popular culture's pessimistic evaluation of technology's impact on our lives" (7) constructs a technophobic image in media. Dinello argues that "the dramatic conflict between the techno-utopia promised by real world scientists and the techno-dystopia predicted by science fiction" (10) will feed the contrasting attitudes towards technology swinging between technophobia and technophilia.

The technophiliac men produce a group of robots called "DOVES" to perform the feminine tasks neglected by the technophobic women, as well as to accompany them. Technophilia not only gives rise to the circulation of DOVES in a very short time, but also further separates men and women. DOVE is actually a coinage composed of the initials of the phrase "DO Very simple things" (65). Thus, it is used as a kind of common label for various types of humanoid robots designed to perform the basic domestic tasks. Various types of DOVES soon appear in daily life, such as robot maids and nannies called MOBOTS, which are particularly designed to take over stereotypical female domestic duties; SEXBOTS designed to function as sexual partners; REPLICATORS, which are organic mechanic hybrid robots with their ability of

reproduction; WARMBOTS, which aim to keep you warm at night with their furry exterior designs and long thick arms; and HAWKS, which are avian robot dogs designed for defensive purposes. In addition to robots designed to perform particular duties, the last group exemplifying the human-nonhuman interaction in the novel is BITS, the older people who were given mechanical replacement parts for medical reasons.

The technophobic women attack Doves and the factories manufacturing these robots. Saul describes the reaction of men upon the hostility of women as follows: "We were the Machine Men, and women were trying to take away our machines […] the Doves who loved us" (105). Actually women are not only trying to take away the robots, but also the techfix babies. "Children's Commune," also known as "Cacoon," a female community composed of short haired women with masculine outlooks, aims to educate children isolated from their biological fathers, and to support fellow sisters. Cutting men off child raising, and seizing the responsibility of raising their children singlehandedly, women join "The Wicca World," which is known for its technophobic hostility and distrust toward technological products. It acts as the political arm of the Children's Commune, and plans to bring on strict policies and restrictions on Dove ownership. The women of the Wicca order associate any technologies, which aim to control women's body, as the extensions of the patriarchal order. Thus, the Wicca order encourages women to protect themselves against technology.

While men become technophiliac, seeking consolation in DOVES, the technophobic stance of women in The Wicca World suggests that solutions are still in nature. They reject all the techfix solutions proposed for the declining reproduction rates and for the changing climate. As their technophobic philosophy prioritises femininity over masculinity, the Wicca women want the world dominated by a matriarchal order instead of a patriarchal one. So, their suggested alternative political regime is as equally totalitarian as the already existing one. With their matriarchal propaganda, they deliberately distort the well-known images of powerful men exemplified in the re-description of Michelangelo's *David* with a smaller penis, and of Jesus surrounded by children with "big kind eyes" and "flowing hair" (25), not by grown-up male disciples as

he is depicted in the original religious illustrations. The Wicca ideology, which is heavily constructed on nature-culture dichotomy, is in fact essentialist. It associates women with nature, and men with anything unnatural due to their engagements with technology. For this reason, like all technological devices, which are controlled by men, they label the Doves as "unnatural." From this perspective, theoretically, women are no different from the patriarchal heterosexist essentialists. This tendency of the Wicca women can be explained through Stacy Alaimo's argument on the drawbacks of feminism. Alaimo states that

> human corporeality, especially female corporeality, has been so strongly associated with nature in Western thought that it is not surprising that feminism has been haunted not only by the spectre of nature as the repository of essentialism, but as Lynda Birke puts it, "the ghost of biology." […] The underlying assumption that some aspects of biology are fixed becomes itself the grand narrative (albeit implicit) from which feminists and other social theorists are trying to escape. ("Trans-corporeal Feminisms" 240-241)

Thus, The Wicca World, while trying to stand up against the patriarchal system, replaces it with an equally oppressive matriarchal one. Therefore, their matriarchal system does not offer a better alternative to the patriarchal one.

Within this divided socio-political system, the DOVES are seen as innocent toys for men to make them feel as if they are regaining the control of their lives in a climatically challenged world. Replacing women, DOVES become the "storks carrying babies" (69). Saul proudly states that "for what was our world short of? Babies. The inventors of the DOVES were our storks" (69). In time, those man-made babies turn out to be obsessions of men and objects of male power as Saul explains: "[I]t was fun adjusting controls, thinking of new tasks for it [the Dove] to do, enjoying our power and its obedience, as we no longer could with servants and children" (69). Those high-tech designs that can more than simply mimic human ability and behaviour, also give human-like emotional responses, such as saying "I love you," giving consolations, chuckling, being offended, and chatting with humans. They even have nicknames like "Dodo" and "Dora." Gradually DOVES begin to occupy more space in social life. Men start to take their DOVE on a picnic, putting the seat belt on and treating it like their own child. Upon their first DOVES's drowning in the river during one of those picnics,

Saul and his family even perform an actual burial service for their non-functional DOVE. Saul describes the rise of the need for DOVES in their lives:

> I was stuck in the flat they [his wife Sarah and their son Luke] abandoned, with Dora [the name of their DOVE]. I found myself getting close to her. I began to use the "sleep" option more rarely, so she was functioning most of the day. She became…I can only say, a companion. Be honest, go further –she was a friend. And she offered the consolation words, I had asked for the special Poetry Module, meaning to play love poems to Sarah, but Dora played them to me, instead; she played me Auden's beautiful words. (89)

This quotation makes it clear that DOVES are not only designed for practical reasons, such as storing millions of songs ready to be played in the right occasions, recording all conversations between the family members, remembering and reminding the important dates about the family members, functioning as the family photo album, and baby-sitting. They can also hug and provide emotional support. In this respect, DOVES satisfy maybe the most difficult human need, that is, emotions. That is why, as Saul states,

> Doves weren't a luxury to men, you see. The Doves supplied us with something we lacked. The men who sat talking about their Doves or drove them to the club […] what were they like? – Proud fathers, that's the only description. They sat in noisy circles, laughing, shouting, swopping anecdotes about their Doves' achievements. And at home the Doves answered other needs. They were our pets, our kids, - our wives. Their docility, their friendliness, the way they served us and seemed to like us, the way they quietly accepted love whereas women had rejected us. (112)

If DOVES are to really replace women, men think that they should have reproductive abilities. Thus, reproduction modules are inserted into Doves, but as a result of a structural error, the replicator Doves start to mutate, and Saul feels terrible when he is faced with no other choice but to remove Dora's replicator module. The following quotation reveals the emotional bond between the human and the robot, Saul and Dora: "I was fond of Dora, I said sorry to her, I stroked her soft panels and apologized, but I took out her replicator module, intact. I felt awful, abusive, like a fake gynaecologist, plunging my hand into her cold inner parts, but persisted, I dragged it out (106). Later on, Saul confesses that his feelings for Dora have changed after that incident. He talks about how a "weird deep tenderness" for his robot was lost when its reproductive ability was destroyed. He questions himself: "Was it because she could no longer reproduce?

Did I see her as menopast, like Sarah?" (106). Saul's self-interrogation also reflects the patriarchal ideology with its tendency to see women and female robots only as maternal figures.

In conclusion, populated by technophiliac men and technophobic women, *The Ice People* presents a fictional world in which all the conventional practices, categorisations, patterns of behaviour, ways of thinking, social norms, and especially sexual identities and gender roles radically change along with the anthropogenic climatic changes. Gee depicts how the pre-existing social systems can be challenged and altered as the climate changes. What also changes is the power balance between the Northern hemisphere and the Southern hemisphere, giving rise to new demographic categorisations, like climate refugees from previously wealthy nations. Therefore, *The Ice People* is a multi-vocal work representing the clash of various voices from different parts of society, from various ethnic minorities to diverse gender compositions in a climatically challenged world. Moreover, the novel is not only a critique of techfix solutions to environmental problems but also a critique of a society which insistently turns a blind eye to the environmental causes of their problems, instead of facing the consequences of their actions. In this respect, *The Ice People* is a Cli-Fi that cautions us against socio-cultural transformations in the near future of the Anthropocene.

CHAPTER III

THE ECONOMIC DIMENSION OF THE ANTHROPOCENE: IAN McEWAN'S *SOLAR*

In addition to being a geological concept denoting various environmental transformations in planetary ecosystems, hence triggering irreversible physical changes on Earth, the Anthropocene is also a driver of socio-political, cultural, psychological, and economic transformations. Since it essentially describes a period of anthropogenic environmental crises and turmoil, the Anthropocene provides a fertile ground for the opportunists who take advantage of chaos and anxieties triggered by these crises to turn them into economic profit. In this respect, in addition to triggering psychological and social transformations, which are discussed in the previous chapters, the Anthropocene has an economic dimension. Providing opportunities both for individuals and institutions that seek economic profit in the face of ecological crises, the Anthropocene presents a vulnerable economic atmosphere open to various abuses. Thus, this last chapter explores the economic dimension of the Anthropocene through illustrative examples from Ian McEwan's recent Cli-Fi novel *Solar* (2010). *Solar* exposes the interest groups, individuals, and institutions profiting specifically from the climate crisis, perceptively revealing their economic motivations. Therefore, *Solar* is selected as an exemplary Cli-Fi representative of the economic dimension of the Anthropocene.

Born in 1948 in Aldershot, Hampshire, England, and spent much of his childhood abroad, in the Far East, Germany, and North Africa due to his father's military duties as an army officer, Ian McEwan returned to England in 1966 to study English at Sussex University and in 1971 he received his MA on Creative Writing from the University of East Anglia. His literary career began in 1975 with his first, award winning, collection of short stories, *First Love, Last Rites* and published his first novel *The Cement Garden* in 1978. His literary accomplishments have been honoured with many prestigious literary awards and nominations including *The Comfort of Strangers* (1981), which was shortlisted for the Booker Prize for Fiction, *The Child in Time* (1987), the winner of the Whitbread Novel Award, *Amsterdam* (1998), the winner of the Booker Prize for Fiction

in 1998, *Atonement* (2001), shortlisted for the Booker Prize for Fiction and the Whitbread Novel Award, and won the W. H. Smith Literary Award, *Saturday* (2005) the winner of the 2006 James Tait Black Memorial Prize (for fiction), *On Chesil Beach* (2007) shortlisted for the 2007 Man Booker Prize for Fiction, and the winner of the British Book Awards Book of the Year and Author of the Year Awards, and finally *Solar* (2010) is the winner of the 2010 Bollinger Everyman Wodehouse Prize. His most recent novels are *Sweet Tooth* (2012), *The Children Act* (2014), and *Nutshell* (2016). Ian McEwan has also written a children's book entitled as *The Daydreamer* (1994), three plays for television which were published under the title of *The Imitation Game* (1981), and original film scripts like *The Ploughman's Lunch* (1985). McEwan is also the writer of a libretto to Michael Berkeley's music for the oratorio *Or Shall We Die?* (1983).

Most McEwan novels deal with the recent political history of Europe, focusing especially on the post Second World War period, and touching upon the Nazi concentration camps, the fall of the Berlin Wall, and the Dunkirk military evacuations. His interest in problematic contemporary social issues (like exploitative sexual relations, paedophilia, incest, and violence) also features in his novels. Although the thematic foci of McEwan's fictions vary, the common point in most of them is the moral dilemmas that his fictional characters find themselves in, though in different contexts. The shared concern in McEwan novels to describe individuals struggling within moral dilemmas, is also observed in *Solar* (2010), which is McEwan's only novel with a particular focus on ecological issues like global warming and climate change. *Solar* portrays a corrupt scientist who has scientific expertise and credibility and thus has managed to secure financial as well as political support to produce solutions to the current environmental problems, but he prefers exploiting his position for his own personal gain. Although the scientist protagonist of *Solar*, Michael Beard, does not struggle within any moral dilemmas; he acts in contrast to the moral expectations of his society throughout the novel, becoming utterly immoral and corrupt when he uses science for his personal advantage. From this perspective, *Solar* presents a story of abuse; abuse of science by a scientist at a time when it is most needed by all humanity, the enduring times of climate change crisis.

Although science, and scientists, assume important roles in McEwan's other books, like evolutionary biology in *Enduring Love* (1997) and neurosurgery in *Saturday* (2005), climate change remains untouched till the publication of *Solar*. McEwan states in various interviews that his interest in climate change dates back to the mid 1990s, but his first novel with clear environmental focus is *Solar*, published in 2010. In an interview with the journalist Mick Brown from *The Telegraph***,** McEwan explains how and why he decided to write a novel about climate change: "I have been thinking of writing about climate change for some years, but it just seemed so huge and so distorted by facts and figures and graphs and science and then virtue. I couldn't quite see how a novel would work without falling flat with moral intent" ("Warming to the Topic"). As McEwan clearly states, his intention in writing *Solar* is not only producing a fictional work about the contemporary threat of global warming but, more importantly, to highlight and to investigate the moral responsibility of people who live through the negative and challenging environmental circumstances created by themselves. This contextual description clearly points to the Anthropocene. Thus, McEwan creates a fictional hero who literally holds the power of reversing the anthropogenic damages already given to the planet, at least in the field of energy, by developing a renewable energy project. But, this fictional hero, lacking the necessary moral responsibility, does not take his power and position seriously and thus is unwilling to undertake the mission of taking action for the future of humanity.

Constructed upon this moral framework, *Solar* is chronologically divided into three parts, each portraying a different phase of the novel's major character Michael Beard's life. The first part, which covers the years between 2000 and 2005, introduces Beard as a Nobel-winning physicist**,** now in his early fifties, and unhappily married with his fifth wife. Over the twenty years, Beard's fame as a Nobel laureate, awarded for his ground-breaking work known as "the Beard-Einstein Conflation," which is an elaboration of Einstein's explanation of photovoltaics with Beard's new perspective as a physicist, has already been fading away. Not being able to propose anything new recently, Beard has been endlessly repeating the same lecture for twenty years. Uninspired as well as unwilling to develop new theories or projects, Beard has merely been enjoying his age-old fame in a mood of stasis for a long time:

> He had an honorary university post in Geneva and did no teaching there, lent his name, his title, Professor Beard, Nobel laureate, to letterheads, to institutes, signed up to international 'initiatives', sat on a Royal Commission on science funding, spoke on the radio in laymen's terms about Einstein or photons or quantum mechanics, helped out with grand applications, was a consultant editor on three scholarly journals, wrote peer reviews and references, took an interest in the gossip, the politics of science, the positioning, the special pleading, the terrifying nationalism, the tweaking of colossal sums out of ignorant ministers and bureaucrats for one more particle accelerator or rented instrument space on a new satellite, appeared at giant conventions in the US – eleven thousand physicists in one place! – listened to post-docs explain their research, gave with minimal variation the same series of lectures on the calculations underpinning the Beard-Einstein Conflation that had brought him his prize, awarded prizes and medals himself, accepted honorary degrees, and gave after dinner speeches and eulogies for retiring or about-to-be-cremated colleagues. In an inward, specialized world he was, courtesy of Stockholm, a celebrity, and he coasted from year to year, vaguely weary of himself, bereft of alternatives. (18-19)

As an aging scientist who left his last important success twenty years behind, and now in his fifties, he lacks "the will, the material, […] the spark" (19). He has "no new ideas" (19). So, as Beard himself puts it, "all the excitement and unpredictability was in [his] private life (18), in which Beard and his fifth wife Patrice have been struggling in a five-year-long, childless marriage. Just like his professional life, his personal life is also in decline. Michael and Patrice are already falling apart when the novel opens, and Beard suspects that his wife is having an affair with their house constructor, Rodney Tarpin. Yet, Beard has no energy, neither to fight for his marriage nor to start just another long break up/divorce procedure. In contrast to his personal life, his professional life takes a new turn when he is offered a new administrative position: the head of a new government research establishment located in Reading, a centre for developing renewable energy solutions. This is where Beard confronts green politics and finds himself caught in the middle of bureaucratic webs of science and politics. The Centre is also where Beard meets Tom Aldous, a post-doctorate researcher who works on renewable energy projects. Soon, Beard surprisingly discovers the emotional involvement of his fifth wife Patrice and Tom, and upon his return from a trip to the North Pole, he witnesses Tom Aldous's accidental death in his house. The first part of the novel ends with Beard's so-called inheritance of the file containing the details of Aldous's photovoltaic solar project and his decision to develop the project as if it was his own idea. The second part, which covers the four years (2005-2009) following Aldous's unfortunate death, portrays Beard working on Aldous's solar project. This part

also highlights Beard's immoral character emphasizing the irony between his position as a scientist, who is expected to fight against climate change, and his newly achieved capitalist mentality as a corrupt scientist who abuses his position to gain personal financial advantages. The third, and the last, part of the novel opens in 2009 and portrays Beard as an older, fatter, ailing man with a serious heart illness and cancerous skin problems, but most importantly, as a person transformed into a sort of businessman who is preparing to launch his Solar Project he had plagiarised from Tom Aldous years ago, and to market it to the possible investors. Illustrating the practical problems encountered during the process of bringing an eco-friendly project from theory to life, such as the necessity of promising economic profit, this last part of the novel reveals the capitalist concerns of individuals even during global ecological crises, like global warming. Thus, the novel, in total, through the characterisation of Michael Beard and some supporting characters and institutions, reveals the economic dimension of the Anthropocene.

Thematically engaging with climate change, *Solar* can be categorized as just another example of climate change fiction. Yet, among the two other Cli-Fi novels discussed in the previous chapters of this dissertation, McEwan's *Solar* occupies a distinctive place in this genre. First of all, unlike many other Cli-Fi novels, *Solar* takes place in the present day, not in the future. Thus, chronologically and thematically speaking, *Solar* is not post-apocalyptic; it does not portray the aftermath of an environmental crisis. On the contrary, it can be regarded as pre-apocalyptic, which portrays the phase just before a possible environmental disaster. People usually tend to fail to read the warning signs of an approaching catastrophe while living through them. *Solar* is a novel set exactly in such an atmosphere: a planet which is on the brink of anthropogenic climate change crisis, and the environmental problems that will be triggered by it soon. Despite the seriousness of the climate crisis at the gate, the tone of the novel is not gloomy. On the contrary, a strong sense of humour is felt throughout *Solar*. Lastly, *Solar* is not dominated by the futuristic imagination of a typical Cli-Fi novel in which the survivors of an environmental catastrophe try to find ways to sustain life in a dark, ecologically imbalanced, climatically challenged, nightmarish world. Instead, the given details in the novel about the current environmental problems and issues of sustainability and the

portrayal of people's experiences, *Solar* creates a more realistic, and a less fictional scenario. Also supported by references to the contemporary political figures like George Bush (44, 53-54, 300), Bill Clinton (104), Al Gore (44, 53-54, 300), Barack Obama (296, 300), Tony Blair (22,179), and Queen Elizabeth II (373), the novel gives the impression of being a contemporary anecdote narrated by an allegedly respectable physicist, not the impression of fictional narrative produced by a mad scientist.

McEwan finds dealing with climate change in fiction hard and risky. Interviewing with Jessica Griggs just after the publication of *Solar*, he explains it saying, "I knew I had to be careful when writing a novel about climate change, it can be such a dull subject" (Griggs 2). To avoid this, McEwan says, he has spent four years gathering material for the book, though he always wanted to write about climate change (Adam, "Ian McEwan: Failure"). Treating the topic of climate change in such a sensitive and meticulous way, McEwan is aware that imagining an invisible, slow-paced, and distant threat like climate change is difficult:

> As humans, climate change is uniquely difficult for us, partly because we're not used to thinking of long timescales, partly because it's not in our nature to perform favours for people that aren't born yet and partly because we have this double edge to our nature - ferociously clever and ingenious, which is what's got us into this mess, but also very tribal. (Griggs, "Funny Thing")

Struggling to envision a fictional Anthropocene future, a real experience of Ian McEwan helps him imagine a climatically challenged present, and provides him with the necessary inspiration and motivation for the birth of *Solar*. In 2005, McEwan was invited by the environmental group Cape Farewell to join a group of artists and scientists on a trip to Svalbard, a region composed of a group of Norwegian islands in the Arctic Ocean. In March 2005, McEwan boards the ship sailing to the frozen fjords of the North Pole with these intentions:

> We have come to this ship in a frozen fjord to think about the ways we might communicate our concerns about climate change to a wider public; we will think about the heady demands of our respective art forms, and we will consider the necessity of good science, and shall immerse ourselves in the stupendous responsibilities that flow from our stewardship of the planet, and the idealism and selflessness demanded of us as we subordinate our present needs to the welfare of

> unborn generations who will inherit the earth and thrive in it and love it - we hope - as we do. (“A Boot Room”)

As it is explained in the official website of the Cape Farewell Foundation, the expedition “took place in March 2005 on board the Noorderlicht, [the ship] locked in ice at Tempelfjorden, Spitsbergen, just north of the 79th parallel. For six days, twenty artists, scientists and journalists experienced the arctic environment in extreme temperatures of -30°C.”[16] David Buckland, the director of the event, explains the motive behind the expedition, and the logic behind the selected destination saying, “Cape Farewell is committed to the notion that artists can engage the public in this issue [global warming], through creative insight and vision. The Arctic is an extraordinary place to visit. It is a place in which to be inspired, a place which urges us to face up to what it is we stand to lose” (“The Cape Farewell Expedition of 2005”).

Upon his return from the Cape Farewell’s Arctic expedition, McEwan writes “A Boot Room in The Frozen North,”[17] to be published in the official web site of the organisation, and shares his impressions about the Cape Farewell art/science expedition. As he states in this essay, McEwan sees his presence in this particular region of the world as a kind of confrontation of a human being with the consequences of his actions:

> The whole world's population is to the south of us, and up here we are our species’ representatives, making in the wilderness, a temporary society, a social microcosm in the vastness of the Arctic. We are the beneficiaries and victims of our nature (social primates, evolved through time like wind-sculpted rock) merry and venal, co-operative and selfish. (“A Boot Room”)

This trip becomes the major inspiration and motivation for McEwan to write a novel about climate change, hence the originating idea behind *Solar*, which will be published only five years later. In the novel, the 2005 Cape Farewell experience is revisited and McEwan sends the protagonist Michael Beard off to a similar expedition to the North Pole with similar intentions: To “see global warming for himself” (46). Even the same boot room anecdote, which was mentioned in McEwan’s “A Boot Room in the Frozen North,” is used in *Solar* as an analogy showing the flawed and selfish nature of humans who are incapable of, as well as unwilling to solve the environmental problems, even if they exactly know what causes them:

> We must not be too hard on ourselves. If you were banished to another galaxy tomorrow, you would soon be fatally homesick for your brothers and sisters and all their flaws: somewhat co-operative, somewhat selfish, and very funny. But we will not rescue the earth from our own depredations until we understand ourselves a little more, even if we accept that we can never really change our natures. All boot rooms need good systems so that flawed creatures can use them well. Good science will serve us well, but only good rules will save the boot room. ("A Boot Room")

McEwan claims that despite the scientific evidence for global warming, or even if we witness what is happening just like the participants of the expedition who witnessed with their naked eyes the effects of global warming on the polar ice sheets, unless we change our nature as humans we will continue to act selfishly. Therefore, according to McEwan, "only good rules" that will force people stop acting selfishly can save the planet. In other words, legal actions and globally accepted environmental policies are urgently needed.

In the absence of such collective environmental policies in real life, the planet remains in environmental risk, as the "boot room" event in the novel projects it realistically. As environmental scholars Seyed Javad Habibi and Sara Soleimani Karbalaei argue, there is a "metonymic relation" (98) between the behavioural patterns of the participants of the North Pole expedition in the novel and the people's treatment of the Earth in real life. The boot room in the ship, which is used by the participants of the expedition every day before and after they start their daily routine of exterior activities, soon turns into a chaotic, disarranged, and messy space where everybody leaves their stuff carelessly all over the place, and even wear each other's hats, boots and gloves without asking for permission As it is, the boot room storing the users' possessions mirrors the Earth providing material for the sustainability of life. Beard hopelessly admits their (the participants of the expedition) failure to form an organized system in the boot room, and indirectly in life: "How were they to save the earth [. . .] when it was so much larger than the boot room?" (109). In an interview with *The Guardian*, McEwan states: "clothes and equipment there [in the boot room] to save our lives, which we should have been able to look after very easily would go missing, and I thought, for all the fine words and good intentions, maybe there was a comic inadequacy in human nature in dealing with this problem" (Adam, " Ian McEwan: Failure").

Because of McEwan's disappointment with humanity at their failure to deal with the climate change problem properly and seriously, and postponing to take action and stop being abusive and over-consumptive of natural resources, in *Solar* he deliberately creates a mocking parody of the Cape Farewell expedition. When the invitation to the expedition arrives at the Centre where Beard works, even the brochure of the expedition ironically highlights the comforts which will be provided by the ship for the participants: "The destination was well below the eighth parallel, and he [Beard] would be staying on a 'well-appointed, toastily-heated vessel of richly-carpeted oak-panelled corridors with tasselled wall lamps,' so a brochure promised" (62). Beard shamelessly lines up the three so-called hardships that the journey may possibly pose for him being "the size of the cabin, limited email opportunities, and a wine list confined to a North African *vin de pays*." (63). When the expedition party, composed of twenty artists and scientists sincerely concerned (!) with climate change, sails along the shores of the frozen fjords, observing from a just-ten-mile-away distance "dramatically retreating glacier whose sheer blue cliffs regularly calved mansion-sized blocks of ice onto the shore of the fjord" (62), an internationally renowned Italian chef will be cooking for them in the ship's kitchen. The safety of the participants will also be guaranteed when they step on the icy ground; for instance, "predatory polar bears would be shot if necessary by a guide with a high-calibre rifle" (63). On top of all, the participation to the expedition will require "no lecturing duties – Beard's presence would be sufficient – and the foundation would bear all expenses" (63). This sentence strengthens the suspicion on the reader's mind suggesting that this is not an expedition primarily concerned with observing global warming on a hot zone, but organizing a photogenic and interesting media event with the attendance of poster faces, and with a possible outcome of creating an eco-friendly public image for the organizing foundation. McEwan also mocks the foundation's generous compensation plan for the expedition's possible damage to the ecosystem: "[T]he guilty discharge of carbon dioxide from twenty return flights and snowmobile rides and sixty hot meals a day served in polar conditions" (63) will be compensated "by planting three thousand trees in Venezuela [in Venezuelan rainforests] as soon as a site could be identified and local officials bribed" (63).

This part about the transportation for the expedition in the novel echoes a similar concern in real life about the frequent overseas travels of some environmental scholars, climate scientists, and activists. Ecocritics and climate scientists, for example, who travel too frequently to conferences are criticized by their colleagues on the grounds that they are not acting upon their principles as they leave unnecessary carbon prints on Earth through their intercontinental flights. So, touching upon a topical debate, McEwan, through Michael Beard, mocks the ironic situation, which the real climate scientists and scholars find themselves in. Yet, being a climate change sceptic, Beard is not concerned about his multiple carbon prints left on Earth at all. When his colleagues at the Centre hear about Beard's journey to the North Pole, urban rumours begin to spread all around the Centre. While some of his colleagues naively appreciate Beard's intention "to see global warming for himself" (63), being obviously unaware of the details of the trip described in the brochure, some others assume that "he [Beard] would be towed by dogs, and others that he would be pulling his own sledge" (63). No matter how shameless a philanderer and hedonist he is, even Beard feels embarrassed at some point. But still, he lets the false rumours circulate. Being one of those naive ones, Jock Braby, the administrator of the Centre, is amazed by Beard's so-called "commitment to the cause" (63) and "offers to arrange a send-off party" (63) for him. Brady never questions Beard's intentions in participating in such a long and difficult expedition, and remembering "the climate models had predicted that the earliest and the most radical signs of planetary warming would be observed in the Arctic" (66), he even finds Beard's journey to the North Pole quite relevant for their climate change-oriented job, just like a kind of in-service training. Thus, Beard sees no necessity to correct the misunderstood length of his trip, which is declared by Brady as eight weeks when it is actually only six nights.

In addition to accepting free trip invitations, Beard has no problem with talking at expensive conferences just for the money offered by the organisation. He remembers once attending an energy conference:

> For an unnaturally large fee, he was to address an energy conference attended by institutional investors, pension-fund managers, solid types who would not easily be persuaded that the world, their world, was in danger and that they should align their investment patterns accordingly. Through inertia, blind professional custom, they

> were bound to their old familiars, oil, gas, coal, forestry. He was to persuade them that what they currently made profitable would one day destroy them. (154)

This is one of the many occasions that he finds himself in, persuading people to the things he himself does not even believe. Thus, to Beard, the Cape Farewell expedition sounds more enjoyable than an academic conference. At least, there are no formal obligations and/or commitments to perform at the end**.** In real life, on the other hand, at the end of the 2005 Cape Farewell expedition, the attendant artists were asked to reflect their experiences in quite original ways, in artistic works, upon their return. "The Ice Garden" installation[18] of December 2005 was one of the first examples of the artistic reflections of the March 2005 Cape Farewell expedition. Some of the artists, who had joined the expedition held in March 6-11, 2005, prepared this art installation to share their impressions and to attract people's attention to the melting ice sheets in the Arctic regions. By this way, they aimed to raise environmental awareness. Believing that raising awareness is the artists' and literary figures' responsibility for the future generations, Ian McEwan also contributed to this installation event.[19] Like the real life artists, the artists on the parodical representation of the expedition in *Solar* spend the long Arctic nights talking about climate change and the topical environmental issues:

> [T]he century had ended and climate change remained a marginal concern, Bush had torn up Clinton's modest proposals, the United states would turn its back on Kyoto, Blair showed no grip on the subject, the long-ago hopes of Rio were lost. Canonically pursuing then overtaking disappointment was alarm. The Gulfstream would vanish, Europeans would freeze to death in their beds, the Amazon would be a desert, some continents would catch fire, others would drown, and by 2085 the Arctic summer ice would be gone and the polar bears with it. (104)

Beard is unwilling to participate in these prolific environmental debates because he feels detached from the future threats posed by global warming:

> Beard had heard these predictions before and believed none of them. And if he had, he would not have been alarmed. A childless man of a certain age at the end of his fifth marriage could afford a touch of nihilism. The earth could do without Patrice and Michael Beard. And if it shrugged off all the other humans, the biosphere would soldier on, and in a mere ten million years teem with strange new forms, perhaps none of them clever in an apeish way. Then who would regret that no one remembered Shakespeare, Bach, Einstein, or the Beard-Einstein Conflation? (104)

Being a representative of positive science, Beard does not believe that art and literature can save the planet. He cannot even believe how he can possibly be in the same room with so many people under the illusion of the same idealistic assumption that

> [i]t was art in its highest forms, poetry, sculpture, dance, abstract music, conceptual art, that would lift climate change as a subject, gild it, palpate it, reveal all the horror and lost beauty and awesome threat, and inspire the public to take thought, take action, or demand it of others. He [Beard] sat in silent wonder. Idealism was so alien to his nature that he could not raise an objection. He was in a new territory, among a friendly tribe of exotics. (107)

Among these idealist, "exotic" tribe of artists and literary figures, there is a musician who records the sounds of nature, "of wind moaning through the rigging" (107), a sculptor who carves out of ice the figures of animals affected negatively by climate change, such as penguins and polar bears, a novelist reading out extracts from books loudly, even shouting. There are also choreographers creating dance shows to be performed on ice, performance artists singing prayer-like songs, and photographers capturing the massive pieces of ice blocks rupturing away from polar ice sheets. Among them, being a non-believer in the power of art and literature to "lift," "gilt," "palpate," and "reveal" (107) many neglected things about climate change, and "to inspire" people to "take thought and action" (107), Beard only feels alienated. It is also ironic for the readers of *Solar* to read a climate change novel, which is about a literary character who does not believe in the power of literature to create collective ecological awareness necessary to stop global warming.

In addition to despising art and literature's role to solve the environmental problems, and to create awareness, Beard is also unwilling to use science and technology. In this regard, Beard seems to be rejecting any tool that can be helpful in solving environmental problems. In a fundamentalist way, Beard sometimes finds contemporary environmental problems impossible to be solved, sometimes looks at the issue too pessimistically and believes that humanity has already passed the point of no return, the environmental doom is already at the gate, and he is lucky to be old enough to die before a possible environmental apocalypse, and also lucky to have no children to worry about. Sometimes, he finds the environmental warnings exaggerated, and sometimes finds them too remote to take action just now. These mood swings of Beard toward

climate change threat echo and represent different views introduced by environmentalist Stewart Brand on climate change and the threat of global warming.

During the 2009 *UNFCCC* (United Nations Climate Change Conference) *Copenhagen Climate Talks*, Brand gives his highly acclaimed speech, in which he proposes a taxonomy of people's various views on global warming. According to Brand's taxonomy, people's views on global warming can be categorized under four different headlines: Denialists, Sceptics, Warners, and Calamatists. The Denialists, according to Brand, believe that the climatologists and the other scientists are not producing facts, but conspiracy theories "to panic the public" ("Four Sides"). They contribute to a "political agenda," and thus, they are "loud, sure and political" (Brand, "Four Sides"). According to Brand, "Senator James Inhofe of Oklahoma and the columnist George Will wave the banner for the hoax-callers" ("Four Sides"). Brand justifies his categorisation with Senator Inhofe's 2003 speech to the American Senate during a debate on the Kyoto Protocol. In his speech, Inhofe states

> the claim that global warming is caused by manmade emissions is simply untrue and not based on sound science. […] CO2 does not cause catastrophic disasters - actually it would be beneficial to our environment and our economy. [....] The motives for Kyoto are economic, not environmental -that is, proponents favor handicapping the American economy through carbon taxes and more regulations. (Brand, "Four Sides")

The Sceptics, on the other hand, base their sceptical stance against the warnings of the scientists on "the contradictions and shortcomings in climate data and models" (Brand, "Four Sides"), hence the lack of "consensus" among climate scientists. As the two prominent representatives of such contradictions among climate scientists, Brand presents Roger Pielke, a climate scientist at the University of Colorado, and the physicist Freeman Dyson. As Pielke defines the apocalyptic climate change scenarios presented by the United Nations Intergovernmental Panel on Climate Change as "overstated and underpredictive," Dyson writes that he is opposing "the holy brotherhood of climate model experts and the crowd of deluded citizens who believe the numbers predicted by the computer models." As the third category, the Warners who are composed of the climatologists and other Earth scientists who find the climate change trends quite alarming and reads them as warning signs showing that the Earth

"headed toward planetary disaster" (Brand, "Four Sides"). Moreover, as the primary cause of this highly possible environmental disaster, they mark the anthropogenic production of greenhouse gases. As the most prominent names in this category, Brand highlights the scientists James Hansen, Stephen Schneider and James Lovelock. Besides, Paul Crutzen and Eugene Stoermer, as the most recent supporters of the anthropogenic climate change argument and the idea of the human figure as an epoch starting geological force, hence the Anthropocene hypothesis, can also be added to this category. Lastly, the Calamatists is the most pessimistic category among all four. They are composed of the environmentalists who believe that "industrial civilization has committed crimes against nature, and retribution is coming" (Brand, "Four Sides"). Social theorist Jeremy Rifkin, who criticizes technology-driven human hubris for environmental degradation, and environmental writer and activist Bill McKibben, who has already heralded the human-induced end of nature in his 1989 book, are mentioned by Brand as the most renowned representatives of this last category.

How about Ian McEwan? Journalist Mike Brown, in an interview that he prepared for *The Telegraph*, asks Ian McEwan about Brand's taxonomy of people's reaction to climate change, and where he stands in the on-going climate change debate. McEwan interprets Brand's four categorical groups in his own words saying

> [t]here are the outright ideological deniers, who believe that man-made global warming is a myth. […] The deniers, like people everywhere, wanted business as usual. They feared a threat to shareholder value, they suspected that climate scientists were a self-serving industry, just like themselves. […] There are the sceptics whose minds will change as the data comes in. Then there are the warners – people who have looked at the data and feel that it's pretty alarming. And finally there are the calamatists who feel it's all going to be over next week and we're in a handcart to hell. ("Warming to the Topic")

Among those four groups, McEwan describes himself as a Warner: "Simply because I'm not a scientist and the weight of the data seems to me to be pretty huge. It would be quite extravagant to think there was some collisional conspiracy, or that there were too many jobs, or university grants that were on the line" (Brown, "Warming to the Topic"). Disagreeing with the Sceptics who point to contradictions in scientists' predictions about the future, McEwan states that "every now and then there is a screw-up –the UEA stuff; the Tibetan plateau is not going to be melted by 2035, but by 2350 – that's quite a

big difference. […] If more evidence came along that the whole process was going to be far slower than we thought – which I think is the least unlikely possibility – then I'd be delighted" (Brown, "Warming to the Topic").

On the other hand, there is no proper category in Brand's taxonomy to put the corrupt physicist of *Solar*, Michael Beard in. According to McEwan, "Michael Beard constitutes yet another type –a man whose primary interest in global warming is the opportunity it presents to further his own interests" (Brown, "Warming to the Topic"). Although his position as a prize-winning scientist responsible for assessing the data on climate change and develop technologies against global warming, requires his categorisation as one of the Warners, his despising attitude towards climate change activists and his co-workers categorizes Beard as a climate change sceptic. Ironically, in *Solar*, McEwan refers to the 2009 *Copenhagen Climate Talks*, where Steward Brant first introduced his famous taxonomy, by making Michael Beard receive an invitation to the event as keynote speaker: "The second email was an invitation to address a meeting of foreign ministers at COP 15, the grand climate-change conference in Copenhagen in December. He would be at one with its spirit and he was, he supposed, the perfect choice" (381). Commenting on the reference to the 2009 Copenhagen Climate Change Summit in *Solar*, the environment correspondent of *The Guardian,* David Adam asks McEwan about his impressions about the real UN 2009 Copenhagen Climate Talks. McEwan states, "he watched the outcome of the Copenhagen summit in December 'very closely and with some despair' and then went back to his novel, *Solar*, to rewrite a section a few pages from the end […] in order "to reflect the spirit of sadness" ("Ian McEwan: Failure"); he feels for the failure of the summit. At this point, McEwan comes to believe that "he [Beard] knows that Copenhagen will be just the place for him. It is where he would be heading to add his confusion to everybody else's" (Adam, "Ian McEwan: Failure"). Obviously, in his portrayal of such a protagonist with conflicting attitudes towards climate change, McEwan was probably influenced by various topical climate issues not only in the world but also particularly in the UK. The 2009 United Nations Copenhagen Climate Change Summit is one of these contemporary issues.

In 2009, another interesting climate-change-related incident occurred in the UK, which probably provided inspiration for McEwan's portrayal of the corrupt scientist in *Solar*. The computer server at the University of East Anglia was hacked and many private e-mail messages with documents and drafts of scientific reports attached, which belonged to some of the climatologists working on a study to be used in the next IPCC (Intergovernmental Panel on Climate Change) report, as well as informal correspondences and illustrations about the climate sceptics, were all together breached. Though no officials confirmed the authenticity of the materials circulating on the Internet, the security breach on their computer server and the following theft were confirmed by the officials of the University of East Anglia, and resulted in police investigations. Under the light of the e-mail correspondences that leaked,[20] serious accusations were addressed to these climatologists by the climate change sceptics. Some of these accusations were using statistical tricks to underline the rapid and sharp rise in recent global warming trends, and manipulating the scientific data to point to the anthropogenic roots of the current climate change crisis, and to hide the decline in temperatures observed recently.

Upon this incident, Andrew C. Revkin, one of the leading environmental journalists who stands against the hubristic promotion of humans as a climate-changing geological force, hence the whole concept of the Anthropocene, has reported the hacking incident in his column published in *The New York Times* on November 20, 2009. Revkin states that the human contributions to global warming is too wide to deny, but the latest developments may cause "a stir among global warming sceptics, who say they show that climate scientists conspired to overstate the case for a human influence on climate change" ("Hacked E-mail"). For Revkin, "the evidence pointing to a growing human contribution to global warming is so widely accepted that the hacked material is unlikely to erode the overall argument. However, the documents will undoubtedly raise questions about the quality of research on some specific questions and the actions of some scientists." (Revkin, "Hacked E-mail"). So, some scientists, like Michael Beard in *Solar*, may be driven off the purely scientific road by more personal, more profitable, political, or ideological motivations in their statements about the climate change threat.

McEwan clearly describes himself as a Warner, but his fictional character Michael Beard's position in Brand's four-sided categorization is more complex and vague. Beard's sceptical stance toward the threat of global warming is closely related to his chaotic personal life:

> Beard was not wholly sceptical about climate change. It was one in a list of issues, of looming sorrows, that comprised the background of news, and he read about it, vaguely deplored it and expected governments to meet and take action. And of course he knew that a molecule of carbon dioxide absorbed energy in the infrared range, and that humankind was putting these molecules into the atmosphere in significant quantities. But he himself had other things to think about (20).

Beard is sceptical about the scientific data for an impending climatic catastrophe because he is too self-centred, and self-involved to evaluate the available data. The catastrophic representations of these data are merely exaggerations, according to Beard. Thus,

> [h]e was unimpressed by some of the wild commentary that suggested the world was in 'peril', that humankind was drifting towards calamity, when coastal cities would disappear under the waves, crops fail, and hundreds of millions of refugees surge from one country, one continent, to another, driven by drought, floods, famine, tempests, unceasing wars for diminishing resources. There was an Old Testament ring to the forewarnings, an air of plague-of-boils and deluge-of-frogs, that suggested a deep and constant inclination, enacted over the centuries, to believe that one was always living in the end of the days, that one's own demise was urgently bound up with the end of the world, and therefore made more sense, or was just a little less relevant. The end of the world was never pitched in the present, where it could be seen for the fantasy it was, but just around the corner, and when it did not happen, a new issue, a new date would soon emerge. (21)

As can be deduced from this quotation, Beard seems to have no problem with the validity of the climate change data, but their interpretation as apocalyptic signs. Humanity has been warned about such calamities since the times of the Old Testament. Here, Beard holds a similar attitude as observed in the conversations among the climate scientists at the East Anglia University, whose emails have been hacked. For Beard, these stories of environmental catastrophe can also be read as fantasies; thus, people should not take them seriously. He even describes climate change as "yet another beast" (21) that has been "conjured" (21) by "the apocalyptic tendency" (21) of people. So, people's perception of climate change changes every day with the emergence of new scientific data. Today's pessimistic interpretations of data may change tomorrow.

As the head of the Centre for Renewable Energy, Beard is open to this flux of new scientific data about climate change every single day. What is more ironic is Beard's assignment to the administrator's position in one of those institutions of climate change research, which provides reliable data for the general public and develops tech-fix solutions by using these data. As Beard's already exhausted reputation as a Nobel laureate is gradually fading away, his university salary, lecture fees, and media appearances are "never quite sufficient" (22) for him, the green political agenda of Tony Blair's government steps in to reanimate Beard's degrading academic life:

> Fortunately, by the end of the century, the Blair government wished to be, or appear to be, practically rather than merely rhetorically engaged with climate change and announced a number of initiatives, one of them was the Centre, a facility for basic research in need of a mortal as its head sprinkled with Stockholm's magic dust. (22)

In the press conference, which proudly announces Beard as the honorary head of the Centre for Renewable Energy, the newly appointed Minister of Energy of Blair's cabinet also addresses the "the genius' of the British people" (22), and invites them to send their own clean-energy ideas and drawings to the Centre. In front of the cameras, the minister promises that every submission will be answered by Braby and Beard's team, which is composed of "half a dozen underpaid post-doctoral physicists housed in four temporary cabins in a sea of mud" (22). Eventually, only within six weeks, the Centre receives hundreds of proposals "most were from lonely types working out of garden sheds, a few from start-up companies with zippy logos and patent pending" (22). Most of these proposals were scientifically worthless and time-consuming for the Centre, which is already short of staff to work on authentic renewable energy projects:

> Some envelopes contained no drawings, only a letter, sometimes, half a page, sometimes ten. The author regretfully explained that he […] declined to enclose detailed plans because it was well-known that government agencies had much to fear from the kind of free energy that his machine would deliver, for it would close off an important tax resource. Or the armed forces would seize on the idea, declare it top secret, then develop it for their own use. Or conventional energy providers would send round thugs to beat the inventor to a pulp in order to maintain business supremacy. Or someone would steal the idea for himself and make his fortune. There were notorious instances of all these, the writer might add. (23)

No matter how weak their focal point is, and how trivial arguments they propose, “every submission had to be answered individually, seriously, politely (26), as the Minister asked from them. According to Beard, in these hundreds of proposals, “there was nothing new, or nothing new that was useful. The revolutionary lone inventor was a fantasy of popular culture – and the Minister” (26). At some point, Beard begins to see a pathetic similarity between these “ingenious men who are caught up by their extravagant ambition to reinvent the wheel, and then one hundred and twenty years after Nikola Tesla, the induction motor, and then read inexpertly and far too hopefully into quantum field theory to find their esoteric fuel right under their noses, in the voids of the empty air of their sheds or spare bedrooms zero-point energy” (25). They were all lonely, desperately in need of a decent distraction, and ready to commit themselves to anything, except for their own life. In this respect, these people are just like Beard who feels like a refugee escaping from the pressure of his fifth marriage, when he is working at the Centre.

Despite the vanity of the Minister’s idea, a long set of tables is reserved at the Centre for such letters already occupying “sixteen hundred letters, and printed e-mails, sorted by date” (24). Beard thinks this is a waste of time and seriously considers forwarding all these letters to the Minister’s department in London, but abstains from the consequence of such an action on the ground that the Minister may take it to be a disrespectful act, and also Braby stops Beard. In the end, the post-doc physicists at the Centre, though unwillingly, set to this time-consuming work, and start going through the pile of letters and mails from “the geniuses,” as nicknamed by them, at the cost of delaying the first real project of the Centre; “designing a wind generator for city roofs” (24). So, the scientists at the Centre, work to please the politicians first, and the politicians work to please the possible voters and taxpayers. By this way, science and politics form a forced collaborative network, to which economics will be added soon.

As it is seen in the novel, climate change creates its own discourse. Today, it is an undeniable fact that the cause of climate change is industrial production and overconsumption; in other words, the abuse of natural resources by economic systems. In general, economic systems, even the two most dominant and oldest ones, capitalism

and communism, are fundamentally based on the use/abuse of natural sources as raw materials for industrial production. So, governments' political ideologies and economic strategies perpetuate the systems that sustain economic growth. For instance, the British environmentalist writer Jonathon Porritt sees no difference between capitalism and communism in their treatment of nature considering their similar dedication "to industrial growth, to the expansion of the means of production, to a materialist ethic as the best means of meeting people's needs, and to unimpeded technological development" (44), as well as both of these economic systems' reliance on "increasing centralisation and large-scale bureaucratic control and co-ordination" (44). Moreover, "from a viewpoint of narrow scientific rationalism, both insist that the planet is there to be conquered, that big is self-evidently beautiful, and that what cannot be measured is of no importance" (Porritt 44). However, the economic systems, which are supposed to be declining because of climate change, ironically find a way to sustain industrial production even under these circumstances, and turn current ecological crisis atmosphere to an opportunity. In other words, any individual, institutional, or governmental effort to reverse the environmental degradation process and to fight against anthropogenic climate change is costly, but it also paves the way to get advantage out of the negative consequences of climate change, although these negative consequences were created by the same economic systems in the first place. This paradoxical situation can be observed in most economically developed countries today. Heavy industrialisation and the overconsumption in such countries is both the cause of their economical development and prosperity, and of their environmental degradation, and depletion of natural resources. Yet, the same environmental crises also provide them new opportunities for financially profitable investments. So, seeking for a profitable way out of crises is like a survival instinct for economic systems like capitalism.

Imitating the survival instinct of the economic systems at the times of crisis, political systems too try to get advantage out of climate change crisis. Thus, McEwan's political criticism in *Solar*, especially in the case of Minister's interest in the Centre for Renewable Energy and trying to attract public attention through an open-access renewable energy project competition, is addressed to the superficiality of the

governments' environmental policies, as well as their insincerity. Integrating uneducated, but enthusiastic civilians into serious energy projects, which requires expertise as well as experience, will only damage the credibility of these institutions in the long-term, though these efforts are seemingly good for these political parties' eco-friendly public image today. In *The Green Political Thought*, Andrew Dobson, scholar of environmental politics, also criticizes the contemporary relationship between environment and politics. Dobson explains this problematic relationship on the grounds that politicians' growing interest in environmental issues may not be sincere:

> One of the most striking political transformations of the past two decades has been the way in which environmental concern has moved from the margins to the mainstream of political life. Everyone wants a piece of it. […] [I]t is as hard to find a politician opposed to sustainable development as it is to find one who is reluctant to kiss babies during election campaigns. This transformation has required of politicians that they assimilate 'the environment' into their respective political positions. (2)

As environmental issues are increasingly popularized, politicians have begun to use them for the purposes of political propaganda. In *Solar*, McEwan satirizes this contemporary political tendency foregrounded by Dobson. In the novel, the foundation of the Centre for Renewable Energy with the political initiatives of the Blair government, and the launching of the Centre's very first project, the WUDU, with wide media coverage strengthens the concerns of people like Dobson about the sincerity of the political incentives that touch upon environmental problems. Unfortunately, these green political agendas lack sincere concern for environmental degradations, thus, provide no sincere efforts to compensate them through tech-fix solutions. Instead, it is suggested that the political and financial support provided by the Blair government to the Centre is motivated by the idea of creating an eco-friendly public image for their government, and/or party.

With the same propagandist intentions, the Blair government in the novel begins to direct substantial amount of money and public funds to the Centre immediately. Michael Beard describes how the facilities of the Centre for Renewable Energy began to take a new shape in short time with the flows of funding provided by the Blair government:

> the mud [where the temporary cabins were based on] was smoothed and seeded, and by summer there were lawns with paths across them, and in time the place resembled every other boring institute in the world. The labs were refitted, and at last the temporary cabins were hauled away. The adjacent field was drained, and foundations were dug, and building began. More staff were taken on –janitors, office cleaners, administrators, repair men, even scientists, and a human-resources team to find such people. When a critical mass was reached, a canteen was opened. And housed in a smart brick lodge next to red-and-white stripped barrier gates were a dozen security guards in dark blue uniforms, who were cheery with one another, stern with almost everyone else. (26-27)

Beard's sarcastic descriptions of the improvements in and around the Centre's facilities justifies, and maybe excuses in the reader's eye, his scepticism about the sincerity of investments on environmental issues. Thus, such investments are only seen as show-off contributing to the public image of the politicians or governments, not to the solutions for the environmental problems. "This was what he [Beard] disliked about political people – injustice and calamity animated them, it was their milk, their lifeblood, it *pleasured* them." (48-49) Although he describes himself as "aggressively apolitical" (53), Beard starts feeling himself gradually absorbed into politics, especially when he is marketing their energy projects to the investors: "He had spent much of his youth thinking about them [electrons]. […] This was when he was a scientist, and now he was a bureaucrat and never thought about electrons." (56-57).

Similarly, not only the motives behind the establishment of the Centre but also the very first project developed by it are economically driven. Indeed, the idea behind the leading renewable energy project developed by the Centre, The WUDU Project, is to attract the attention of the taxpayers and the media. The very first project of the Centre should definitely be comprehensible by the general public and should have practicality, being easily and quickly applicable to real life. Thus, the WUDU (Wind Turbine for Urban Domestic Use) Project is a perfect catch. The WUDU was a "gizmo that a householder could install on his rooftop to generate enough power to make significant reduction in his electricity bill" (32). Most governments and non-profit organisations direct substantial amount of funding to alternative eco-friendly projects that seem to be for the benefit of humanity in the long term. Thus, these projects create immediate sympathy among the masses. But behind the scene, the hidden agendas of these green technologies are not that innocent, as it is clearly seen in the case of the WUDU Project. Among many alternatives, economically the most profitable one, and/or the one with

the highest public acclaim, is prioritised and financially supported by the Blair government, and the funds are immediately channelled to it. However, in time, it turns to be a bad business investment. The WUDU that was supposed to be a simple project composed of only making the necessary mathematical calculations for the design, building a few prototypes and testing them, begins to create various complications, and soon it turns into "a monster that was eating up all the attention and resources of the half-built centre" (32). Since it was Beard's idea in the first place, and the most "eye-catching" project (32) and the best chance of promotion for the Centre, it was too late to cancel the WUDU, so it continues to devour the entire budget.

Under these circumstances, Tom Aldous's photovoltaic solar project could be a better replacement for the Centre's WUDU Project, as Aldous himself rationalizes:

> Micro wind [as an alternative energy source promoted by the WUDU] is not going to solve the problem, Professor [Beard]. The wind doesn't blow hard enough in most towns. We need a new energy source for the whole civilisation. There really isn't much time. We should be doing the basics on solar, before the Germans and Japanese run away with it, before the Americans wake up. I've got some ideas. Even with our crappy climate, there's infrared. (46)

Ironically, Tom Aldous's defence for his artificial photosynthesis project is similar to the one promoted by the WUDU Project. Aldous believes that "the technology is already good enough. The government just needs to make it attractive to people –it's a stroke-of-the-pen stuff, the market will do the rest. There's so much money to be made" (38). The profit-oriented efforts of these scientists, Beard and Aldous, disappoint the reader, and also justify the views of climate change sceptics.

Unwilling to take more responsibility at the Centre with the supervision of another project, Beard does not take Tom Aldous's solar project seriously, and even despises the enthusiasm of the young scholar. But, behind Beard's disinterestedness in saving the world through producing renewable energy projects, lies his disbelief in humanity. As he returns from the Arctic expedition, the view of the world from his plane's window ever strengthens his hopelessness. As his plane descends on Thames, and Beard gazing at London from the sky, he wonders if it is ever possible to reverse these anthropogenic impacts all over the planet, so he rhetorically asks himself: "How could we [humans]

ever begin to restrain ourselves? We appeared, at this height, like spreading lichen, a ravaging bloom of algae, a mould enveloping a soft fruit – we were such a wild success. Up there with the spores!" (153). Being one of the most strikingly relevant illustrations in the novel to describe the human impact on the planet in the Anthropocene, the view from the plane is quite remarkable. At this moment of enlightenment, Beard's retrospective acknowledgement of humans' aggressiveness in conquering nature is quite alarming: How can humans stop being such aggressive consumers of natural resources, and continue to pollute not-yet-urbanised, industrialised, contaminated wilderness, and feel being selfishly superior to other biological species? And more importantly, what is going to happen if it is already too late to stop our invasive practices?

Upon his return to London, Beard finds his personal life in a mess. His wife Patrice is involved in an affair with their constructor Rodney Tarpin and an inevitable divorce is at the gate. Moreover, even more surprisingly, Tom Aldous and Patrice are also strangely close to each other. The same night, Tom Aldous visiting Patrice in her (and Beard's) house accidentally hits his head and dies immediately. Unfortunately, eyewitness of the situation Beard stages a murder scene in such a way that every single clue points to the jealous lover Tarpin. So it happens, and Beard luckily gets rid of the two competitor men in his private and academic life. Part II of *Solar* opens five years after Tom Aldous's death, Tarpin's conviction of murder, and with the separation of Beard and Patrice. After the failure of the WUDU Project, Beard is no longer the head of the Centre, and is now introducing himself as an "energy consultant" (159). He has been spending most of his time with what is left from "his" solar project (ironically inherited from the deceased Aldous) travelling abroad to expensive scholarly conferences mostly attended upon invitation and well-paid by the hosting international organisations or institutions. The new Beard defines himself as a man "who takes his pleasures seriously" (168), thus and expects from the organisers to be accommodated in luxurious hotels offering an exclusive lunch and/or dinner menu composed of say; "[…] quails' legs wrapped in bacon on a bed of creamed garlic, [and] cubes of pork belly mounted on a hill-fort of buttered rice followed by a paving slab of chocolate sponge encased in chocolate under a chocolate sauce; goat's cheese, cow's cheese in a nest of white grapes, three rolls, a chocolate mint, three glasses of Burgundy" (163). He also

insists on drinking high quality wines/champagnes all the time. With the so-called inheritance of the envelope containing the details about the deceased Tom Aldous' solar project, a new phase in Beard's academic life thus begins.

Although the Beard-Einstein Conflation that had brought Beard his title of Nobel laureate years ago when he was a young physicist and put his name in all physics textbooks, the young undergraduates seem not to be caring about Beard's accomplishment. Though not spoken up in public, "at informal gatherings in the canteen" (28), the young undergraduates treat the Conflation as a "dusty formulation" (28). Instead, some of the physicists they take for granted alternatively are totally unfamiliar to Beard so much that he sometimes has to look their names up in the search engines. So, not being given credit by the young generation of physicists, combined with the pressure of not being able to come up with new ideas for a long time, make Beard feel incompetent and old-fashioned. This feeling of inadequacy in academia echoes a similar inadequacy that he has been feeling recently in his private life and his problematic marriage with Patrice. It is this combination of the circumstances that motivates Beard to plagiarize Tom Aldous's solar project, and to invest in it like a businessman who greedily sees ahead its profitable outcomes in the future. This is the beginning of Beard's transformation.

The second part of the novel portrays the transition in Beard's character from the hedonist Beard, who is after carnal pleasures like sex and fame, to the business-minded scientist Beard, who tries to advertise a product that does not even belong to him. Understanding the motives of Beard and the other business-minded characters in the novel -probably Tom Aldous should be excluded- is closely connected to the answer of this question: Why is everybody in the novel after their individual economic well-being rather than the planet's ecological well-being? And why now, in the Anthropocene, has such a capitalist, or profit-oriented mind-set become so dominant again? At this point, social ecologist Murray Bookchin's views, connecting the current ecological crisis to the rise of social hierarchies and humans' tendency to dominate, can be helpful. In *The Ecology of Freedom* (1982) Bookchin underlines the distinction between the preliterate, non-hierarchical cultures and the civilizations based on hierarchy and domination. He

also sheds light onto the motives of today's technologically developed and increasingly industrialized modern societies in their exploitative treatment of nature. According to Bookchin, "people in preliterate cultures viewed themselves not as the 'lords of creation' […] but as part of the natural world. They were neither above nature nor below it, but within it" (*The Ecology of* 5). But in today's heavily industrialised, and technologically well-equipped modern societies, humans began to feel more powerful. Moreover, since global economy is predominantly based on production/consumption rates, it inevitably causes the constant abuse of natural resources and raw materials, both above and under ground. Thus, the conventional notion that humans are destined to dominate nature is perpetuated. According to Bookchin, this hierarchical mentality, which is based on the domination of the weak, has led the way to further stratifications in the society, such as class, race and gender-based hierarchical classifications. Bookchin suggested a model of an "organic society" in which "[…] the differences between individuals, age groups, sexes, and between humanity and the natural manifold of living and nonliving phenomena were seen (to use Hegel's superb phrase) as a 'unity of differences' or 'unity of diversity,' not as hierarchies" (*The Ecology of* 5). But even if in the past such a model was possible, today we live in hierarchically stratified capitalist societies, because the ecological essence of the organic societies began to erode long time ago. In other words, the ecological mentality, which rejects any hierarchical constructs, not only among human beings but also among nonhuman beings, like "king of beasts" (*The Ecology of* 5), or "lowly creatures" (*The Ecology of* 5), dissolved. The ecological mentality that treated ecosystems as harmonious systems in which "living things are interdependent and play complementary roles in perpetuating the stability of the natural order" (*The Ecology of* 5) got replaced by abusive and profit oriented mentalities imposed by modern economic systems based on capitalism. Such societies, "almost unconsciously derived a body of values that influenced their behavior toward individuals in their own communities and the world of life" (*The Ecology of* 5), hence the emergence of class stratifications. Once the unity between nature and culture began to break down, "the sociopolitical or 'civil' sphere of life expanded, giving increasing eminence to the elders and males of the community, who now claimed this sphere as part of the division of tribal labor. [Also] male supremacy over women and children emerged" (Bookchin, *The Ecology of* 5). Believing that hierarchies create injustices in

society, Bookchin's concept of *social ecology* suggests copying and applying the same non-hierarchical character observed in nature to social life:

> Hierarchy threatens the existence of social life today, it cannot remain a social fact. Because it threatens the integrity of organic nature. […] We must now try to transpose the non-hierarchical character of natural ecosystems to society. What renders social ecology so important is that it offers no case whatsoever for hierarchy in nature and society; it decisively challenges the very function of hierarchy as a stabilizing or ordering principle in both realms. (*The Ecology of* 36-37)

In the non-hierarchical systems, Bookchin argues, "from this feeling of unity between the individual and the community emerges a feeling of unity between the community and its environment" (46), and that feeling may stop the human abuse of natural resources. But, unfortunately, human exploitation of nature still continues today. The process of "the dissolution of organic societies into hierarchical, class [-driven], and political societies" (6), according to Bookchin, occurred "unevenly and erratically, shifting back and forth over long periods of time" (6), shaping today's capitalist mentality. So, Michael Beard, and the politicians, businessmen, and investors in *Solar*, who try to see an economically profitable future through the foggy atmosphere set by the contemporary climate change crisis, are representatives of such an economy-driven society in the twenty-first century, mirroring Bookchin's deformed hierarchical societies.

As a remedy, some environmentally activist theorists, like Deep Ecologists [21], propose a fundamental ethical shift that "would dethrone human interests as the centrepiece of political life, and extend ethical concern deep into the natural world" (Dobson 32). This call for an ethical shift invites a political response to environmental problems, and hence suggests the extension of the political voice in a way that would include the well-being and the intrinsic value of the nonhuman environments. However, criticising the potentially misanthropic stance of radical environmentalists like the deep ecologists, who endorse nature's intrinsic value, and see all humanity as the violators of nature, and thus rather than blaming all humanity, Bookchin spotlights the abusive role of corporations and the capitalist system in the current ecological crisis. In his essay "Where I Stand Now," which is included in *Defending the Earth* (1991) that he co-

edited with Dave Foreman, Bookchin states: **"**whatever its merits, the fact is that deep ecology, more than any other 'radical' ecological perspective, blames 'Humanity' as such for the ecological crisis –especially ordinary 'consumers' and 'breeders of children'– while largely ignoring the corporate interests that are really plundering the planet" (123). So, for Bookchin, "the cause of the environmental crisis is not the human species. Rather, the cause is the rise of social hierarchies and their tendency to dominate and exploit. In *Remaking Society: Pathways to a Green Future* (1990), Bookchin further explains the connection between ecological crisis and the humans' tendency for domination:

> Hierarchies, classes, and states warp the creative powers of humanity. They decide whether humanity's ecological creativity will be placed in the service of life or in the service of power and privilege. Whether humanity will be irrevocably separated from the world of life by hierarchical society, or brought together with life by an ecological society depends on our understanding of the origins, development, and, above all, the scope of hierarchy — the extent to which it penetrates our daily lives, divides us into age group against age group, gender against gender, man against man [...] The conflicts within a divided humanity, structured around domination, inevitably lead to conflicts with nature. The ecological crisis with its embattled division between humanity and nature stems, above all, from divisions between human and human. (72)

Considering the institutions and values in decline due to the injustices triggered by social hierarchies, Bookchin sees his century (20th century) as a decaying age. For him, the ecological crisis we face today is interconnected with social crises generated by class hierarchy, patriarchy, class, race, and gender inequality. Bookchin observes that the "established society is faced with a breakdown not only of its values and institutions, but also of its natural environment" (*The Ecology of* 19), and as "intertwined with the social crisis" (*The Ecology of* 19) is the environmental crisis that "has emerged directly from man's exploitation of the planet" (*The Ecology of* 19). Thus, environmental degradation is as crucial as the decay in institutions and values. Bookchin underlines "the damage inflicted on the environment by contemporary society encompasses the entire earth. […]. The exploitation and pollution of the Earth has damaged not only the integrity of the atmosphere, climate, water resources, soil, flora and fauna of specific regions, but also the basic natural cycles on which all living things depend" (*The Ecology of* 19). Bookchin clearly blames the corrupt corporates instead of

corrupt individuals for the current environmental degradation. However, he is sympathetic to the use of technology:

> […] modern man's capacity for destruction is quixotic evidence of humanity's capacity for reconstruction. The powerful technological agents we have unleashed against the environment include many of the very agents we require for its reconstruction. The knowledge and physical instruments for promoting a harmonization of humanity with nature and of human with human are largely at hand or could easily be devised. (*The Ecology of* 19)

In *Solar*, Michael Beard represents the redeeming and reconstructive hand of technology that Bookchin mentions. As a Nobel winning scientist, he holds the power of such a technology that can vindicate the anthropogenic damage inflicted on the planetary ecosystems. Yet, for the wrong ethical reasons; that is, not for saving the planet for all humanity, but saving money for himself, Beard continues to work on a plagiarised renewable energy project. Thus, in the five years following Aldous's death, Beard continues to develop Aldous's solar project, and starts thinking about how to bring the project to the attention of the international investors. Thus, the infamous speech of Beard addressed to the possible investors of "his" solar project is dominated by ecological as well as economic undertones:

> The Planet […] is sick. […] Curing the patient is a matter of urgency and it is going to be expensive –perhaps as much as two per cent of global GDP [Gross Domestic Product], and far more if we delay the treatment. […] What's at issue is the creation of another industrial revolution. Here is your opportunity. Coal and then oil have made our civilisation, they have been superb resources. […] But we have to replace it. So, what's next? (204-205)

As Beard is warning people against the impending environmental catastrophe saying, "we either slow down, and then stop, or face an economic and human catastrophe on a grand scale within our grandchildren's lifetime" (206), he assumes the role of a concerned scientist. Yet, his question, which seems to be motivated by a scientist's environmental concerns, is actually an advertisement slogan for his solar project: "How do we slow down and stop while sustaining our civilisation and continuing to bring millions out of poverty?" (206). Beard's answer to this crucial question is "affordable clean energy" (207), and their project is advertised as suitably addressing both ecological and economic concerns. He promotes his team's solar project to the investors

convincing them that they are witnessing a historical moment similar to the first introduction of the internal combustion engine, microprocessors, personal computers or the internet decades ago, and by making them aware beforehand. Beard argues that he is giving them an opportunity to make substantial amount of money by investing on his solar project. Following economic and profitable sides of their investments on solar, Beard supports his argument by calling attention to our collective responsibility to the planet: "Our planet is a finite entity. You have the data in front of you, you have the choice – the human project must be safely and cleanly fuelled, or it fails, it sinks. You, the market, either rise to this, and get rich along the way, or sink with all the rest. We are on this rock together, you have nowhere else to go" (207). As it is clearly seen in Beard's public speech, the economic profit, which the project Solar will yield, is highlighted for the investors representing the market. The future well-being of the planet and sustainability of life are only of secondary importance for both sides.

As can be seen, the only motivation behind Beard's putting years-long efforts in the affordable clean energy project is economic profit. Therefore, Beard's sharp conversion from a climate change sceptic, and a denier of global warming as an urgent ecological threat, to an ardent supporter and a developer of clean energy solutions is the most striking irony in the novel. In the same public speech, Beard condemningly addresses the deniers of climate change, as if he was not one of them just a few years ago: "The deniers, like people everywhere, wanted business as usual. They feared a threat to shareholder value, they suspected that climate scientists were a self-serving industry, just like themselves. Beard felt towards them all the contempt of the recent convert" (208). Financial profit, then, is the primary reason behind his ideological transformation. In addition to his materialist orientations directed by money, his urge for acknowledgement among the academic circles, and public reputation stand as the two other motivations for Beard's actions. Thus, he sees climate change denial merely from an economic perspective, and bases the deniers' opposition on economic grounds. In this respect, the business-minded Beard tries to position the climate change deniers as a rival company opposing to the climate scientists who warn the masses against the threat of climate change.

Moments later, Beard the business-minded economist re-assumes his role as a scientist, and describes climate change as an undeniable scientific fact:

> It's more than twenty-five years since scientists first warned the US government of anthropogenic climate change. In fifteen years there have been three IPCC (Intergovernmental Panel on Climate Change] reports of mounting urgency. […] The science is relatively simple, one-sided, and beyond doubt. […] We've observed and we know the mechanisms, we've measured and the numbers tell the story, the earth is warming and we know why. There is no scientific controversy, only this plain fact. (210)

In other words, he abuses his position as a once-respected scientist. Acting like a chess player trying to checkmate the hesitations in the minds of potential investors about his solar project, he now plays the scientist card. He starts speaking not like a businessman who tries to sell his product, but as a scientist who offers indisputable proofs supporting the necessity of this product:

> Allow me to make some suggestions. Collectively, according to my enquiries, your various organisations represent around for hundred billion dollars of investments. These are golden days in the global markets and sometimes it seems the party will never end. But you might just have overlooked one sector that is outperforming the rest by doubling every two years. […] A passing fashion, you may have thought. [But] the revolution has begun. The market will be even more lucrative than coal or oil because the world economy is many times bigger and the rate of change is faster. Colossal fortunes will be made. […] Scientists, engineers, designers are pouring into the sector. There are log jams in the patent offices and supply chains. This is an ocean of dreams, of realistic dreams […]. (211)

Even as he is highlighting the reliability of the project and the keen interest of the scientists, engineers, and designers in the renewable energy sector, he also inserts into his speech relevant statements on the economic advantages of such an investment that will assure the investors that "colossal fortunes will be made (211) out of Solar. The next move of Beard is offering "scientific" solutions to the current environmental problems. So, choosing not to invest in his Solar project would be both scientifically and financially illogical. To support the logic behind this investment, Beard uses illustrative examples in his speech:

> An alien landing on our planet and noticing how it was bathed in radiant energy would be amazed to learn that we believe ourselves to have an energy problem, that we ever should have thought of poisoning ourselves by burning fossil fuels or creating plutonium. Imagine we came across a man at the edge of a forest in heavy

> rainfall. This man is dying of thirst. He has an axe in his hand and he is felling the trees in order to suck sap from the trunks. There are a few mouthfuls in each tree. All around him is devastation, dead trees, no birdsong, and he knows the forest is vanishing. So, why doesn't he tip back his head and drink the rain? Because he cuts trees expertly, because he has always done it this way, because the kind of people who advocate rain-drinking he considers suspicious-types. The rain is our sunlight. An energy source drenches our planet, drives its climate and its life. It falls on us in a constant stream, a sweet rain of photons. (211-212)

As the careful reader will notice, the last two illustrative examples, of aliens and the man in the forest, are directly quoted from Tom Aldous. In Part I of *Solar*, as he was trying to convince Beard about the Centre's investment in his solar project instead of the wind turbine project, Aldous had used the same parable:

> There is a guy in a forest in the rain, and he's dying of thirst. He has an axe and he starts cutting down the trees to drink the sap. A mouthful in each tree. All around him is a wasteland, no wildlife, and he knows that thanks to him the forest is disappearing fast. So why doesn't he just open his mouth and drink the rain? Because he's brilliant at chopping down trees, he's always done things this way, and he thinks that people who advocate rain-drinking are weird. That rain is our sunlight, Professor Beard. It drenches our planet, drives our climate and its life. A sweet rain of photons, and all we have to do is hold out our cups! (36-37)

On the podium, Beard just repeats exactly the same illustrative examples previously used by Aldous. So, not only the project itself but also how it is promoted is plagiarised from Aldous. According to Habibi and Karbalaei, the parable of the man in the rainforest also symbolically serves McEwan in *Solar,* providing

> the opportunity for McEwan to express his view on the mutual validity of science and ethics. Not only can science's method and concepts be helpful in elaborating ethics but ethical discourse is also capable of shedding light on scientific dilemmas. So, in contrast to those like Beard who theoretically regard only science as truthful and reliable and disregards ethics thoroughly in practice, McEwan suggests a possibility of their interdependence even the essential dependence of science on ethics. (96-97)

Beard not only steals Aldous' idea of solar and his illustrative examples, but also explains the project in Aldous's own sentences:

> I am talking of artificial photosynthesis, of copying the methods nature took three billion years to perfect. We'll use light directly to make cheap hydrogen and oxygen out of water, and run our turbines night and day, or we'll make fuels out of water, sunlight and carbon dioxide, or we'll build desalination plants that make

> electricity as well as fresh water. Believe me, this will happen. Solar will expand, and with your help, and with your and your clients' enrichment, it will expand faster. (213).

Despite Beard's impressive launch of the solar project and his emphasis on the project's ecological benefits and economic advantages, Beard faces many objections to and hesitations about the project. Interestingly, but not surprisingly, all the objections are related to the economic handicaps of Solar, and its being a risky investment, not related to its applicability from theory to life. For instance, a young man who obviously expects guaranteed results on the long-term continuity of solar energy, and mistakenly believes that fossil fuels are "continuous" whereas sunlight is not, asks: "why would we risk our customers' money on unproven, non-continuous forms of energy supply?" (216). A woman standing next to the young man supports him saying, "The Stone age didn't end because of a shortage of stones" (216). Some others make local objections as well: "there simply isn't enough sun and wind in the UK to drive the economy" (216), or "So we buy in solar energy from North Africa. Where's your energy security in that?" (217). On the other hand, some just wanted to learn where Professor Beard got his exemplary anecdotes in his speech. So, the problem about solving anthropogenic environmental problems is also about the problem of convincing people to take action. The second part of the novel ends with Beard's speech addressing these hesitations about the project.

The third, and the last, part of the novel opens in 2009, four years after Beard's famous speech at the Savoy with which he introduced the Solar Project to investors. After four years, the theoretical background search is finally completed, and Beard, being the head of the laboratory team now, has a partner to lead his project's executive team, Toby Hammer. Thus, the problems about the applications of the project dominate this part. First of all, since installing huge and numerous solar panels to produce solar energy is the most fundamental part of the project, as finding a proper site is the first and the foremost practical problem for Beard and his team, and Britain is absolutely not a proper geography with a sunny climate for this project. Thus, after long researches, the site for the solar project is chosen as a small town called Lordsburg, which is located in New Mexico on the Mexican border of the US. Finding a proper site for the project, which had to be sunny and near the water sources was not that easy. Lordsburg was their fourth choice in the American southwest. Obviously Arizona and Nevada had

more sunshine per year, but the prices of available estates were high due to the competition from the big utilities. Other alternative locations had either no water, or lacked good transportation networks, or stable connection to the local electricity grid. In this respect, Beard and his team's global search for the most suitable geographical location for their project connotes a kind of ecological imperialism and the aspirations of the developed countries on the underdeveloped countries, which are rich in natural sources and underground mines, just like the case of English scientists' choosing Mexico for launching their solar project in the novel.

In addition to reserving the most suitable site for the project, Beard and his team have to build good relations with the local administrators, but unfortunately very few of them are friendly towards Beard and his teammates. As Beard and his team delve more deeply into their Solar project, which is based on artificial photosynthesis, they realize that finding enough financial support and funding for such an experimental and risky enterprise is as difficult as developing the project on the theoretical level. Hesitating that the return profit may not compensate for the cost of their investment in 'Solar' during its start-up phase, most venture capitalists find the project quite risky. The general expectation of the investors was that "reliable and cheap artificial photosynthesis was twenty years away" (291). Yet, Beard and Hammer manage to find a few potential investors to support them financially in their construction of a miniature plant in Lordsburg; a facility to produce clean energy out of sunlight as they have promised. Yet, on their way, some of the investor companies break their promise due to the recent decline in their economic status as the world economy enters a recession. Under these global economic conditions, investing money, according to them, in a business with blurry, long-term return would be even more risky. Thus, the previous promises are broken one by one, and Beard's team begins to face various problems. To begin with,

> the option on the land, renewed three times already, was expiring. [After renegotiation], instead of four hundred acres, [they] bought twenty-five, right by the water source. There were now two small gas-storage tanks instead of eight giants, only one compressor for the hydrogen, one generator instead of five, and worst of all, they were the core and symbol of the project, a mere twenty-five panels tilted skywards instead of one hundred and twenty-five. (292-93)

Under these financial pressures, Beard and his team come up with an emergency plan. The details of this emergency plan are significant in revealing Beard's capitalist motives and of his business partner, Toby Hammer. The plan is this: On the day that Beard and his team will launch the Solar Project, all the important people and institutions will be invited to Lordsburg to witness this historical moment:

> Representatives of the national media [including *Scientific American* and *New York Times*], people from the power companies, colleagues from Golden [National Center for Renewable Energy in Golden, Colorado, the USA: the American counterpart of the British Centre for Renewable Energy once Beard worked as the Head] and MIT, Caltech and the Lawrence Berkeley labs, as well as a few entrepreneurs from the Stanford area. (293)

As the brain behind the project, Beard will make an influential opening speech, and then he will press a switch: "The sun would shine on an empty patch of land in the boot heel of south-west New Mexico, strike the plexiglas tubes and split water, the storage tanks would fill with gas, the fuel-cell generator would turn and electricity would be ready to flow to the town" (293) in front of many people, and the humanity will witness a "new chapter," which "would begin in the history of industrial civilisation, and the earth's future would be assured" (293). An army marching band hired by the local Chamber of Commerce would begin playing and a giant neon sign that says Lordsburg, which is situated a quarter mile away from the plant, would be lit up as Beard turns on the switch. So, marketing the project by persuading ordinary people about the project's ecological benefits for the future of humanity, and the possible investors for the future of their company, is as important as developing a green project.

All these obstacles, collective and/or individual, include "human" elements. Yet, there is also a "nonhuman" obstacle that may build a wall against Beard and his team's solar project. Since their alternative energy project is basically developed against the possible negative outcomes of global warming, only a reversed climate change prediction could stand on their way; that is the possibility of global cooling instead of global warming. So, in addition to the technical and financial difficulties, Beard and his team need to overcome another alarming threat to their project: the possibility of global cooling. The arguments about global cooling, which were first proposed in the 1970s, are revisited here and discussed again among climate scientists. Even today, climate scientists hold

controversial positions about the interpretation of the available climate change data; thus, they swing between two climate change data interpretation camps: the supporters of global warming, and the supporters of global cooling. Both theories are based on the scientific interpretations of the recent climatic trends, hence defined as "myths." Referring to this recently popularized trend in the scientific circles, Toby Hammer, Beard's business partner in the project, expresses his anxieties to Beard. At the basis of the supporters of the global cooling myth in real life, there lies the remarkable decline in the usual rise in the global temperature observed in the last ten years. Namely, recent measurements are below the regular fluctuations, and the Earth is not warming as steadily as expected. Similarly, in the novel, Hammer anxiously states that "they're [scientists] saying point-seven degree rise since pre-industrial times, that's two hundred and fifty years, is negligible, well within usual fluctuations. And the last ten years have been below the average. We've had some bad winters here – that doesn't help our cause. […] If the place [the earth] isn't hotting up, we're fucked (296-97). Beards counter-arguments to relieve Hammer from his concerns about a possible global cooling are also based on science:

> Here is the good news. The UN estimates that already a third million people a year are dying from climate change. Bangladesh is going down because the oceans are warming and expanding and rising. There's drought in the Amazonian rainforest. Methane is pouring out of the Siberian permafrost. There's a meltdown under the Greenland ice sheet that no one really wants to talk about. Amateur yachtsmen have been sailing the North-West Passage. Two years ago, we lost forty per cent of the Arctic summer ice. Now the eastern Antarctic is going. The future has arrived, Toby. (298)

Such catastrophic consequences of climate change and a globally warmed planet are ironically considered as relief for the business-minded corrupt scientist Michael Beard, and his partner Toby Hammer. As it is observed in the disturbing conversation between Hammer and Beard, it is not the planet turning into a greenhouse that concerns them, but the end of their project if it does not. The hypocrisy of Beard as a scientist is born out of his in-betweenness; whether to use his scientific expertise to develop environment-friendly solutions and help people survive the catastrophic times, or to make money out of people's anxieties and exploit the atmosphere of crisis. Beard chooses the second option as it is seen in the dialogue between Beard and Hammer. Hammer is anxious about the future of his business, not of the planet: "I put all this

work, then guys in white coats come on TV to say the planet's not heating. I get spooked" (298). On the other hand, Beard assures him about the catastrophic future of the planet: "Toby, listen. It's a catastrophe. Relax!" (298)

These are the moments that Beard's character as an immoral scientist with a totally corrupt ethical stance regulated by capitalist ideals, becomes more visible to the reader. As Beard gets involved in the Solar Project, the immoral side in him begins to appear under the disguise of a honourable Nobel Prize winning scientist, who is fighting for the future of the planet. Especially after becoming a father, accidentally or as a result of his last girl friend Melissa's scheme, the idea of getting acknowledgement first from academia and then from the rest of the world, expands into a source of pride in the eye of his three-year daughter, Catriona. The night before Beard leaves for New Mexico, where the solar energy panels are located, Catriona and her mother Melissa throw a send-off party for Beard. The mother and the daughter get dressed in party costumes, the meal was particularly given the shape of the Earth by little Catriona. She also sings a song about ducklings, and together they celebrate Beard's quest to America "to save the planet." Catriona believes that her daddy is going to America "to switch something on, and when he did, the world would be saved" (311). Now, Beard is a hero of her little daughter.

Michael Beard is not only little Catriona's hero but also the green hero of the project. The Centre for Renewable Energy in Reading, England, and Toby Hammer, the executive manager of the Solar Project, want to benefit from Beard's reputation and image as a respectable Nobel winning scientist, so they want to create a heroic media figure. Even the deceased Tom Aldous, who wanted his photovoltaic project to be known by large groups of people, had made use of Beard's popularity and position. Beard's reputation was the primary reason why Aldous came to Beard and insistently mentioned his solar energy project to him more than once, otherwise nobody would listen to a no-name post-doc. Similarly, as Toby Hammer is composing the team for Solar, he positions Beard on the foreground to attract both the media and the investor's attention to the project, though Beard is not fully informed about the practical side of the project:

> Among the group were engineers, hydraulic and computer specialists and other technicians. Beard had done the theoretical work, designed and supervised the experiments in the lab, but the rest, the scaling up, the drawings the mass-production design, the actual plant layout and construction, the pipes and valves, and how they were represented in the software, was not his concern. He knew the principles, he owned the patents, but he could not have given a detailed account of the site. (334-35)

Beard thus becomes the poster face of the project, the sugar attracting the huge swarm of investor bees. At this point, advertising the project seems as important as developing it. Beard, on the other hand, is already willing to accept this mediatic position, for personal as well as economic reasons. Taking Aldous's solar project after his unfortunate death, though not via the correct ways, Beard had taken a big risk, and spent years on the project. He confesses that "eight-year journey from the slow deciphering of the Aldous file to lab work, refinements, breakthroughs, drawings, field tests must be completed. General acclaim was the final stage. […] He was so hungry for public triumph" (331). Thus, for Beard, The Lordsburg Artificial Photosynthesis Plant, or LAPP as abbreviated by the engineers, was "negligible, a mere toy, barely prototype" (336). On the day before the launch, as he is sitting there with his team, Beard feels himself to be "at the centre of the world" (336).

Despite his psychological and economic expectations from the project, feeding his ego and his pocket respectively, as he is delivering his long-rehearsed speech of thanks in front of his teammates, Beard speaks quite humbly. He praises his team that made his dream come true. Claiming no credit for himself, Beard also admits that he owes most of his success to earlier physicists, biologists, and countless other scientists who devoted themselves to science, and maybe the most, to nature, and "slavishly" (344) "borrowed from nature" (344). And now, after eight years of hard work, it is time to "have clean energy, endlessly self-renewing" (344) and to "begin to draw back from the brink of disastrous, self-destructive global warming" (344). Beard's false modesty reaches its climax as he hypocritically states:

> some have claimed that my role was vital, that none of this could have happened without me. Well, who knows? All I say is that I was lucky to have had certain ideas, and I was fortunate to be standing in the right place at the right moment in history, at a time of pressing need. My part was simple inevitability. The point is,

> we're a team and everyone's part was crucial, every last one of you was a vital link. (344-45)

Indeed, though not sincere in his case, what Beard says is applicable to collective treatment of climate change and sharing responsibilities as well as compensating actions. Since the current climatic threat is a consequence of human activities that have piled up for many centuries, the solution lies in the collective counter-action. Seen from this perspective, every single human being's choice matters, and we have to make the correct choice.

In *Solar*, Beard makes the wrong choices throughout the novel, thus his words contradict his actions. In this respect, according to the British ecocritic Richard Kerridge, Beard represents

> a broad mass of people," whose consumptive habits accelerate current environmental threats, but still knowingly continue to consume. For Kerridge, Beard's "failure to restrain or change his appetites for the sake of long-term well-being -his own and humanity's- represents the collective failing of wealthy consumers to change their behaviour in response to the threat of global warming. (155)

Moreover, by dealing with Beard's intellectual and personal appetites separately, McEwan may be suggesting "a more complex mixture of emotional responses to the global warming threat" (Kerridge 159), and inviting various institutions, classes, and disciplines, such as arts, humanities, environmental politics and economics into reconsidering their individual and collective environmental responsibilities in the Anthropocene.

Towards the end of the novel, Professor Beard's patent theft is finally revealed by Jock Braby, Beard's old friend and the administrator of the Centre, and the Centre immediately sends a lawyer to Lordsburg where Beard is currently located accommodating the launching of his solar project. By this way, Beard is officially confronted with the accusations of the Centre and Tom Aldous's father. He is accused of stealing intellectual property; the three hundred and twenty-seven-page document written by Thomas Aldous, and handed to Beard just after Aldous's death. After thorough investigations, it is noticed that the applications used by Beard in the

Lordsburg plant are largely based on Aldous's artificial photosynthesis idea, and thus, the Solar project, the patent of which possessed by Beard from illegal ways, is claimed to be Tom Aldous's. Mr. Barnard legally representing the Centre claims that they have enough evidence to think so: Aldous's letters to his father, in which he mentions about the solar project many times, the suspicious coincidence of Beard's sudden interest in developing a technology to produce environmentally undamaging, clean energy, Aldous's suspicious death, and Beard's zero interest in mentioning global warming in his earlier academic career, or in any of his previous lectures. Thus, Mr. Barnard advises Beard and Hammer to cancel launching the project immediately and give up proceeding any further if they want to avoid any legal enforcements.

At first glance, the Centre's defence of Aldous's legal rights seems like an innocent and legally right act. Yet, unfortunately, the reason behind the Centre's legal pursuits, that is sending a lawyer after Beard all the way from Britain to the US-Mexican border, is also economic. Aldous was a former employer of the Centre, therefore the patent rights of any of his research, conducted through the Centre's funds, belong to the Centre, as Aldous had previously agreed in his employment contract. So, the Centre, just like Beard, is after economic gain that they can get through Aldous's project. Mr. Barnard's final offer to Beard strengthens this possibility. The Centre is ready to compromise with Beard, and drop charges if Beard accepts cancelling the official opening of the Lordsburg plant and the following media event, which is scheduled to be held on the following day. Yet, the second part of their offer to Beard is as dirty and immoral as Beard's patent theft. Mr. Barnard representing the National Centre for Renewable Energy states that

> If you agree to call off tomorrow's media event and agree to revisit the patent situation, you'll find us sympathetic collaborators who will certainly find a role for you in the development of a technology which rightly belongs to the Centre. If not, then our first move will be to go to the courts to freeze all the exploitation until this matter is resolved. (374)

To convince Beard, Barnard assures Beard and Hammer that "The British government has deep pockets, at least in this affair. They're keen to see the Centre own the patents and show the taxpayer a decent return" (374). However, as both Beard and Hammer

know, they cannot afford any more delays in the project. Moreover, as soon as the suspicion of a possible patent theft becomes public, they would start losing their investors. Toby Hammer tries to persuade Beard to accept the Centre's final offer, but Beard continues to plead not guilty of patent theft claiming that the idea of artificial photosynthesis belongs to him, Aldous was only his "amanuensis" (370) who is assigned to note down the sentences dictated by Beard himself. The power play between Beard and Braby, the Centre's lawyer, comes to a resolution with Beard stepping down upon learning that Jock Braby was given the title of "Sir" by the Queen herself: "Last month was the Queen's birthday and to mark the occasion as special she invited him [Jock Braby] to become her knight of the realm. He is Sir Jock Braby now" (373). This is the last stroke that causes Hammer to panic: "If Braby had the Queen of England on his side, what possible chance did they have in an English court of law?" (373). Thus, in order to protect himself from the debts that Beard has brought on their partnership, he calls off his partnership with Beard and leaves the project. Here, after Prime Minister Tony Blair and his cabinet, McEwan criticizes Queen Elizabeth II too, and subtly satirizes Her Majesty's effort to take credit from the English people by giving credit to the green institutions and to their administrators.

Although Beard's patent theft is finally revealed, the readers of *Solar* cannot find a poetic justice in the conventional sense at the end of the novel. Despite the serious accusations about him, the reader finds Beard as carefree as usual, feeling no regret for his patent theft, still planning to deliver that public speech that he dreamed of for almost eight years, and believing that after sharing "his" accomplishment with people, he can find and "persuade someone with money to back him through the courts in return for a part share" (376). But, something unexpected ruins his plans. Tarpin, the man Beard sent to jail for the murder of Aldous out of his grudge for his love affair with his fifth wife Patrice, probably after being paid by Mr. Barnard, smashes and destroys the solar panels, the wind turbines, the electronics and the other crucial stuff in the Lordsburg plant just before the opening, and makes the project and Beard's long-waited public acclaim impossible. Left alone by his business partner Toby Hammer with a three and a half million debt, Beard finds himself in an impossible situation, and the moment he returns to the UK he will be arrested as he is charged with intellectual patent theft and

fraud. Under these circumstances, Beard has no other choice but either to surrender, or escape somewhere outside the borders of the US that does not have an extradition treaty with the UK. Obviously, staying and hiding in the USA is not an option. To avoid extradition, the nearest destination seems to be Brazil. But Beard is not in a hurry, at least he has time till tomorrow. So, he chooses to enjoy today, although he knows that his personal apocalypse will be waiting for him tomorrow. Just like he neglects dealing with the urgent global warming threat, he chooses to procrastinate his personal doom, too. Not surprisingly, Beard is in a constant habit of delaying the confrontation with his actions, both in his personal and professional life.

Looking at the cancerous lesion, the diagnosed melanoma on the back of this hand, the surgical removal of which he keeps postponing, once again Beards decides not to act, but to wait as long as possible. Although the untreated melanoma may kill him soon, he takes the risk, and denies the obvious threat, just like he denies the approaching threat of global warming: "It [the melanoma] would take care of itself. Nor would he go to the site [where Solar will be launched] tomorrow to speak to the angry crowds. Nor would he be saving the world" (384). He totally rejects the mission of saving the world and saving himself. The only moment that the image of Beard in the readers' minds as an insensitive, emotionally numb, materialist womaniser is shattered when Beard opens his arms to give a sincere hug to his three-year old daughter Catriona who pays a surprise visit to Lordsburg to see her father supposedly saving the world. At this moment of father-daughter reunion, Beard feels "in his heart an unfamiliar, swelling sensation" that, to the disbelief of everyone who knows Beard, he would call "love" (384). This is one of the rare moments that the reader may find Michael Beard sincere, sympathetic, and real. Maybe for the first time in his life, Beard feels emotionally attached to another human being, his daughter.

Despite his negative portrayal as a corrupt, immoral scientist, as a womanizer, an abuser, and an opportunist man throughout the novel, Beard cannot be categorized as an evil antagonist to deserve a tragic end. Combined with McEwan's light, humorous, and satirical tone, Beard's portrayal as a carefree, escapist, seize-the-day, postpone-tomorrow type of protagonist, brings him closer to a stereotypical comic hero who

mocks the seriousness of the situation that he unfortunately finds himself in, rather than a tragic hero who gets ready to face his dark fate. As Joseph Meeker states in *The Comedy of Survival* (1974), "comedy demonstrates that humans are durable, although they may be weak, stupid, and undignified. As the tragic hero suffers or dies for ideals, the comic hero survives without them" (15). Furthermore, "comedy illustrates that survival depends upon man's ability to change himself rather than his environment, and upon his ability to accept limitations rather than to curse fate for limiting him" (Meeker, "The Comic Mode" 169). Similarly, Michael Beard, the immoral, corrupt scientist and thief, survives at the end of the novel, and escapes from severe punishments. Thus, in his carefree, "seize the day, think tomorrow tomorrow" attitude towards his personal problems (his problematic marriages, accusation with Aldous accidental murder, his surprise child, and his declining health), as well as the planet's global environmental problems, Beard perfectly fits into the stereotypical anti-hero typology in Meeker's comic mode.

Lastly, in the appendix part of the novel, another document is shared with the reader of *Solar*; the full text of the speech given by Beard when he receives his Nobel Prize. In his article "Accidental Prone," Sam Sacks particularly comments on McEwan's final attachment to the end of the novel. For Sacks, Beard's Nobel speech is "a disarmingly eloquent ode to the beauty of scientific thought" (118). Sacks also believes that this speech highlights the paradoxical transformation of Beard from a scientist who believes in the magical power of science to a disillusioned and corrupt scientist who abuses the magical power of science for his personal interests. Sacks finds a parallelism between McEwan and Beard in their belief and trust in science. According to Sacks, like the young Nobel laureate Beard, Ian McEwan is also a believer in such magic. Quoting the words of McEwan extracted from an interview, Sacks underlines McEwan's admiration of science: "you have to go to the sciences today to find any real sense of wonder, any real joy in the intellectual life" (qtd. in Sacks 118). Indeed, *Solar* is a fictional work that paradoxically makes the reader disillusioned about the magic of science by showing us what is inside the magician's sleeve. In this respect, *Solar* deconstructs our perception of climate change, and the efforts to reverse it, by showing us the climate change-induced economy, and the profit-oriented motivations of the green politics and eco-friendly

technologies. *Solar* also magnifies ethical issues related to climate change, and satirizes the moral responsibility of the scientists both as being a part of this anthropocentric problem and as being part of a bio-centric solution.

Among such contrasting views and changing perceptions about climate change, writing about climate change is already a difficult task. Thus, upon learning that McEwan is planning to undertake this task, the British ecocritic Greg Garrard anticipates the difficulty of writing a novel about an ongoing environmental crisis, the difficulty of how to portray it as you live through it. According to Garrard,

> a further difficulty for McEwan's next novel [*Solar*] is that global environmental crisis is also a crisis of representation. None of the traditional forms in literature, film, or television documentary is unproblematically suited to capturing the geographical and temporal scale complexity and uncertainty of climate change in particular. (709)

Thus, Cli-Fi, as the most appropriate genre to illustrate both short and long term effects of anthropogenic climate change, will help us recognize the present and envision the future in the Anthropocene with its various dimensions.

CONCLUSION:

LIVING IN THE ANTHROPOCENE AND ENVISIONING THE FUTURE THROUGH THE LENS OF CLI-FI

"We make too much history.

With or without us
there will be the silence
and the rocks and the far shining.
But what we need to be
is, oh, the small talk of swallows
in evening over
dull water under willows.
To be we need to know the river
holds the salmon and the ocean
holds the whales as lightly
as the body holds the soul
in the present tense, in the present tense."

Ursula K. Le Guin, "Deep in Admiration" in *Arts of Living in a Damaged Planet*.

As Earth scientists search through the stratigraphic layers of the Earth to find traces left by biological species, they also try to attribute meaning to these carbon prints when decoding geologic messages and signals. The Anthropocene hypothesis is one of the recent outcomes of these efforts. The clear message of the Anthropocene is that, acting collectively, humans have become a geological force with a capacity to intervene and change the functioning of the Earth systems. Humans are now considered to be the route shifters in the Earth's geological timeline. Yet, any reconstruction of the Earth's geological history triggers parallel transformations in imaginative ways of knowing and responding to these physical changes.

Within the new contextual framework introduced by the Anthropocene, the field of the Environmental Humanities has been collaborating with the Earth sciences to propose new ways of seeing and reading the current environmental changes observed on our planet. In other words, the Anthropocene requires new narrative tools to transmit the hard-core scientific facts about the current ecological status of the Earth and its declining ecosystems to the scholars in the humanities and social sciences, as well as to the general public. At this point, in the Anthropocene, the interdisciplinary collaboration of arts and humanities with the earth sciences becomes more important than ever. Under these circumstances, especially imaginative literature assumes a crucial role in the Anthropocene. As environmental scholars Tobias Menely and Jesse Oak Taylor state in *Anthropocene Reading: Literary History in Geologic Times*, "literary dimensions of geology –a practice of *reading* stratigraphic inscriptions and *narrating* evocative, if improbable, stories– become even more pronounced in the Anthropocene" ("Introduction" 1). Literature in the Anthropocene acts like the interpreter of these geological layers, meticulously unfolding them and revealing the hidden messages of the Earth to its human inhabitants. In this respect, literature assumes the role of the storyteller in an age of anthropogenic environmental crises and transformations.

In an age of profound geomorphological environmental transformations entangled with social, cultural psychological, and economic ones, and also encompassing long durations of time and global spatial scales, finding the most accurate medium to describe these transformations is a complex task. As Menely and Taylor note, "when your object of concern is something like the Anthropocene –multiform, multiscalar, multicausal, multitemporal– […] reading in the Anthropocene is an invariably polyglot, salvage practice in which we employ all of our tools to discover meaning amid the ruins" (13). Thus, expressing the effects of the Anthropocene in a literary text becomes even more enduring. In this study, climate change fiction, or Cli-Fi, is proposed as the most suitable literary form to express the various dimensions of the Anthropocene especially on two grounds. First, since the time scale of the Anthropocene encompasses past, present and future, all at the same time in a temporal entanglement, a literary genre which takes the Anthropocene as its subject matter needs to reach out to the same time spans. This problematic temporality is one of the most compelling challenges of

imagining the Anthropocene. To borrow environmental scholar Richard Klein's description, imagining the Anthropocene is a kind of "prospective archaeology" (qtd. in Mahlu and Craps 135), requiring us "to imagine a future in which our future has already become the past; we need the future perfect tense (Mahlu and Craps 135). Representing climate change, which is one of the defining symptoms of the Anthropocene, is challenging for the same reason. Since global warming is a dismaying phenomenon, or as more accurately defined by Timothy Morton, a "hyperobject" that is "massively distributed in time and space relative to humans" (1), it is difficult to grasp it without making connections between past, present and future. Thus, in their lifetime, every human being can only see or experience "pieces of climate change at any one moment; [so] we can never see it completely (Morton 4). These temporal and spatial challenges force writers to seek new literary forms to narrate such phenomena.

In this regard, Cli-Fi enables the writer and the reader to imagine alternative futures, and produce scenarios about the Earth's environmental future. Thus, climate change narratives are fictional and based on futuristic speculations. Portraying a fictional reality, Cli-Fi is also inspired by scientific facts, but is not necessarily restricted by these realities. As a literary genre born in the Anthropocene, Cli-Fi is also the outcome of the dialogue between literature and science. Based either on scientific facts, predictions, climate modellings, or on partly real, partly fictional, "educated" speculations about our ecological future, Cli-Fi definitely helps us envision our future in the Anthropocene. Each Cli-Fi novel discussed in this study, dealing with a different aspect of the human-induced environmental changes, contributes to the construction of a literary stratigraphy in the Anthropocene. By this way, reading about their actions with irreversible consequences, the readers may come to a self-awareness about the global ecological decline, and recognise the fact that human activities have greater influences both on humans and other species. As such, Cli-Fi narratives expose economic practices, social formations, and psychological conditions in the Anthropocene. Thus, though a young literary genre, Cli-Fi has important contributions to the literary field and plays an important role in the understanding of the Anthropocene. Cli-Fi genre in general spotlights the human's role in causing anthropogenic environmental threats in the Anthropocene and invites humans to self-

criticism. Due to all these contributions, the popularisation of climate change fiction in the age of Anthropocene is not surprising.

Showing that the Anthropocene is no longer a merely geological concept, the novels analysed in this study exemplify the British climate-change fiction's contributions to the Anthropocene concept: introducing the Anthropocene to the general public, and underlining the role of humanity in various environmental transformations. J. G. Ballard's *The Drowned World*, Maggie Gee's *The Ice People*, and Ian McEwan's *Solar* specifically underline the more-than-geological extensions of the Anthropocene by focusing on different aspects of the Anthropocene. Each novel portrays how life in the Anthropocene is shaped in many spheres by human-induced environmental stressors like climate change. But all of them represent environmentally harmful human activities on planetary ecosystems and their long-term consequences in human life on Earth. The common aim of all three Cli-Fi novelists is to present striking environmental situations in which human beings confront the consequences of their previous actions, or ecological decisions. So, each writer presents a fictional reality shaped by life-like climate change experiences, but in each novel a different human realm is under transformation, or threat. In J.G. Ballard's *The Drowned World*, the radically changed climate and the physically transformed environment put mental pressures on the characters, and disturb their psychological balance. In Maggie Gee's *The Ice People*, on the other hand, the social realm is under climatic threat, and the relationship between men and women, and between the countries located in the Northern hemisphere and the Southern hemisphere are reconfigured. Facing the emerging environmental conditions after human-induced ecological disasters, the characters in the novels barely survive. Yet, the survivors of the environmental catastrophes described in the novels continue to suffer from side effects of climate change, and struggle to adapt to the changed climates and environments.

These novels highlight the entanglement of humans and nature pointing to the idea that any radical change in their characters' physical environment triggers direct or indirect reflections on humans' socio-cultural landscapes and mental mindscapes. Especially, in the first two novels discussed in Chapter I and Chapter II, the relation between human-

induced environmental degradation and the decline in human-constructed social systems is seen as closely interrelated. Thus, in both *The Drowned World* and *The Ice People*, the communal ego and solidarity among the inhabitants are gradually weakened in the face of an environmental crisis. In *The Drowned World*, the UN research team, which is on a cartographic mission on the submerged parts of Europe, is the victim of environmental threats. Once the ecological balance on Earth is lost, the characters in the novel lose their psychological balance too. They start isolating themselves from one another, behave aggressively, and succumb to hatred and distrust that dominate their relationships. Similarly, in *The Ice People*, as the climatic challenges threaten human survival, human communities dissolve. Men and women segregate themselves from each other, feel less secure with the opposite sex, and adopt queer lifestyles. Moreover, climate change-related mass migrations force people to leave their homelands and transgress national borders in order to survive. In *Solar* discussed in Chapter III, on the other hand, environmental degradations do not trigger such radical transformations in everyday life, or social systems, but they reveal the vulnerabilities of the existing economic systems, and highlight the problematic relationship between eco-friendly solutions and their financial beneficiaries. For instance, McEwan's scientifically acclaimed protagonist persistently reminds his possible investors and most importantly the reader that global warming is a serious threat, but also the biggest investment opportunity of our age. Thus, in *Solar*, climate change is presented both as a threat and an opportunity. So, in all three novels, climate change determines radical psychological, social and cultural transformations, or creates an economically vulnerable atmosphere for possible abuses and opportunists. In other words, in all three novels, human life is changed through climate change; a natural phenomenon becomes a major determining force in human life.

Showing the effects of the anthropogenic climate change, either in distant and imaginary futures, or as they have been experienced in the present day, the selected Cli-Fi novels of Ballard, Gee and McEwan collectively aim to evoke an ecologically conscious approach to contemporary environmental problems, such as global warming, endangered species (humans included), depletion in natural resources, melting ice caps, rising sea levels, as well as their immediate, or long-term consequences, such as mass

migrations, psychologically traumatic effects of these environmental stressors on humans, and various disturbances in global and local economies. Reflecting their common concerns for the environmental problems of the Anthropocene through various focal points —male, female, black, white, scientific, layman's— the novels present dark, apocalyptic portrayals about the future and the present. Their stories may sound pessimistic, but they alert the reader to the negative consequences of destructive human activities and create ecological awareness. Thus, Menely and Taylor foreground the necessity of these dark stories observing that

> if the Anthropocene marks a breach in the wall between human and natural history, then imaginative literature may be understood as the ivy that overspreads that wall, finding its way through the gap, entwining the happenings of history, intractable yet fragile, holding on to the crumbling structure even while hastening its decay, wrapping its tangled forms around the ruins of the modern constitution. (21)

If the effects of the Anthropocene have already transgressed their original borders in the geological sphere, and extended into psychological, social, cultural, and economic spheres, these multi-dimensional reflections can also be seen in literature. Similarly, the novels discussed in the three chapters should not be seen merely as portrayals of ecological disasters. Rather than that, addressing the non-geological extensions of the Anthropocene, these literary representations envision the Anthropocene as a multi-layered phenomenon.

Supported by literary representations, the Anthropocene concept proposes two perceptive changes. First of all, developing an understanding based on the entanglement of human and nonhuman agents on Earth, and a balanced, reciprocal relationship between humans and nature are the essential solutions to the ecological crises increasing in the Anthropocene. Thus, the previously held anthropocentric view of the planet, and the hubristic treatment towards its nonhuman agents and natural resources, need to be replaced by an egalitarian and more democratic biocentric approach. Any hierarchical categorizations prioritizing humans over nonhumans need to be rejected, and replaced by equal ecological concern for all elements of nature. Adoption of such a biocentric view of the planet will automatically entail another perceptive change in the Anthropocene: a change in seeing nature as a passive entity. Although the

Anthropocene, as a geological term, suggests a new epoch in the Earth's geological history, it also opens a new chapter in human history. Yet, in this new chapter, the environment is no longer an ever-stable, ever-resilient setting, or a passive stage on which human actors perform abusively and carelessly. Rather it is alive and respondent to human activities. That is to say, the Anthropocene concept attributes a more active agential role on nature with its capacity to respond to humans' negative or positive treatments of it exactly in the same way, negatively or positively. Now, humans and their nonhuman environment, in other words, culture and nature, have a reciprocal relationship shaping and transforming one another. However, this new perception about nature should not create in humans' minds a negative image of nature, which is vindictive and getting ready to strike back against humans when the right time arrives, hence cause ecophobia. Instead, it should aim to prevent any justification of human species' exploitative activities, and consumption habits. Such an entanglement of human and nonhuman elements on Earth, and the development of a more democratic understanding of the environment, caring for both humans and nonhumans, will promote the idea of a common ecologically secure future for every single biological species. Thus, it will also provide the first step towards finding solutions for the current ecological problems. In this respect, the Anthropocene is an opportunity to initiate changes in various spheres.

This study concludes that the inhabitants of the Earth living in the twenty-first century have two options to see the Anthropocene: either to see it as an epoch of environmental crisis, the beginning of an ecological apocalypse, and eventually the end of the life on Earth, taking the Anthropocene discourses as catastrophic discourses, or, more optimistically, to see the Anthropocene as a warning sign sent by nature itself, in its own way, before it is too late to reverse the anthropogenic environmental damages already given to nature. In this case, we should change our ecologically destructive life styles immediately. Our planet, with its human and nonhuman inhabitants, is on the brink of a sustainability crisis now, and as Serpil Oppermann states, "if their [nonhuman environment's] existence continues to be threatened, so is ours" (250). Despite its mostly pessimistic connotations, the Anthropocene is not the end of the world, but a transitory period in which the ultimate future of the Earth will be determined depending

on humans' responses to the environmental crises. Environmental journalist and writer Elizabeth Kolbert, at the end of her book *Field Notes from a Catastrophe* (2007), emphasizes the same dilemma of the people living in the Anthropocene, and addresses the same crucial question to the twenty-first century individuals:

> As the effects of global warming become more and more difficult to ignore, will we react by finally fashioning a global response? Or will we retreat into ever narrower and more destructive forms of self-interest? It may seem impossible to imagine that a technologically advanced society could choose in essence, to destroy itself, but that is what we are now in the process of doing. (189)

In this crucial decision-making process, it should not be forgotten that if the habitability of the Earth is lost forever, we all lose our *home*.

NOTES

INTRODUCTION

[1] International Geosphere-Biosphere (IGBP) Conference hosted by United Nations, and held in Cuernavaca, Mexico in February 2000.

[2] The name derives from Greek words meaning "most" plus "new" or "recent" suggesting that this is most of the period of recent Earth history (Peters 265).

[3] The name derives from the Greek words meaning "whole" or "entirely" plus "new" or "recent" suggesting that this is the time that's the whole, most recent piece of Earth history (Peters 265).

[4] "Cartography of the Anthropocene" (2013).
(SEE http://globaia.org/portfolio/cartography-of-the-anthropocene/)

[5] As the US National Oceanic and Atmospheric Administration explains, the only difference between a hurricane, a cyclone, and a typhoon is the location where the storm occurs. Hurricanes, cyclones, and typhoons are all the same weather phenomenon; different names are used for these storms in different places. In the Atlantic and Northeast Pacific, the term "hurricane" is used. The same type of disturbance in the Northwest Pacific is called a "typhoon" and "cyclones" occur in the South Pacific and Indian Ocean.
(SEE, http://oceanservice.noaa.gov/facts/cyclone.html).

CHAPTER I

[6] The third novel of Ballard's Cli-Fi quartet, *The Drought*, is another Cli-Fi novel with ecopsychological insights in which an environmental disaster, drought, isolates people confining them into their mindscape. Similar to *The Drowned World*, the theme of disturbance of inner balance due to the physical changes in the environment is the focus of the novel:

> At first Ransom had assumed that he himself, like Philip Jordan and Mrs. Quilter, was returning to the past, to pick up the frayed ends of his previous life but he now felt that the white deck of the river was carrying them all the opposite direction, forward into the zones of time future where the unresolved residues of the past would appear smoothed and rounded, muffled by the detritus of time, like images in a clouded mirror. Perhaps these residues were the sole elements contained in the future. (*The Drought* 186)

[7] The psychological motivation behind Surrealism can be summarized as the blurring of "the boundaries between the unconscious and the conscious, self and object, reason and imagination with the aim of liberating the mind and the soul from the paralysing constraints of the rationalist thought" (Baxter 6). Similarly, Ballard's surrealist fictional worlds aim to explore an "alternative reality beyond the familiar reality perceived through our senses" (Baxter 6). In this respect, the Surrealist art in his novels envisages such alternative perceptions of realities and provides a kind of sub-text for Ballard's climatically challenged fictional worlds.

[8] Three Surrealist painters' names are clearly stated in the novel: Max Ernst, Paul Delvaux and Salvador Dali, but not the titles of their paintings. Although the titles of the Surrealist paintings are not clearly stated, through the descriptions of these paintings or of the objects/subjects of their focus, such as "the scorching sun," "ashen-faced women," "skulls," "phantoms," and "jungles," the reader can easily guess which paintings are mentioned. Especially in the following paintings of Max Ernst, the image of a scorching sun is dominant: *Forest and Sun* (1927), *The Large Forest* (1927), and *Petrified Forest* (1927).

Though they do not focus on the image of a scorching sun, Max Ernst's *Dark Forest and Bird* (1925), *The Embalmed Forest* (1933), *La Joie de Vivre* [The Joy of Life] (1936), *Epiphany* (1940), L'Oeil du Silence [The Eye of Silence], 1943-44, *The Golden Eye* (1948), and *Last Forest* (1960-69) are the other phantasmagoric jungle portraits which provided inspiration for Ballard when he was writing *The Drowned World*.

The images of skulls is can be observed in many charcoal drawings of Ernst and some paintings of Dali, such as *Skull of Zubaran* (1956), and of Delvaux, *Skeleton* (1944). The most common pale-skinned, naked women images, on the other hand, can be found in the paintings of Delvaux such as *Composition with Naked Figures in the Wood* (1927), *Woman in Cave* (1936). *The Awakening of the Forest* (1939), and *The Mirror* (1939).

Moreover, day by day, Kerans and Bodkin recognise the resemblance between the real landscape around them and the fictional landscapes of the Surrealist paintings of Max Ernst and Paul Delvaux:

> Kerans threw her a mock salute and strolled over to look at the painting by *Ernst* at the far end of the lounge, while Bodkin gazed down at the jungle through the window. More and more the two scenes were coming to resemble each other, in turn the third nightscape each of them carried within his mind. They never

> discussed their dreams, the common zone of twilight where moved at night like *the phantoms in the Delvaux painting*. (81)

[9] Here, Ballard suggests a well-known Surrealist painting of Salvador Dali, entitled *The Persistence of Memory* (1931).

[10] In a personal memoir included in *Man and His Symbols* Carl Gustav Jung mentions one of his dreams from 1909:

> I dreamt that I was in "my house," apparently on the first floor, in a cosy drawing-room furnished in the style of the eighteenth century. I was rather astonished because I realized I had never seen this room before, and began to wonder what the ground floor was like. I went downstairs and found it rather dark, with panelled walls and heavy furniture dating from the sixteenth century or even earlier. I was greatly surprised and my curiosity increased, because it was all a very unexpected discovery. In order to become better acquainted with the whole structure of the house, I thought I would go down to the cellar. I found a door, with a flight of stone steps that led down to a large vaulted room. The floor consisted of large slabs of stone, and the walls struck me as very ancient. I examined the mortar and found it was mixed with splinters of brick. Obviously it was an old Roman wall. I began to grow excited. In a corner, I saw an iron ring in one of the stone slabs. I lifted it up and saw yet another narrow flight of steps leading down to a sort of cave which was obviously a prehistoric tomb. It contained two skulls, some bones, and broken shards of pottery. Then I woke up. (484)

The editor of the book *The Earth Has a Soul: Jung on Nature, Technology and Modern Life,* Meredith Sabini interprets this dream as a gateway opening up to human species' archetypal roots emphasised by Jung. She argues that the multi-storied house image in the dream can be interpreted as human beings' phylogenetic history; the top floor represents the present, and the cave on the lowest floor containing bones, shards, and tools represents the Neolithic times. Like Jung' interpretation of his dream as a symbolic description of the internal structure of the evolving human psyche, Sabini writes that Jung's dream presents "an objective picture not only of European history but of the evolutionary composition of the human psyche" (5). In other words, "the floors above the ground represent recent historical periods" and the floor under the ground, which provides the foundation of the house, symbolizes the phylogeny of human species, or the evolutionary history of human beings. Since the stories signify "successive layers of consciousness" (Sabini 5), as we descend, each storey on our way provides us with access to various stages of consciousness eventually leading to the primitive inside every human being. In most of his seminars and letters, Jung explains the location of the primitive side of human

conscious at the bottom of this symbolical hierarchy arguing that cultural order and civilisation have repressed disorderly primitive sides of human beings too long and too violently.

[11] Van Allen Belts were first discovered in 1958 by the United States' first satellite, *Explorer 1*. Since the expedition was led by James Van Allen at the University of Iowa, the belts were named after him as *Van Allen Radiation Belts* (Howell, "Van Allen" 1). The charged particles around the Earth, which form the Earth's magnetic system, are organized in layers. This makes the Earth look like being "surrounded by giant donut-shaped swaths of magnetically trapped, highly energetic charged particles" (Howell, "Van Allen" 1).

[12] "amniotic sac:" The fluid-filled sac that contains and protects a fetus in the womb. (*OED Online*: https://en.oxforddictionaries.com/definition/amniotic_sac)

CHAPTER II

[13] A comprehensive list of the articles on global cooling published between 1970 and 1979 can be found in the following website under the title of "1970s Global Cooling Alarmism:" (http://www.populartechnology.net/2013/02/the-1970s-global-cooling-alarmism.html)

[14] For illustrative real cases about climate refugees and the socio-cultural, and political problems triggered by them, the following web sites can be visited:

Casey, Nicholas, and Josh Haner. "Easter Island Is Eroding." *New York Times* Online. March 15, 2018. Web. Date of Access: 15 February 2018. (https://www.nytimes.com/interactive/2018/03/14/climate/easter-island-erosion.html?rref=collection%2Fsectioncollection%2Fclimate)

Doherty, Ben, and Eleanor Ainge Roy. "World Bank: Let Climate-threatened Pacific Islanders Migrate to Australia or NZ." *The Guardian* Online. May 8, 2017. Web. Date of Access: 15 February 2018. (https://www.theguardian.com/environment/2017/may/08/australia-and-nz-should-allow-open-migration-for-pacific-islanders-threatened-by-climate-says-report)

Halton, Mary. "Climate Change Impacts Women More Than Men." *BBC News* Online. March 8, 2018. Web. Date of Access: 15 February 2018. (https://www.bbc.com/news/science-environment-43294221)

Mellino, Cole. “Meet the World’s First Climate Refugees.” January 5, 2016. Web. Date of Access: 15 February 2018.
(https://www.ecowatch.com/meet-the-worlds-first-climate-refugees-1882143026.html)

Vidal, John. “'Boats Pass over Where Our Land Was: Bangladesh’s Climate Refugees – Photo Essay.” *The Guardian* Online. January 18, 2018. Web. Date of Access: 15 February 2018.
(https://www.theguardian.com/global-development/2018/jan/04/bangladesh-climate-refugees-john-vidal-photo-essay)

Weller, Richard J., Claire Hoch, and Chieh Huang. “The Map of Sea Level Rise.” *Atlas for the End of the World Project.* 2017. Web. Date of Access: 15 February 2018. (http://atlas-for-the-end-of-the-world.com)

Weller, Richard J., Claire Hoch, and Chieh Huang. “The Map of Environmental Displacement.” *Atlas for the End of the World Project*. 2017. Web. Date of Access: 15 February 2018. (http://atlas-for-the-end-of-the-world.com)

[15] “In vitro fertilization:” The process is based on the stimulation of egg and sperm’s fertilization process in the laboratory. It involves the fertilization of the eggs removed from the woman‘s ovaries and man’s sperm samples in an artificial setting [thus “in vitro”= “in glass”] and monitoring the process.
(*OED Online*: http://www.oxforddictionaries.com/definition/english/in-vitro-fertilization?q=in+vitro+fertilisation,
Wikipedia: *https://en.wikipedia.org/wiki/In_vitro_fertilisation)*

CHAPTER III

[16] Further information about the expedition can be found at
http://www.capefarewell.com/2005.html

[17] The full text of McEwan’s “ A Boot Room in the Frozen North” can be found at
http://www.capefarewell.com/explore/215-a-boot-room-in-the-frozen-north.html

[18] Further information can be found in “The Ice Garden” installation event official web site. (http://www.oomf.org.uk/icegarden.html)

[19] “The Ice Garden” installation event held in central Oxford in December 2005 presented sound, light, text and sculptural installations by various artists aiming “to create a physical environment which provided a creative and accessible comment on climate change” (“The Ice

Garden"). To represent and visualize amount of carbon dioxide generated by each person in the UK each year, 10x2 metre columns of ice were designed by Peter Clegg and Antony Gormley, later on sound effects echoing the shattering ice sheets due to global warming were added by Max Eastley, ice projections were handled by David Buckland, ice carvings and thermal imaging were made by Heather Ackroyd and Dan Harvey, and a neon sculpture that reads "Here Today" were created by Kathy Barber. Slogans, mottos, and messages calling people to take action were either reflected on the walls of the nearby buildings, or placed afloat on water. Ian McEwan also contributed to the event by writing the texts of the installation. According to McEwan, the artists/literary figures have an important role, more like a responsibility for the future generations, to contribute to raising environmental consciousness. Thus, he sees his contributions to such events as one of the missions of the artist, stating that "we are shaped by our history and biology to frame our plans within the short term, within the scale of a single lifetime. Now we are asked to address the well-being of unborn individuals we will never meet and who, contrary to the usual terms of human interaction, will not be returning the favour" ("The Ice Garden Installation").

[20] Some of these e-mail correspondences can be found as published by *The Guardian* (July 7, 2010) in the following link: https://www.theguardian.com/environment/2010/jul/07/hacked-climate-emails-analysis

[21] The first use of the term "deep ecology" is credited to the Norwegian ecophilosopher Arne Naess. In September 1972, Naess gave a lecture in Bucharest, in which he drew a distinction between what he called the "shallow" and the "deep" ecology movements. The distinction is based on the difference between a shallow concern at "pollution and resource depletion," for the damaging effects this might have on human life, and the deep concern for ecological principles such as "complexity, diversity and symbiosis."

(SEE for more details: Naess, Arne. "The Shallow and the Deep, Long-Range Ecology Movement: A Summary." *Inquiry: An Interdisciplinary Journal of Philosophy and the Social Sciences* (1973) 16: 95-100.)

WORKS CITED

Primary Sources:

Ballard, J.G. *The Drowned World*. London: Fourth Estate Harper Collins Publishers. 2011. Print.

Gee, Maggie. *The Ice People.* London: Richard Cohen Books, 1998. Print.

McEwan, Ian. *Solar*. London: Vintage, 2010. Print.

Secondary Sources:

Adam, David. "Ian McEwan: Failure at Copenhagen Climate Talks Prompted Novel Rewrite." March 5, 2010. *The Guardian* Online. Web. Date of Access: 10.12.2017. (https://www.theguardian.com/environment/2010/mar/05/ian-mcewan-climate-copenhagen-solar).

Alaimo, Stacy. "Trans-corporeal Feminisms and the Ethical Space of Nature." *Material Feminisms*. Eds. Stacy Alaimo and Susan Hekman. Indiana: Indiana UP, 2008. 237-264. Print.

---. "Your Shell on Acid: Material Immersion, Anthropocene Dissolves." *Anthropocene Feminisms*. Ed. Richard Grusin. Minneapolis: Minnesota UP, 2017. 89-120. Print.

"An Appreciation by J.G. Ballard." Web. (http://brigid-marlin.tripod.com/An%20Appreciation%20by%20J.G.%20Ballard.htm) Date of Access: 17.06.2017

Autin, Whitney J., John Holbrook. "Is the Anthropocene an Issue of Stratigraphy or Pop Culture?" *GSA Today* 22.7 (July 2012): 60-61. Print.

Balsamo, Anne. *Technologies of the Gendered Body: Reading Cyborg Women*. Durham, NC and London: Duke UP, 1996. Print.

Baxter, Jeanette. *J.G. Ballard's Surrealist Imagination: Spectacular Authorship*. Surrey: Ashgate, 2009. Print.

Bennet. Jane. *Vibrant Matter: A Political Ecology of Things*. Durham: Duke UP, 2010. Print.

Bishop, Andrew. " 'A Temporarily Tame Tiger:' Brigid Marlin on J.G. Ballard, Paul Delvaux and Surrealist Art." Web. (www.ballardian.com). Date of Access: 03.01.2012

Bonneuil, Christopher. "The Geological Turn." Eds. Clive Hamilton, et al. *The Anthropocene and the Global Environmental Crisis: Rethinking Modernity in a New Epoch.* New York: Routledge, 2015. Print.

Bookchin, Murray. *The Ecology of Freedom: The Emergence and Dissolution of Hierarchy*. Palo Alto, CA: Cheshire Books, 1982. Print.

---. *Remaking Society: Pathways to a Green Future*. Boston: South End Press, 1990. Print

---. "Where I Stand Now." *Defending the Earth*. Eds. Murray Bookchin and Dave Foreman. New York: Black Rose Books, 1991. Print. 121-134.

Braidotti, Rosi. *The Posthuman*. Polity: Cambridge, 2013. Print.

Braje, Todd J. "Earth Systems, Human Agency, and the Anthropocene: Planet Earth in the Human Age." *Journal of Archaeological Research* (September 2015) 23.3:

1-31. Web. Date of Access: 02.05.2016.

Brand, Stewart. “Four Sides to Every Story.” December 14, 2009. *The New York Times* Web. Date of Access: 02.02.2018 (http://www.nytimes.com/2009/12/15/opinion/15brand.html)

Brende, Borge, and Didier Burkhalter. “Forward.” *Forced Migration Review, Issue 49*: *Disasters and Displacement in a Changing Climate.* (May 2015): 4-5. Web. (www.fmreview.org/climatechange.htm). Date of Access: 16.07.2016.

Brigg, Peter. “The Drowned World.” Web. (www.jgballard.ca). Date of Access: 17.05.2016

Brown, Lester R. “Environmental Refugees: The Rising Tide.” *The World on the Edge*. New York: W.W. Norton & Company, 2011. 167-191. Print.

Brown, Mike. “Ian McEwan interview: Warming to the Topic of Climate Change.” March 11, 2010. *The Telegraph* Online. Web. Date of Access: 05.02.2018 (http://www.telegraph.co.uk/culture/books/7412584/Ian-McEwan-interview-warming-to-the-topic-of-climate-change.html)

Brown, Lester R., Patricia McGrath, and Bruce Stokes. **“**The Twenty-two Dimensions of the Population Problem.” *Worldwatch Paper 5.* (1976): 1-86. Web. Date of Access: 16.07.2016.

Casey, Nicholas, and Josh Haner. “Easter Island Is Eroding.” *New York Times* Online. March 15, 2018. Web. Date of Access: 15.02.2018 (https://www.nytimes.com/interactive/2018/03/14/climate/easter-island-erosion.html?rref=collection%2Fsectioncollection%2Fclimate)

Chakrabarty, Dipesh. “The Climate of History: Four Theses.” *Critical Inquiry* (Winter

2009) 35.2:197-222. Print.

---. "The Anthropocene and the Convergence of Histories." Eds. Clive Hamilton et al. *The Anthropocene and the Global Environmental Crisis: Rethinking Modernity in a New Epoch.* New York: Routledge, 2015. 45-56. Print.

Clark, Timothy. *Ecocriticism on the Edge: The Anthropocene as a Threshold Concept*. London: Bloomsbury, 2015. Print.

Climate Refugees: The Documentary. Dir. Michael P. Nash. 2010. Documentary.

Crist, Eileen. "On Poverty of Our Nomenclature." *Environmental Humanities* 3 (2013): 129-147. Print.

Crutzen, Paul J., and Eugene F. Stoermer. "The Anthropocene." *IGBP Newsletter* 41 (May 2000): 17. Print.

Crutzen, Paul J. "Geology of Mankind." *Nature* 415.3 (January 2002): 23. Print.

Crutzen, Paul J. and Christian Schwagerl. "Living in the Anthropocene: Toward a New Global Ethos." *Environment 360* (2011). Web. Date of Access: 23.06.2015.

Damasio, Antonio R. *Descartes' Error*: *Emotion, Reason, and the Human Brain*. New York: Avon Books, 1994. Print.

Dinello, Daniel. *Technophobia! Science Fiction Visions of Posthuman Technology*. Austin, TX: U of Texas P, 2005. Print.

Dobson, Andrew. *The Green Political Thought.* London and New York: Oxford UP, 2007. Print.

Doherty, Ben, and Eleanor Ainge Roy. "World Bank: Let Climate-threatened Pacific

Islanders Migrate to Australia or NZ." *The Guardian* Online. May 8, 2017. Web. Date of Access: 15.02.2018 (https://www.theguardian.com/environment/2017/may/08/australia-and-nz-should-allow-open-migration-for-pacific-islanders-threatened-by-climate-says-report)

Doyle, Timothy, and Sanjay Chaturvedi. "Climate Refugees and Security: Conceptualizations, Categories, and Contestations." *The Oxford Handbook of Climate Change and Society*. Eds. John S. Dryzek, Richard B. Norgaard, and David Schlosberg. Oxford, Oxford UP, 2011. 278-294. Print.

Dryzek, John S. Richard B. Nogaard and David Schlosberg. "Climate Change and Society: Approaches and Responses." *The Oxford Handbook of Climate Change and Society*. Eds. John S. Dryzek, Richard B. Nogaard and David Schlosberg. Oxford: Oxford UP, 2011. 3-17. Print.

Dun, Olivia, and François Gemenne. "Defining Environmental Migration." Eds. Couldrey Marion and Maurice Herson. *Forced Migration Review, Issue 31: Climate Change and Displacement.* (October 2008): 10-12. Web. (www.fmreview.org/climatechange.htm) Date of Access: 16.07.2016.

Ellis, Erle C. "Anthropogenic Transformation of the Terrestrial Biosphere." *Philosophical Transactions of the Royal Society* 369 (2011): 1010-1035. Print.

---. "The Planet of No Return." *Breakthrough Journal* 2 (Fall 2011). Web. Date of Access: 26.04.2016

Fisher, Andy. *Radical Ecopsychology: Psychology in the Service of Life*. New York: Suny P, 2013. Print.

Fox, Karen C. "NASA's Van Allen Probes Spot an Impenetrable Barrier in Space." Web. (www.nasa.gov/van-allen-probes). Last updated August 4, 2017.

Date of Access: 17.05.2016

Francis, Samuel. *The Psychological Fictions of J. G. Ballard*. London: Bloomsbury, 2011. Print.

Fressoz, Jean-Baptiste. "Losing the World Knowingly: Six Environmental Grammars around 1800." *The Anthropocene and the Global Environmental Crisis: Rethinking Modernity in a New Epoch.* Eds. Clive Hamilton, Christopher Bonneuil, and François Gemenne. New York: Routledge, 2015. 70-84. Print.

Gaard, Greta. "From Cli-Fi to Critical Ecofeminism: Narratives of Climate Change and Climate Justice." *Contemporary Perspectives on Ecofeminism*. Eds. Mary Phillips and Nick Rumens. New York: Routledge, 2016. 169-191.

Garrard, Greg. "Ian McEwan's Next Novel and the Future of Ecocriticism." *Contemporary Literature* (Winter 2009) 50.4: 695-720.
Date of Access: 05.02.2018

Gasiorek, Andrzej. *Contemporary British Novelists: J.G. Ballard*. Manchester: Manchester UP, 2005. Print.

Ghosh, Amitav. *The Great Derangement: Climate Change and the Unthinkable.* Chicago: The U of Chicago P, 2016. Print.

Goddard, J. and D. Pringle. "An Interview with J. G. Ballard." J.*G. Ballard, The First 20 Years*. Eds. J. Goddard and D. Pringle. Hayes, Middlesex: Bran's Head, 1976. Print. 5-35.

Greenway, Robert. "Ecopsychology: A Personal History" (1-2). *Gatherings*: *Journal of International Community for Ecopsychology* (1999). Web. (www.ecopsychology.org). Date of Access: 23.07.2017.

Griggs, Jessica, "Funny Thing, Climate." *New Scientist* (March 4, 2010) 206.2754: 1-3. Web. Date of Access: 05.02.2018

Habibi, Seyed Javad, and Sara Soleimani Karbaleai. "Incredulity towards Global-Warming Crisis: Ecocriticism in Ian McEwan's *Solar.*" *The Southeast Asian Journal of English Language Studies* (2015) 21.1:91-102. Web. Date of Access: 05.02.2018

Halton, Mary. "Climate Change Impacts Women More Than Men." *BBC News* Online. March 8, 2018. Web. Date of Access: 15.02.2018 (https://www.bbc.com/news/science-environment-43294221)

Hamilton, Clive. "The Theodicy of the *Good Anthropocene.*" *Environmental Humanities* 7 (2015): 233-238. Print.

Hamilton, Clive. "Human Destiny in the Anthropocene" Eds. Clive Hamilton, et al. *The Anthropocene and the Global Environmental Crisis: Rethinking Modernity in a New Epoch.* New York: Routledge, 2015. Print.

Hamilton, Clive, Christopher Bonneuil and François Gemenne. "Thinking the Anthropocene." Eds. Clive Hamilton, et al. *The Anthropocene and the Global Environmental Crisis: Rethinking Modernity in a New Epoch.* New York: Routledge, 2015. Print.

Haraway, Donna. "Anthropocene, Capitolocene, Plantationocene, Cuthulucene: Making Kin" *Environmental Humanities* 6 (2015): 159-165. Web. Date of Access: 14.04.2016.

Heise, Ursula. *Sense of Place and Sense of Planet: the Environmental Imagination of the Global*. Oxford; New York: Oxford UP, 2008. Print.

Hibbard, W. "Ecopsychology: A Review." *Trumpeter* (2003) 19 (2): 25-58. Web.

Date of Access: 27.06.2017.

Hillman, James. "A Psyche the Size of the Earth: A Psychological Forword." *Ecopsychology: Restoring the Earth Healing the Mind.* Eds. Theodore Roszak, Mary E. Gomes, and Allen D. Kanner. Sierra Club Books: San Francisco, CA, the USA, 1995. xvii-1. Print.

Howell, Elizabeth. "Van Allen Radiation Belts: Facts & Findings" Web. (www.space.com) Last updated: September 1, 2016. Date of Access: 23.07.2017

Hulme, Mike. *Why We Disagree About Climate Change: Understanding Controversy, Inaction and Opportunity*. Cambridge, Cambridge UP, 2009. Print

Irr, Caren. "Climate Fiction in English." *Oxford Research Encyclopaedia, Literature*. Web. (www.literature.oxfordre.com). Online Publication Date: February 2017. Date of Access: 27.11.2017

Jensen, Derrick. "The Age of the Sociopath." *Earth Island* Journal Online (Spring) 2013. Web. Date of Access: 20.04.2016.

Jung, Carl G. "Two Kinds of Thinking." *Collected Works*, Vol. 5. New York: Pantheon Books, 1956. Print.

---. *Collected Works*, Vol. 10. New York: Pantheon Books, 1956. Print.

---. *Man and His Symbols*. New York: Aldus Books Limited, 1973. Print.

Kellert, Stephen, "The Biological Basis for Human Values of Nature." *The Biophilia Hypothesis.* Eds. Stephen R Kellert, and Edward O. Wison. London: Shearwater, 1993. Print. 43-68.

Kerridge, Richard. "The Single Source." *Ecozon@* (2010) 1.1: 155-161. Web.

Date of Access: 05.02.2018

Klein, Naomi. *This Changes Everything: Capitalism vs. the Climate*. London: Penguin Books, 2014. Print.

Kolbert, Elizabeth. *Field Notes from a Catastrophe: A Frontline Report on Climate Change*. London: Bloomsbury, 2007. Print.

Laing, R. D. *The Divided Self*. Hammondsworth, London: Penguin Books, 1965.

Latour, Bruno. "Telling Friends from Foes in the Time of the Anthropocene." Eds. Clive Hamilton, et al. *The Anthropocene and the Global Environmental Crisis: Rethinking Modernity in a New Epoch.* New York: Routledge, 2015. Print.

LeMenager, Stephanie, Teresa Shewry and Ken Hiltner, eds. *Environmental Criticism for the Twenty-First Century*. New York: Routledge, 2011. Print.

LeMenager, Stephanie. "Climate Change and the Struggle for Genre." *Anthropocene Reading: Literary History in Geologic Times*. Eds. Tobias Menely and Jesse Oak Taylor. Pennsylvania: The Pennsylvania State UP, 2017. 220-238. Print.

Lewis, Simon L. and Mark A. Maslin. "Defining the Anthropocene." *Nature* (March 2015) 519: 171-180. Web. Date of Access: 17.07.2015.

McEwan, Ian. " A Boot Room in the Frozen North." Web. Date of Access: 05.02.2018 (http://www.capefarewell.com/explore/215-a-boot-room-in-the-frozen-north.html)

McKibben, Bill. *The End of Nature*. New York: Random House, 1989. Print.

McNeill, J.R. and Peter Engelke. *The Great Acceleration: An Environmental History of*

the Anthropocene since 1945. Massachusetts: The Belknap P of Harvard UP, 2014. Print.

"Media note: Anthropocene Working Group (AWG)." University of Leicester Press Releases August 29, 2016. Web. Date of Access: 15.09.2016

Meeker, Joseph W. *The Comedy of Survival: Studies in Literary Ecology*. New York, the USA: Charles Scribner's Sons, 1974. Print.

---. "The Comic Mode." *The Ecocriticism Reader: Landmarks in Literary Ecology*. Eds. Cheryll Glotfelty and Harold Fromm. Athens, Georgia, the USA: The University of Georgia Press, 1996. 155-169. Print.

Mellino, Cole. "Meet the World's First Climate Refugees." January 5, 2016. Web. Date of Access: 15.02.2018.
(https://www.ecowatch.com/meet-the-worlds-first-climate-refugees-1882143026.html)

Menely, Tobias and Jesse Oak Taylor. "Introduction." *Anthropocene Reading: Literary History in Geologic Times*. Eds. Tobias Menely and Jesse Oak Taylor Pennsylvania: The Pennsylvania State UP, 2017. 1-24. Print.

Merchant, Carolyn. *Ecological Revolutions: Nature Gender and Science in New England*. Chapel Hill: U of North Carolina P, 1989. Print.

---. *Autonomous Nature: Problems of Prediction and Control from Ancient Times to the Scientific Revolution.* New York: Routledge, 2016. Print.

Mertens, Mahlu, and Stef Craps. "Contemporary Fiction vs. the Challenge of Imagining the Timescale of Climate Change." *Studies in the Novel*: Climate Change Fiction Special Issue (Spring 2018) 50.1: 134-153. Web. Date of Access: 26.03.2018

Mitchell, Audra. "Extinction." *Gender: Nature*. Mexico: MacMillan Reference, 2016. 183-198. Print.

Moore, Jason W. "Introduction: Anthropocene or Capitalocene? Nature, History and the Crisis of Capitalism." *Anthropocene or Capitalocene? Nature, History and the Crisis of Capitalism*. Ed. Jason W. Moore. Oakland, PM Press, 2016. 1-13. Print.

Moore, Kathleen Dean. "Anthropocene is the Wrong Word." *Earth Island Journal,* The Anthropocene Special Issue: "Manmade" 28.1 (Spring 2013): 1-3. Web. Date of Access: 24.04.2016

Morton, Timothy. *Hyperobjects*: *Philosophy and Ecology after the End of the World.* Minneapolis: U of Minnesota P, 2013. Print.

Neuman, Justin. "Anthropocene Interruptions: Energy Recognition Scenes and Global Cooling Myth." *Anthropocene Reading: Literary History in Geologic Times*. Eds. Tobias Menely and Jesse Oak Taylor. Pennsylvania: The Pennsylvania State UP, 2017. 150-166. Print.

Oppermann, Serpil. "Seeking Environmental Awareness in Postmodern Fictions." *Critique*: Studies in Contemporary Fiction (April 2008) 49 (3): 243-253. Web. Date of Access: 07.05.2018

Oppermann, Serpil, and Serenella Iovino. "Introduction." *Environmental Humanities: Voices from the Anthropocene.* Eds. Serpil Oppermann and Serenella Iovino. London: Rowman and Littlefield, 2016. 1-22. Print.

Oramus, Dominika. *Grave New World: The Decline of the West in the Fiction of J.G. Ballard*. Toronto, Canada: The Terminal P, 2007.

Özyurt Kılıç, Mine. *Maggie Gee: Writing the Condition-of-England Novel*. London: Bloomsbury, 2013. Print.

Parikka, Jussi. *The Anthrobscene*. Minneapolis: U of Minnesota P, 2014. Print.

Peters, Kirsten E. *The Whole Story of Climate: What Science Reveals About the Nature of Endless Change*. New York: Prometheus Books, 2012. Print.

Plumwood, Val. *Feminism and the Mastery of Nature*. New York, Routledge, 1994. Print.

Porritt, Jonathon. *Seeing Green.* Oxford: Blackwell, 1984. Print.

Rasool S.I., and S.H. Schneider. "Atmospheric Carbon Dioxide and Aerosols: Effects of Large Increases on Global Climate." *Science* 173.3992 (July 1971): 138-41. Web. Date of Access: 05.01.2018

Revkin, Andrew. "Hacked E-Mail Is New Fodder for Climate Dispute." November 20, 2009. *The New York Times* Online. Web. Date of Access: 05.02.2018 (http://www.nytimes.com/2009/11/21/science/earth/21climate.html)

Rose, Deborah Bird, Thom van Dooren, et al. "Thinking Through the Environment, Unsettling the Humanities." *Environmental Humanities* 1 (2012): 1-5. Web. Date of Access: 15.04. 2016.

Roszak, Theodore, Mary E. Gomes, and Allen D. Kanner (Eds.). *Ecopsychology: Restoring the Earth Healing the Mind*. San Francisco, CA: Sierra Club Books, 1995. Print.

Roszak, Theodore. *The Voice of the Earth: An Exploration of Ecopsychology*. Michigan: Phanes P, 2001. Print.

Sabini, Meredith (Ed.). *The Earth Has a Soul: C.G. Jung on Nature, Technology and Modern Life*. Berkeley, California: North Atlantic Books, 2016. Print.

Sacks, Sam. "Accidental Prone." *Culture & Civilisation* (July/August 2010): 116-118. Web. Date of Access: 05.02.2018

Scull, John. "Ecopsychology: Where Does It Fit in Psychology in 2009?" *The Trumpeter* (2008) 24.3: 68-85. Web. Date of Access: 12.03.2017

Schroll, Mark A "Remembering Ecopsychology's Origins: A Chronicle of Meetings, Conversations, and Significant Publications." *Gatherings: Journal of International Community for Ecopsychology*. Web. Date of Access: 12.03.2017

Shepherd, Paul. *Nature and Madness*. Athens, Georgia: U of Georgia P, 1998. Print.

Shultz, Kathryn. "Writers in the Storm." *The New Yorker* Online Archive. Web. Date of Access: 23.11.2015.

Smith, Paul J. "Climate Change, Mass Migration and the Military Response." *Orbis: A Journal of World Affair* 51.4 (2007): 617.

Sorokhtin, O.G., G.V. Chilingar and L.F. Khilyuk (Eds.). *Global Warming and Global Cooling: Evolution of Climate on Earth*. Oxford: Elsevier, 2007. Print.

Speth, James Gustave. "Will Branding Help?" *Earth Island Journal,* The Anthropocene Special Issue: "Manmade" 28.1 (Spring 2013): 1-3. Web. Date of Access: 24.04.2016

Stephens Beth, and Annie Sprinkle. "Ecosexuality." *Gender: Nature*. Mexico: MacMillan Reference, 2016. 313-330. Print.

Steffen, Will, Asa Persson, Lisa Deutsch, et al. “The Anthropocene: From Global Change to Planetary Stewardship.” *Ambio* 40 (2011): 739–761. Print.

Steffen, Will. Jacques Grinevald, Paul Crutzen, and John McNeill. “The Anthropocene: Conceptual and Historical Perspectives.” *Philosophical Transactions of the Royal Society* 369 (2011): 842-867. Print.

Szerszynski, Bronislaw. “Reading and Writing the Weather: Climate Technics and the Moment of Responsibility.” *Theory, Culture and Society*. 27. 2-3 (March 2010): 9-30. Print.

---. “The End of the End of Nature: the Anthropocene and the Fate of the Human.” *Oxford Literary Review*. 34 (2012): 165-184. Print.

“The Cape Farewell Expedition of 2005” Official Website. Web. (http://www.capefarewell.com/2005.html)

“The Carboniferous Period.” University of California Museum of Palaeontology Official Web Site. Web. (http://www.ucmp.berkeley.edu/carboniferous/carboniferous.php) Date of Access: 25.08.2017.

“The Ice Garden” Installation Official Website. Web. (http://www.oomf.org.uk/icegarden.html)

Tonn, Shara. “Cli-Fi -that is Climate Change Fiction- is the New Sci-Fi.” Web. Date of Access: 17.07.2015.

Tuhus-Dubrow, Rebecca. “Cli-Fi: Birth of a Genre.” *Dissent* 60.3 (Summer 2013): 58-61. Print.

Trexler, Adam and Adeline Johns-Putra. “Climate Change in Literature and Literary Criticism.” *Wiley Interdisciplinary Reviews* (March/April 2011) 2.2: 185-200. Web. Date of Access: 23.11.2015.

Trexler, Adam. *Anthropocene Fictions: The Novel in a Time of Climate Change.* Charlottesville, VA: U of Virginia P, 2015. Print.

Ursula K. Le Guin, “Deep in Admiration.” *Arts of Living on a Damaged Planet*. Eds. Anna Tsing et al. Minneapolis: U of Minnesota P, 2017. 15-21. Print.

Vanderheiden, Steve. *Atmospheric Justice: A Political Theory of Climate Change*. Oxford: Oxford UP, 2008. Print.

Varn, Derrick C. “Climate Friction: An Interview with Dan Bloom on Cli-Fi.” 1-7. Web. Date of Access: 11.05.2014.

Vidal, John. “'Boats Pass over Where Our Land Was: Bangladesh’s Climate Refugees – Photo Essay.” *The Guardian* Online. January 18, 2018. Web. Date of Access: 15.02.2018. (https://www.theguardian.com/global-development/2018/jan/04/bangladesh-climate-refugees-john-vidal-photo-essay)

Visconti, Guido. “Anthropocene: Another Academic Invention?” *Lincei* (2014) 25: 381-392. Web. Date of Access: 23.11.2015.

Walsh, Roger. “Psychology and Human Survival: Psychological Approaches to Contemporary Global Threats.” Psychology and Social Responsibility: Facing Global Challenges, (Eds.) Sylvia Staub and Paula Green. New York: New York UP, 1992. Print. 59-86.

Warf, Barney. “Symptoms and Effects of Climate Change.” *Encyclopaedia of Geography.* Sage Publications. 2010. Web. Date of Access: 17.11.2015.

Wark, McKenzie. *Molecular Red: Theory for the Anthropocene*. London: Verso, 2015. Print.

Weir, Jessica K. "Lives in Connection." *Manifesto for Living in the Anthropocene*. Eds. Katherine Gibson, Deborah Bird Rose, Ruth Fincher. New York: *Punctum Books*, 2015.17-23. Print.

Weik von Mossner, Alexa. *Affective Ecologies: Empathy Emotion and Environmental Narrative.* Columbus, OH: Ohio State UP, 2017. Print.

Weller, Richard J., Claire Hoch, and Chieh Huang. "The Map of Sea Level Rise." *Atlas for the End of the World Project.* 2017. Web. Date of Access: 15.02.2018. (http://atlas-for-the-end-of-the-world.com)

---. "The Map of Environmental Displacement." *Atlas for the End of the World Project*. 2017. Web. Date of Access: 15.02.2018. (http://atlas-for-the-end-of-the-world.com)

Whitehead, Mark. *Environmental Transformations: A Geography of the Anthropocene.* New York: Routledge, 2014. Print.

Zalasiewicz, Jan, and Mark Williams. "Are We Now Living in the Anthropocene" *GSA Today* 18.2 (February 2008): 4-8. Print.

---. et al. "The Anthropocene: A New Epoch of Geological Time?" *Philosophical Transactions of the Royal Society* 369 (2011): 835-841. Print.

---. et al. "Stratigraphy of the Anthropocene." *Philosophical Transactions of the Royal Society* 369 (2011): 1036-1055. Web. Date of Access: 10.06.2015.

Ziolkowski, Lori A. “The Geologic Challenge of the Anthropocene.” *Whose Anthropocene? Revisiting Dipesh Chakrabarty’s* “Four Theses.” Eds. Robert Emmett and Thamas Lakan. *RCC Perspectives*, 2016/2. Web. Date of Access: 28.05.2016.

APPENDIX 1: GLOSSARY

English:	**Turkish**
aeon	üst zaman
age	çağ
agency	eyleyicilik
agent	eyleyici
Anthrobscene	Edebsizlik Çağı
(the) Anthropocene	Antroposen
anthropogenic	insan kaynaklı
anthropos	insan
apocalyptic	çevresel kıyamete dair
archeopsychic past /impulses	arkeo-psişik geçmiş/dürtüler
artificial photosynthesis	yapay fotosentez
AWG – Anthropocene Working Group	Antroposen Çalışma Grubu
(the) Calamatists	İklim Değişimi Felaket Tellalları
(the) Capitalocene	Kapitalosen / Sermaye Çağı
carnal pleasure	bedensel / cinsel haz
(the) Cenozoic Era	Senozoik Zaman
Chthulucene	Kutulusen
Cli-Fi novel	iklim kurgu romanı
climate change	iklim değişimi
climate change denialist	iklim değişimi inkarcısı
climate change fiction (Cli-Fi)	iklim kurgu
climate modelling	iklim modelleme
climate scientist	iklim bilimci
climate refugee	iklim mültecisi
(the) collective unconscious	kolektif bilinçdışı
Deep Ecology	Derin Ekoloji
deforestation	ormansızlaşma
Earth sciences	Yeryüzü bilimleri

Earth scientist	Yeryüzü bilimci
eco-fiction	eko-kurgu
eco-friendly	çevre dostu
(the) ecological self	ekolojik benlik
ecologically conscious	çevre bilinçli
(the) ecological unconscious	ekolojik bilinçdışı
ecopsychology	eko-psikoloji
embedded mind	fiziksel çevreyle bütünleşmiş zihin
embodied mind	bedenselleşmiş zihin/ bedenle bütünleşmiş zihin
environmental humanities	çevreci beşeri bilimler
environmental refugee	çevre mültecisi
epoch	devre
era	zaman
evolutionary memory	evrimsel hafıza
fossil fuel	fosil yakıt
geology	Yerbilim, jeoloji
geologist	Yerbilimci, jeolog
geological timeline	jeolojik zaman çizelgesi
global warming	küresel ısınma
global cooling	küresel soğuma
golden spike	altın sıçrayış
GSSP – Global Stratotype Section and Point	Küresel Stratotip Kesit ve Noktası
(the) Holocene	Holosen
human-induced	insan kaynaklı
ice age	buzul çağı
ICS – (The) International Commission on Stratigraphy	Uluslararası Stratigrafi Komisyonu
Industrial Revolution	Sanayi Devrimi
installation	enstalasyon / yerleştirme
interglacial	son iki buzul çağı arasındaki

International Chronostratigraphic Chart	Uluslararası Stratigrafik Zaman Çizelgesi
IPCC – (The) Intergovernmental Panel on Climate Change	Hükümetlerarası İklim Değişimi Paneli
New Materialism	Yeni Maddecilik
nomenclature	terimlendirme, bilimsel olarak adlandırma
nonhuman	insan olmayan
oceanic acidification	okyanus sularının asitleşmesi
period	devir
phylogenetic roots	filogenetik, türoluşsal kökenler
phylogenetics	filogenez, türoluş,
post-nature	doğa sonrası
posthuman	insan sonrası
post-apocalyptic	çevresel kıyamet sonrasına dair
primordial roots	arkaik dönemlere dayanan kökler
(the) Quarternary Period	Kuvaterner Devri
radiation belt	radyasyon kuşağı
renewable energy	yenilenebilir enerji
(rock) sediment	kayaç katmanı
species extinction	türlerin yokoluşu
stratigraphic	katmansal, stratigrafik
stratigraphy	katman bilim, stratigrafi
technophilia	aşırı teknoloji düşkünlüğü
technophobia	teknoloji fobisi
The Great Acceleration	Büyük İvme
The Stratigraphy Commission of the Geological Society of London	Londra Jeoloji Derneği Stratigrafi Komisyonu

APPENDIX 2: ORIGINALITY REPORTS

HACETTEPE ÜNİVERSİTESİ
SOSYAL BİLİMLER ENSTİTÜSÜ
DOKTORA TEZ ÇALIŞMASI ORİJİNALLİK RAPORU

HACETTEPE ÜNİVERSİTESİ
SOSYAL BİLİMLER ENSTİTÜSÜ
İNGİLİZ DİLİ VE EDEBİYATI ANABİLİM DALI BAŞKANLIĞI'NA

Tarih: 28/06/2018

Tez Başlığı : THE BRITISH CLIMATE CHANGE FICTION IN THE AGE OF THE ANTHROPOCENE: ECOCRITICAL READINGS OF J.G. BALLARD'S *THE DROWNED WORLD*, MAGGIE GEE'S *THE ICE PEOPLE* AND IAN McEWAN'S *SOLAR*

Yukarıda başlığı gösterilen tez çalışmamın a) Kapak sayfası, b) Giriş, c) Ana bölümler ve d) Sonuç kısımlarından oluşan toplam 141 sayfalık kısmına ilişkin, 28/06/2018 tarihinde tez danışmanım tarafından Turnitin adlı intihal tespit programından aşağıda işaretlenmiş filtrelemeler uygulanarak alınmış olan orijinallik raporuna göre, tezimin benzerlik oranı % 5'tir.

Uygulanan filtrelemeler:

1- ☒ Kabul/Onay ve Bildirim sayfaları hariç
2- ☒ Kaynakça hariç
3- ☒ Alıntılar hariç
4- ☐ Alıntılar dâhil
5- ☒ 5 kelimeden daha az örtüşme içeren metin kısımları hariç

Hacettepe Üniversitesi Sosyal Bilimler Enstitüsü Tez Çalışması Orijinallik Raporu Alınması ve Kullanılması Uygulama Esasları'nı inceledim ve bu Uygulama Esasları'nda belirtilen azami benzerlik oranlarına göre tez çalışmamın herhangi bir intihal içermediğini; aksinin tespit edileceği muhtemel durumda doğabilecek her türlü hukuki sorumluluğu kabul ettiğimi ve yukarıda vermiş olduğum bilgilerin doğru olduğunu beyan ederim.

Gereğini saygılarımla arz ederim.

28.06.2018

Adı Soyadı:	Fatma AYKANAT
Öğrenci No:	N10248688
Anabilim Dalı:	İngiliz Dili ve Edebiyatı
Programı:	İngiliz Kültür Araştırmaları Doktora Programı
Statüsü:	☒ Doktora ☐ Bütünleşik Dr.

DANIŞMAN ONAYI

UYGUNDUR.

Prof. Dr. Serpil OPPERMANN

HACETTEPE UNIVERSITY
GRADUATE SCHOOL OF SOCIAL SCIENCES
Ph.D. DISSERTATION ORIGINALITY REPORT

HACETTEPE UNIVERSITY
GRADUATE SCHOOL OF SOCIAL SCIENCES
ENGLISH LANGUAGE AND LITERATURE DEPARTMENT

Date:28/06/2018

Thesis Title : THE BRITISH CLIMATE CHANGE FICTION IN THE AGE OF THE ANTHROPOCENE: ECOCRITICAL READINGS OF J.G. BALLARD'S *THE DROWNED WORLD*, MAGGIE GEE'S *THE ICE PEOPLE* AND IAN McEWAN'S *SOLAR*

According to the originality report obtained by myself/my thesis advisor by using the Turnitin plagiarism detection software and by applying the filtering options checked below on 28/06/2018 for the total of 141 pages including the a) Title Page, b) Introduction, c) Main Chapters, and d) Conclusion sections of my thesis entitled as above, the similarity index of my thesis is 5 %.

Filtering options applied:

1. ☒ Approval and Decleration sections excluded
2. ☒ Bibliography/Works Cited excluded
3. ☒ Quotes excluded
4. ☐ Quotes included
5. ☒ Match size up to 5 words excluded

I declare that I have carefully read Hacettepe University Graduate School of Social Sciences Guidelines for Obtaining and Using Thesis Originality Reports; that according to the maximum similarity index values specified in the Guidelines, my thesis does not include any form of plagiarism; that in any future detection of possible infringement of the regulations I accept all legal responsibility; and that all the information I have provided is correct to the best of my knowledge.

I respectfully submit this for approval.

28.06.2018

Name Surname:	Fatma AYKANAT
Student No:	N10248688
Department:	English Language and Literature
Program:	British Cultural Studies Doctoral Programme
Status:	☒ Ph.D. ☐ Combined MA/ Ph.D.

ADVISOR APPROVAL

APPROVED.

Prof. Dr. Serpil OPPERMANN

APPENDIX 3: ETHICS BOARD WAIVER FORMS

HACETTEPE ÜNİVERSİTESİ
SOSYAL BİLİMLER ENSTİTÜSÜ
TEZ ÇALIŞMASI ETİK KOMİSYON MUAFİYETİ FORMU

HACETTEPE ÜNİVERSİTESİ
SOSYAL BİLİMLER ENSTİTÜSÜ
İNGİLİZ DİLİ VE EDEBİYATI ANABİLİM DALI BAŞKANLIĞI'NA

Tarih:28/06/2018

Tez Başlığı: THE BRITISH CLIMATE CHANGE FICTION IN THE AGE OF THE ANTHROPOCENE: ECOCRITICAL READINGS OF J.G. BALLARD'S *THE DROWNED WORLD*, MAGGIE GEE'S *THE ICE PEOPLE* AND IAN McEWAN'S *SOLAR*

Yukarıda başlığı gösterilen tez çalışmam:

1. İnsan ve hayvan üzerinde deney niteliği taşımamaktadır,
2. Biyolojik materyal (kan, idrar vb. biyolojik sıvılar ve numuneler) kullanılmasını gerektirmemektedir.
3. Beden bütünlüğüne müdahale içermemektedir.
4. Gözlemsel ve betimsel araştırma (anket, mülakat, ölçek/skala çalışmaları, dosya taramaları, veri kaynakları taraması, sistem-model geliştirme çalışmaları) niteliğinde değildir.

Hacettepe Üniversitesi Etik Kurullar ve Komisyonlarının Yönergelerini inceledim ve bunlara göre tez çalışmamın yürütülebilmesi için herhangi bir Etik Kurul/Komisyon'dan izin alınmasına gerek olmadığını; aksi durumda doğabilecek her türlü hukuki sorumluluğu kabul ettiğimi ve yukarıda vermiş olduğum bilgilerin doğru olduğunu beyan ederim.

Gereğini saygılarımla arz ederim.

28/06/2018

Adı Soyadı:	Fatma AYKANAT
Öğrenci No:	N10248688
Anabilim Dalı:	İngiliz Dili ve Edebiyatı
Programı:	İngiliz Kültür Araştırmaları Doktora Programı
Statüsü:	☐ Yüksek Lisans ☒ Doktora ☐ Bütünleşik Doktora

DANIŞMAN GÖRÜŞÜ VE ONAYI

Prof. Dr. Serpil OPPERMANN

Detaylı Bilgi: http://www.sosyalbilimler.hacettepe.edu.tr
Telefon: 0-312-2976860 **Faks:** 0-3122992147 **E-posta:** sosyalbilimler@hacettepe.edu.tr

HACETTEPE UNIVERSITY
GRADUATE SCHOOL OF SOCIAL SCIENCES
ETHICS COMMISSION FORM FOR THESIS

HACETTEPE UNIVERSITY
GRADUATE SCHOOL OF SOCIAL SCIENCES
ENGLISH LANGUAGE AND LITERATURE DEPARTMENT

Date: 28/06/2018

Thesis Title: THE BRITISH CLIMATE CHANGE FICTION IN THE AGE OF THE ANTHROPOCENE: ECOCRITICAL READINGS OF J.G. BALLARD'S *THE DROWNED WORLD*, MAGGIE GEE'S *THE ICE PEOPLE* AND IAN McEWAN'S *SOLAR*

My thesis work related to the title above:

1. Does not perform experimentation on animals or people.
2. Does not necessitate the use of biological material (blood, urine, biological fluids and samples, etc.).
3. Does not involve any interference of the body's integrity.
4. Is not based on observational and descriptive research (survey, interview, measures/scales, data scanning, system-model development).

I declare, I have carefully read Hacettepe University's Ethics Regulations and the Commission's Guidelines, and in order to proceed with my thesis according to these regulations I do not have to get permission from the Ethics Board/Commission for anything; in any infringement of the regulations I accept all legal responsibility and I declare that all the information I have provided is true.

I respectfully submit this for approval.

28/06/2018

Name Surname:	Fatma AYKANAT
Student No:	N10248688
Department:	English Language and Literature
Program:	British Cultural Studies Doctoral Programme
Status:	☐ MA ☒ Ph.D. ☐ Combined MA/ Ph.D.

ADVISER COMMENTS AND APPROVAL

Prof. Dr. Serpil OPPERMANN