



An Ecocritical Exploration of Nuclear Winter in Cormac McCarthy's *The Road*

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Abstract

*This article uses the lens of ecocriticism to explore nuclear winter in Cormac McCarthy's ecodystopian novel *The Road*. The narrative depicts the perilous journey of a father and son across post-apocalyptic America after an unspecified cataclysm has destroyed most civilization and almost all life on Earth. In *The Road*, the cause of the cataclysmic event is not disclosed. McCarthy describes the aftermath of the apocalypse and silences the cause of the environmental collapse. Based on the theory of Nuclear Winter proposed by an outstanding team of American scientists called the TTAPS group in their 1983 groundbreaking study "Nuclear Winter: Global Consequences of Multiple Nuclear Explosions", this article argues that the catastrophic climate change in *The Road* is presumably caused by a major nuclear war, resulting in a Nuclear Winter with devastating repercussions on the environment. The mysterious cataclysmic event resulted in perpetual darkness, freezing winter, toxicity, death of the biosphere and starvation. All these signs are shown to be in line with the scientific phenomenon of nuclear winter. Because of the current race for nuclear power, humanity today faces crucial existential threats such as nuclear annihilation and anthropogenic climate change. *The Road* is, thus, seen as a powerful cautionary tale that expresses the fears and anxieties about the danger of nuclear war and the resulting ecological crisis.*

1. INTRODUCTION

The world today faces a serious nuclear threat as political conflicts are escalating in many parts of the globe including Eastern Europe, the Middle East, and South Asia. Indeed, the world is living in troubling times in which the risk of nuclear war is intensifying, given the current nuclear arms race between several countries and the erosion of arms control agreements. Moreover, the shadow of nuclear apocalypse is hovering over us today, especially because of the catastrophic climate change that could result from nuclear war and lead to devastating repercussions on the entire planet.

In the field of science, a groundbreaking theory which predicts such tremendous damage on the earth ecosystem is the theory of "Nuclear Winter" proposed by an outstanding team of American scientists called the TTAPS group in their 1983 paper "Nuclear Winter: Global Consequences of Multiple Nuclear Explosions". The TTAPS group (named for Richard Turco, Owen Toon, Thomas Ackerman, James Pollock, and Carl Sagan) hypothesized that multiple nuclear explosions would inject massive amounts of smoke and dust into the atmosphere blocking sunlight and creating a prolonged period of cold and darkness with severe consequences for natural ecosystems and human survival. (Turco et al., 1983, p. 1283).

In the realm of literary fiction, a novel that expresses such anxiety of world devastation and the resulting disastrous climate change is *The Road* by American novelist Cormac McCarthy. Seen in the light of the current nuclear arms race and the constant wars around the globe, the novel offers a bleak vision of the aftermath of a major nuclear war with devastating effects on the earth's climate and biosphere. The mysterious cataclysmic event in *The Road* resulted in freezing winter, darkness, toxicity, death of the biosphere, and starvation. All these perils could be the outcome of nuclear warfare and the phenomenon of nuclear winter.

The author of *The Road* is the American novelist, playwright, and screenwriter Cormac McCarthy (1933-2023). McCarthy is one of the most celebrated contemporary American writers. He has written acclaimed novels in the Southern Gothic and post-apocalyptic genres. *The Road* (2006), which is the focus of this research, has won worldwide acclaim because of its literary significance. In the US, *The Road* was awarded the 2007 Pulitzer Prize in fiction. In the UK, it received the prestigious James Tait Black Memorial Prize in 2006. *The Road* was adapted as a Hollywood movie picture starring Viggo Mortensen and Kodi Smit-McPhee. Environmentally speaking, Cormac McCarthy's celebrated novel has been hailed by Scottish novelist and literary critic Andrew O'Hagan on the back cover of the 2010 Picador edition of *The Road* as "the first great masterpiece of the globally warmed generation".

Cormac McCarthy's *The Road* depicts the journey of a man, and his son across post-apocalyptic America after an unspecified cataclysm has destroyed most civilization and almost all life on Earth. To escape the freezing winter, they travel towards the coast where they expect to find a warm and hospitable environment. On their perilous journey, they confront some survivors who have turned to cannibalism because of the extreme shortage of food. However, throughout the narrative, the man maintains the noble mission of protecting his son and trying to find hope in a world characterized by disastrous climate change and human savagery.

In Cormac McCarthy's ecodystopian magnum opus, the apocalyptic event that has caused the catastrophic climate change is only hinted at and never clearly revealed by the author. Cormac McCarthy speculates about the aftermath of the apocalypse and leaves the reader to speculate about the cause. The ambiguity of the cataclysmic event in *The Road* makes one wonder: "What is the cause of the environmental apocalypse?", "What is the nature of the catastrophic climate change?", "What are its dire repercussions on the natural environment?", and "What ecological moral message does the novel convey?".

Using an ecocritical approach based on "the fundamental premise that human culture is connected to the physical world, affecting it and affected by it." (Glotfelty, 1996, p. xix), this article explores through thematic analysis and close reading the cause and effects of the disastrous climate change in *The Road*, contending that it is of an anthropogenic nature, namely a nuclear winter. Since ecocriticism is basically concerned with the relationship between humans and nature and their mutual impacts, this paper suggests that in *The Road* human culture caused terrible harm to nature, which in turn strikes back through a disastrous climate change. The ecocritical approach of this paper is also based on the definition of ecocriticism provided by the prominent German ecocritic Ursula K. Heise, who defines the field as involving a "triple allegiance to the scientific study of nature, the scholarly analysis of cultural representations, and the political struggle for more sustainable ways of inhabiting the natural world (Heise, 2006, p.506). Taking into account the interdisciplinary nature of ecocriticism, this paper engages with the scientific debate about anthropogenic climate change and the TTAPS' theory of nuclear winter. It engages also with the presumed political and activist stance of the novelist in influencing the reader to be more ecologically conscious towards the preservation of the natural environment. Being part of the tradition of dystopian fiction with a

powerful moral function, *The Road* can, thus, be read as a cautionary tale about the perils of nuclear war.

2. THE EVOLUTION OF ECOCRITICISM

Ecocriticism is an emerging literary critical approach that explores the intersections of ecology and human culture from an interdisciplinary lens. This booming critical field has captured the attention of many scholars worldwide over the last three decades, and its contours are constantly being expanded. Ecocriticism officially gained critical recognition following the publication of two prominent works in the 1990s. Cheryll Glotfelty and Harold Fromm published a seminal anthology of ecocritical essays entitled *The Ecocritical Reader: Landmarks in Literary ecology* in 1996 and Lawrence Buell released his influential book *The Environmental Imagination* back in 1995. Glotfelty describes ecocriticism as “the study of the relationship between literature and the physical environment” (Glotfelty, 1996, p. xviii) and Buell defines it as “a study of the relationship between literature and the environment conducted in a spirit of commitment to environmentalist’s praxis” (Buell, 1995, p.430).

The word “ecocriticism” was first coined by William Rueckert in his 1978 essay *Literature and Ecology an Experiment in Ecocriticism*. Rueckert defines ecocriticism as “the application of ecology and ecological concepts to the study of literature” (Rueckert, 1978, p.107). In *Beginning Theory*, Peter Barry asserts that ecocriticism began in the United States in the late 1980s, while its equivalent Green Studies started in the United Kingdom in the early 1990s. Ecocriticism in the United States was based on the ideas of 19th-century American writers Ralph Waldo Emerson (1803-1882), Margaret Fuller (1810- 1850), and Henry David Thoreau (1817-1862). These three prominent writers and philosophers were called the transcendentalists and their work celebrated nature and the wilderness in America. According to Barry, the UK version of Ecocriticism known as “Green Studies” is based on the works of British Romanticism of the 1790s. The founding figure of this new field in Britain is the critic Jonathan Bate who examined the ways in which romantic writers portrayed the natural environment and responded to ecological matters (Barry, 2002, p.250-251).

Ecocriticism has also developed as a by-product of the rising of ecological awareness during the 1960s in the United States. Rachel Carson’s book *Silent Spring* (1962) is considered a milestone in the birth of modern environmentalism as it made people aware of the hazards of pesticides such as DDT to the environment and to the lives of humans and animals. British ecocritic Greg Garrard calls *Silent Spring* “the founding text of ecocriticism” (Garrard, 2004, p.33), because it had a tremendous impact on public opinion and inspired many writers and activists to defend the welfare of planet Earth.

It is important to highlight that ecocriticism is an interdisciplinary approach. According to Peter Barry, ecocriticism has no ‘universally accepted model’ (Barry, 2017, p.248). That is to say, it is not a unitary method of literary analysis. In fact, all sciences can contribute to this broad field. Ecocriticism can benefit from a myriad of sciences such as ecology, biology, geology, psychology, technology, etc. Therefore, ecocriticism is an umbrella term including various sub-disciplines such as ecopsychology, ecofeminism, ecopedagogy, Postcolonial ecocriticism, etc. In this respect, Buell asserts in *The Future of Environmental Criticism* that “ecocriticism gathers itself around a commitment to environmentality from whatever critical vantage point” (Buell, 2008, p.11). Ecocriticism’s commitment to interdisciplinarity is also evident in ISLE, the acronym of the official journal of the Association for the Study of Literature and Environment, which stands for Interdisciplinary Studies in Literature and Environment.

Indeed, in doing ecocriticism, ecocritics are compelled to deal with scientific matters. In this regard, Glen A. Love says: “Ecocriticism urges its practitioners into interdisciplinarity, into science. Literature involves interrelationships and ecological awareness enhances and expands our interrelationships to encompass nonhuman as well as human contexts” (Love, 2003, p.561). Accordingly, when doing an ecocritical analysis of *The Road* this paper involves the scientific phenomenon of nuclear winter which is presumably responsible for the degradation of the natural environment in the novel.

3. THE NUCLEAR WINTER THEORY

Nuclear winter is the hypothesized environmental catastrophic phenomenon that could be triggered by major nuclear explosions. The beginning of the nuclear winter theory goes back to the year 1982 when *Ambio* (the international environmental journal of the Royal Swedish Academy of Sciences) published a special issue on the environmental effects of nuclear war. The issue included a groundbreaking article by renowned scientists Paul Crutzen & John Birks entitled "*The atmosphere after a nuclear war: Twilight at Noon*". Paul Crutzen (the Dutch atmospheric chemist and future winner of the Nobel Prize in Chemistry in 1995) and John Birks (professor of chemistry at the University of Colorado) investigated the danger of massive fires generated by nuclear explosions and their climatic effects. According to these prominent scientists, as an outcome of the nuclear explosions, “Several types of fires may rage. Besides the fires in urban and industrial centers, vast forest fires would start, extensive grasslands and agricultural land would burn, and it is likely that many natural gas and oil wells would be ruptured” (Crutzen & Birks, 1982, p.116).

Using a two-dimensional computer model of coupled photochemistry and dynamics, they did a calculation of the amount of smoke that would be produced from the fires after the nuclear bombs exploded. To their amazement, they found that “the fires will produce a thick smoke layer that will drastically reduce the amount of sunlight reaching the earth’s surface” (Crutzen & Birks, 1982, p.115). As a consequence, they concluded that this would lead to ongoing darkness and even “twilight at noon”. Crutzen & Birks suggested that the thick smoke generated in a large nuclear exchange could absorb sunlight and prevent it from reaching the Earth’s surface over extended periods, perturbing weather patterns significantly and leading to the elimination of much of the food production in the Northern Hemisphere during the growing season. (Crutzen & Birks, 1982, p.115).

As the theory of “Nuclear Twilight” gained the attention of the media and scientific academia, scholars started to take more interest in the hypothesis. Crutzen and Birks largely anticipated the nuclear winter theory, but they focused mainly on smoke from nuclear-ignited fires and the resultant darkness. To investigate the phenomenon deeper, a prominent group of scientists called the TTAPS team benefited from Crutzen & Birks’ findings and took a step further to come up with more insights about the atmospheric effects following a nuclear war, which culminated in the discovery of the nuclear winter theory.

The official Nuclear Winter theory was the subject of a major scientific paper entitled “*Nuclear winter: Global consequences of multiple nuclear explosions*” published in 1983 by a distinguished team of scientists called TTAPS (named for Richard Turco, Owen Toon, Thomas Ackerman, James Pollock, and Carl Sagan). The objective of the TTAPS paper was to describe the climatic effects of a nuclear war. Building on the Crutzen & Birks idea that smoke and dust from a large-scale nuclear war would block out sunlight from reaching the earth’s surface and cause darkness, the TTAPS team realized that the loss of heat from sunlight could cause a “nuclear winter” characterized by a severe temperature drop and producing worldwide famine.

Since there has never been a major nuclear war, the TTAPS group used computer models previously developed to study the effects of volcanic eruptions to investigate the potential global atmospheric and climatic consequences of nuclear war. TTAPS were inspired by the natural phenomenon of volcanic eruptions, which produce huge amounts of smoke similar to what would be expected in a nuclear war. TTAPS were aware of the climate influence of massive volcanic eruptions such as Tambora in Indonesia, which set off “the year without summer” in 1816. Resembling the hypothesized nuclear winter, the series of explosions accompanying the Tambora eruption ejected massive amounts of dust and smoke into the atmosphere, blocking sunlight and causing freezing temperatures across Europe. While in Geneva, the dark and cold weather inspired British poet Lord Byron to describe the phenomenon vividly in his famous poem “*Darkness*”.

The authors of the Nuclear Winter hypothesis used a 1-dimensional computer model from their volcanic studies to estimate the effects of nuclear war-generated smoke and dust on the earth’s climate. The TTAPS postulated a series of nuclear exchange scenarios ranging from 100 megatons to 25000 megatons of various warheads. They took as their baseline scenario a nuclear war involving a 5000 megaton attack, in which a total of 10,400 warheads of various sizes are detonated over a variety of targets. In addition to the huge blasts which would flatten cities and cause massive fires, the baseline scenario assumed that the nuclear bombs would produce 225 million tons of smoke particles, causing severe climatic perturbations (Turco, et al., 1983, p. 1285). They claimed that the huge amount of debris thrown into the atmosphere following a major nuclear war would block sunlight and cause extremely cold weather across the globe. In this regard, they contend that:

a global nuclear war could have a major impact on climate manifested by significant surface darkening over many weeks, sub-freezing land temperatures persisting for up to several months, large perturbations in global circulation patterns, and dramatic changes in local weather and precipitation rates—a harsh 'nuclear winter' in any season. (Turco, et al., 1983, p.1290)

Even more shocking is their postulation that the resulting cold, darkness, and radiation would threaten human survivors and other living species by halting photosynthesis. They hypothesized that the lack of sunlight would cause the extinction of food crops across the world, leading to mass starvation. Overall, it is clear that nuclear weapons represent a serious threat to the safety of humans and the entire environment. As the TTAPS group conclude in their original paper “When combined with the prompt destruction from nuclear blast, fires, and fallout and the later enhancement of solar ultraviolet radiation due to ozone depletion, long-term exposure to cold, dark, and radioactivity could pose a serious threat to human survivors and to other species” (Turco, et al., 1983, p.1283). McCarthy’s *The Road*, as this article suggests, showcases this human and environmental tragedy. Although the author himself is not explicit about it in the novel, the nuclear winter apocalypse is a strong contender among other theories concerning the cause of the disastrous climate change in the novel.

4. CRITICAL STUDIES AND THE APOCALYPSE IN *THE ROAD*

There has been much critical speculation by several scholars concerning the cause of the environmental apocalypse in Cormac McCarthy’s *The Road*. Various critical readings of the novel interpret and identify the cause of the environmental apocalypse as ranging from a meteor impact event and nuclear disaster to a divine apocalypse. This shows that there is no agreed-upon interpretation of the cataclysmic event that shattered the world of *The Road*.

In her paper “*Cormac McCarthy’s The Road as Apocalyptic Grail Narrative*”, Lydia Cooper identifies the disaster as “cataclysmic meteor strike” (Cooper, 2011, p.228). For her, *The Road* is a retelling of the Holy Grail. She contends that the father’s mission of protecting his son has a religious motif because the son “pictured as a vessel made translucent by the glory of the essence of divinity within him, is consistently associated with light” (Cooper, 2011, p.224). Similarly, in her article “*He ought not have done it: McCarthy and Apocalypse*”, Dana Phillips speculates that the cause of the cataclysm was “the impact of a massive meteor and not the detonation of multiple warheads” (Phillips, 2011, p.177). Also, Derek J. Thiess in his article “*On The Road to Santa Fe: Complexity in Cormac McCarthy and Climate Change*” suggests a natural cause, proclaiming that the landscape of *The Road* is “scorched by a meteorite” (Thiess, 2013, p.532).

Collado-Rodríguez in his article “*Trauma and storytelling in Cormac McCarthy’s no country for old men and The Road*” suggests “nuclear disaster” as the cause of the earth’s devastation in the novel (Collado-Rodríguez, 2012, p.45). He highlights the protagonists’ traumatic experiences in the cauterized wasteland. He does not provide details about the cause of the environmental apocalypse but focuses on the emotional and physical wounds of the disaster instead. Also, Tim Edwards in his article “*The End of the Road: Pastoralism and the Post-Apocalyptic Waste Land of Cormac McCarthy’s The Road*” identifies the cause of the environmental apocalypse as a nuclear war. He does not dwell on climate change, but he foregrounds the post-apocalyptic landscape, which he describes as a “(deathscape), really bleak and decidedly unromantic, a landscape, in a sense, without meaning” (Edwards, 2008, p.56). Similarly, in his review of the novel “*A Tabernacle in the Dark On the Road with Cormac McCarthy*”, Phil Christman claims that *The Road* vividly portrays “an ash-blackened America, having somehow survived a nuclear attack that has wiped out civilization” (Christman, 2007). Christopher Lawrence in his article “*Because we carry the fire”: An Eco-Marxist Reading of Cannibalism in Cormac McCarthy’s The Road*”, similarly contends that the apocalypse is “hinted to have been a widespread nuclear incident” (Lawrence, 2011, p.162). However, he does not interrogate climate change in the novel, focusing instead on cannibalism and the human ethical struggle to survive. In contrast, John Cant in his book *Cormac McCarthy and the Myth of American Exceptionalism*, argues against the nuclear hypothesis. For him, it is unrealistic because there remain some survivors, while “ubiquitous radioactivity, especially in the ash and dust, would have long since killed everybody” (Cant, 2008, p.186).

Apart from the manmade or natural hypotheses regarding the novel’s apocalypse, critic Carl James Grindley contends in his paper “*The Setting of McCarthy’s The Road*”, that the apocalypse of *The Road* is similar to that of *the Biblical Book of Revelation* and that the devastation of the novel world has a divine ‘supernatural cause’. For him, there are clear clues that *The Road* echoes the End of times apocalypse that John the Divine depicts such as “fire from heaven, the trees and the grass burned up, ships destroyed, all sea life dead, the sun and the moon blotted out, plagues and earthquakes, cities full of unburied dead people” (Grindley, 2010, p.12).

Through the reviewed papers, it is evident that controversy remains regarding the cause of the apocalypse in *The Road*. As McCarthy leaves the origin of that destruction ambiguous, there is no general agreement by scholars on its nature. As the narrative withholds this information from its readers, several scholars have focused on the treatment of the relationship between the father and son in the post-apocalyptic world without adequately interrogating nuclear winter. Therefore, it will be the task of this article to address this gap and provide more insights about nuclear winter in McCarthy’s post-apocalyptic novel, based on the TTAPS original theory.

5. DISCLOSING THE ENVIRONMENTAL APOCALYPSE IN *THE ROAD*

In this ecodystopian novel, the narrator does not provide enough details about the origin of the environmental devastation. The apocalyptic event is described in a very short flashback statement: “The clocks stopped at 1:17. A long shear of light and then a series of low concussions” (45). The details could apply to a number of apocalyptic scenarios, both natural and manmade. However, McCarthy focuses mainly on the aftermath of the apocalypse, leaving the reader to speculate about the cause of the cataclysmic event.

This paper presumes that the cause of the environmental apocalypse in the novel is a major nuclear war resulting in a harsh nuclear winter. Accordingly, the apocalyptic event described in this brief phrase could be read as the detonation of a nuclear bomb with multiple warheads. The “long shear of light” suggests that the nuclear blast emitted a massive flash of light, which is scientifically the first effect of a nuclear detonation. According to American nuclear war expert Robert Johnston: “Flash is the intense light and other thermal radiation given off by the fireball. With a temperature of thousands of degrees, the fireball radiates visible light, infrared light, and ultraviolet light.” (Johnston, 2005). Indeed, the flash of light is a possible indicator of a nuclear blast. A BBC report on the 1945 bombing of Hiroshima and Nagasaki in Japan provides evidence of this claim, highlighting the fact that “When the bomb exploded in Hiroshima, the city was struck by a flash of blinding light” (qtd. in BBC website).

In addition to the long flash of light, another textual clue supporting the nuclear theory of *The Road's* apocalypse is the sudden stopping of the clocks in the family's home following the sudden blast. This incident suggests that the nuclear blast caused the loss of electric power presumably from an electromagnetic pulse (EMP). American chemical security expert George Lane defines this scientific phenomenon as “an intense burst of electromagnetic energy caused by rapid acceleration of charged particles that can destroy or damage electronic systems by overloading circuits”, noting that “EMPs are caused by geomagnetic disturbances (GMD) in the Sun and by atmospheric detonation of nuclear weapons” (Lane, 2017, p. 4).

Another hint concerning the nuclear origin of the apocalypse in the novel is the underground shelter that the two protagonists find in an abandoned house (116). The shelter which is presumably a nuclear fallout bunker contains canned food, blankets, water, and various other supplies that are necessary to keep surviving for a while in the time of a nuclear attack.

More importantly, a major supporter of the nuclear origin of the cataclysmic event that devastated the environment in *The Road* is the harsh climate change which closely resembles a nuclear winter. The next part of the paper will provide an ecocritical reading of nuclear winter in the novel, highlighting its nature and effects on the environment, including the perpetual darkness, the extreme cold weather and the death of the biosphere due to toxicity.

6. AN ECOCRITICAL EXPLORATION OF NUCLEAR WINTER IN *THE ROAD*

6.1 THE PERPETUAL DARKNESS

Using an ecocritical lens, this article suggests that the catastrophic climate change in *The Road* is presumably caused by a large-scale nuclear war resulting in Nuclear Winter with devastating repercussions on the environment. The first aspect of nuclear winter in *The Road* is the perpetual darkness that pervades the post-apocalyptic world. Throughout the narrative, the environment is constantly described as bleak, dark, and devoid of life.

The persistent darkness which permeates the land is arguably an indicating sign of nuclear winter. Indeed, the climatic and environmental phenomenon depicted in the novel resembles to a great extent the post-nuclear war scenario that the prominent scientific group TTAPS described in their 1983 paper: *Nuclear Winter: Global Consequences of Multiple Nuclear Explosions*. According to the TTAPS group, a massive nuclear war would result in a nuclear winter characterized by worldwide freezing cold and darkness caused by sunlight-dimming smoke and dust entering the atmosphere. The extreme darkness and cold, combined with nuclear fallout radiation, would kill most of Earth's flora and fauna, causing famine and diseases to the remaining survivors (Turco et. al., 1983, p. 1283).

The smoke and soot of burning cities during the nuclear war polluted the atmosphere of this unspecified region of America to the point where the sun is largely blocked out for an extended period of time. As everything is covered in a thick layer of dust and ash, the sunlight cannot penetrate the grey clouds. In the novel, McCarthy paints a description of the lack of sunlight in the very opening lines: "When he woke in the woods in the dark of the night he'd reach out to touch the child sleeping beside him. Nights dark beyond darkness and the days more grey each one than what had gone before" (McCarthy, 2006, p.3).

The novel starts in media res as the man wakes in the woods to the post-apocalyptic dark and cold world around him. The mysterious cataclysmic event has destroyed human civilization and scorched the whole planetary ecology, leaving behind a huge grey cloud enveloping Earth. The weather is getting extremely dark and cold making it hard to survive another winter. Therefore, the father intends to move south seeking a warmer and more hospitable climate.

Indeed, from the beginning, McCarthy sets the scene for the major motif of darkness in the novel. After the environmental apocalypse, the sky is so heavy with ash that both the sunlight and the moonlight are banished. In the novel, the sky is shown to be permanently pitch dark at night and extremely gray in the morning. The narrative frequently uses words like "dark" and "grey" to describe the lack of light. The climate-changed world of *The Road* is described as "pitiless dark" (McCarthy, 2006, p.158), and "pitch dark" (McCarthy, 2006, p.191). As "the world grew darker daily" (McCarthy, 2006, p.181) in this post-apocalyptic wasteland, the two protagonists kept "running from dark to dark" (McCarthy, 2006, p.220), which strongly suggests the scenario of nuclear winter. As everything is covered in ash, presumably as an outcome of nuclear blasts, hardly anything in this dark world has color. The only colors to be found anywhere are various shades of black and gray.

This desolate post-apocalyptic world is engulfed in a blinding darkness so utterly black that it extends from hurting the eyes to hurting the ears, "[t]he blackness he woke to on those nights was sightless and impenetrable. A blackness to hurt your ears with listening" (McCarthy, 2006, p.13). The absence of moonlight due to the ash that covers the sky has intensified the darkness at night. Because there is hardly anything to hear in this desolate wasteland, listening so closely to hear a sound makes one harm his ears from trying. It is a darkness that harms the senses and it is psychologically tormenting to just be in it waiting in vain for a light or a sound.

Darkness is even personified by McCarthy as a "cold autistic dark" (McCarthy, 2006, p.13). It is described as an autistic person with whom communication is impossible. It is a darkness that does not respond to any attempt of interaction on the part of the protagonists and does not allow any relationship with them. It is even an antagonistic enemy which hinders their surviving mission as they cannot continue walking safely in the dark moonless nights.

Because of the ash that covers the sky and the land, the color gray dominates the post-apocalyptic world of *The Road*. Throughout the narrative "the stark gray world appeared again

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and again” (McCarthy, 2006, p.40) indicating the power of the nuclear winter which pervades “the gray country and the gray sky” (McCarthy, 2006, p.172). Indeed, the color gray saturates the post-apocalyptic setting, making it hard for the protagonists to move safely and survive. McCarthy likens this pervading greyness to “the onset of some cold glaucoma dimming away the world” (McCarthy, 2006, p.3). The word “glaucoma” is a reference to impaired sight, alluding to the gray world of *the Road* that is likened to a sick eye gradually losing its sight. Similarly, due to nuclear winter, the sunlight is blocked, and the world becomes hardly visible as it is covered in a vast grey cloud of ash. This medical condition, which causes deteriorating vision and eventual blindness, is used symbolically by the author, as the characters struggle to see through the grey smog throughout the entire novel. In his article “*The cold illucid world: The poetics of gray in Cormac McCarthy's The Road,*” Chris Danta describes the setting of *The Road* as a “glaucomic world” (Danta, 2012, p.10) struck by an “ecological glaucoma” (Danta, 2012, p.11). In other words, it is a bleak world in which light is not totally absent but decays into perpetual greyness.

In the climate-changed world of *The Road*, the sun isn't able to break through the thick atmosphere of ash and mist. McCarthy poetically describes the state of the blocked sun “By day the banished sun circles the earth like a grieving mother with a lamp” (McCarthy, 2006, p.28). The sun is likened to a heartbroken mother crying over her lost children. Moreover, the sun is not blinding as it used to be, but appears only as a dim lamp, barely providing enough light to see. In fact, in the post-apocalyptic world of *The Road*, there is only a minimal difference between day and night as the characters struggle through “the long gray dusks [and] the long gray dawns” (McCarthy, 2006, p.7).

The post-apocalyptic climate-changed world of *The Road* seems to be plunged in the perpetual darkness and greyness of nuclear winter, a factor that makes it hard for the protagonists to survive and reach their destination. However, it is not the only hindrance in their perilous journey. In addition to the omnipresent dimness, this pitiless bleak world is characterized by an extremely cold weather, another major aspect of the environmental nuclear apocalypse that will be examined next.

6.2 THE EXTREME COLD WEATHER

In McCarthy's intensely chilling cli-fi novel *The Road*, the mysterious cataclysmic event has covered the sky in a vast cloud of ash and smoke, blotting out the sun for an extended period of time. This resulted in a severely cold weather which makes it hard for the remaining humans to survive. The lack of sunlight resulted in a lack of warmth and plunged this blasted region of the United States into prolonged coldness. Stranded in this desolate world which is “cold and growing colder” (McCarthy, 2006, p.12), the two protagonists decide to move south, hoping to escape the deadly winter and find a warmer climate near the sea.

The extreme cold resulting from the environmental apocalypse that the novel depicts is in line with the chilling post-nuclear war scenario of nuclear winter that the prominent scientific group TTAPS described in their 1983 paper: *Nuclear Winter: Global Consequences of Multiple Nuclear Explosions*. According to the TTAPS group:

Most striking are the extremely low temperatures occurring within 3 to 4 weeks after a major exchange. In the baseline 5000-MT case, a minimum land temperature of -250 K (-23°C) is predicted after 3 weeks. Subfreezing temperatures, persist for several months. Among the cases shown, even the smallest temperature decreases on land are -5° to 10°C (cases 4, 11, and 12), enough to turn summer into winter (Turco et. al., 1983, 1286)

According to the TAPPS study, the vast amounts of smoke and dust resulting from a large-scale nuclear war would prevent sunlight from reaching the surface of the Earth. Consequently, average surface temperatures would drop below freezing even in summer. Nuclear winter is what presumably happened to the United States' environment in Cormac McCarthy's *The Road* following a devastating nuclear war. In effect, the smoke and ash of burning cities during the nuclear war have polluted the atmosphere of this blasted region of America to such an extent where the sun is largely blotted out for an extended period of time. As the sunlight cannot reach the land, the weather has become very cold. Under these radical transformations of the environment and climate, the world of *The Road* has plunged into a prolonged cold winter.

From the beginning of the novel, the narrator points to the harsh cold which pervades the post-apocalyptic wasteland. He explains that because of the radically altered climate, the protagonists' homeland has become uninhabitable. Leaving the shelter of their house, the two protagonists travel on foot towards the south, pushing a creaking shopping cart that contains all their possessions. For them, "[t]here'd be no surviving another winter here" (McCarthy, 2006, p.4). Because the sun is blotted out, the weather is constantly cold in this charred and lifeless landscape but it will get even colder in the coming winter season. The man is well aware that the approaching winter would be too harsh to face due to the growing bitter cold.

Starting on their perilous journey towards the south, the two protagonists are aware that the cold is one of the fiercest enemies that will hamper their surviving mission. As the two protagonists continue heading south, the weather grows colder and the nights grow longer. They repeatedly risk freezing to death, especially at night. Indeed, the nuclear winter is gradually becoming unbearably cold, so "[c]old to crack the stones" (McCarthy, 2006, p.12).

Through their journey across the mountains, the snow starts falling more heavily, freezing their feet and impeding their progress. Because of the high altitude, the weather in the mountains grows worse, and the snow presents a serious threat to their survival. In addition to making the environment too cold, the steadily falling snow threatens to bury the cart that contains their necessary supplies.

The snow in the novel is described in evil terms using animal imagery. At one point, when the two protagonists trudge along towards the expected warm coast, the snow starts to fall again and they cover themselves with a plastic tarp. The narrator recounts that "[b]y late afternoon it had begun to snow and they went on with the tarp over them and the wet snow hissing on the plastic" (McCarthy, 2006, p.150). Using imagery which applies to sound, the snow is described as "hissing" on the plastic tarp. This example of imagery does convey a sinister tone of danger and evil, which overshadows the dreary wasteland. The snow is depicted negatively as having the voice of a snake. It is not a normal kind of snow, but one that hisses and bites like a poisonous snake causing frostbite, which is a type of injury that occurs when the skin is exposed to the cold. The narrator, thus, creates a vivid mental sound of the hissing snow, which is represented as a coldly venomous enemy of the remaining survivors in this chilling post-apocalyptic world.

Trapped in the nuclear winter-stricken wasteland, the two protagonists engage in a continuous battle against the natural elements. The harsh weather that surrounds them shows that nuclear winter can be extremely merciless, unrelenting, and hopeless. Throughout their journey, the father and son are obsessed with the weather. It is always on their minds and occupies their thoughts. It becomes a determining acting agent in the events of the novel. In his article "*Facing the Weather*", Nels Christensen asserts that "[f]ar from merely an aspect of setting, the weather acts as an oppressively omnipresent character" (Christensen, 2014, p.199).

Indeed, the weather is a persistently antagonizing enemy that keeps threatening the lives of the remaining humans throughout their journey. The man and the boy keep battling the cold weather and its various elements, such as snow, rain, thunderstorms, lightning, chill winds, etc. as they move south as quickly as possible before winter gets harsher. There are moments that they were about to die of the freezing cold before they reach their destination. In addition to the extreme cold weather, another aspect of the environmental apocalypse in *The Road* is the death of the biosphere, a factor that will make nuclear winter even harder to survive, as we shall see next.

6.3 THE DEATH OF THE BIOSPHERE

Another indicator of nuclear winter in the novel is the death of the biosphere. Cormac McCarthy's *The Road* features a devastated post-apocalyptic world that has suffered a severely catastrophic ecological collapse. The world's biosphere has undergone a drastic blast from a major cataclysmic event that has caused widespread death to almost all living organisms. The novel describes a landscape where nearly everything is dead and burnt, the soil is covered in toxic ash, nearly all plants and animals are extinct. Accordingly, the landscape could be considered a blazing hell on earth. The land is bleakly described as "barren, silent, godless" (McCarthy, 2006, p.3), "cauterized terrain" (McCarthy, 2006, p.12), "ashen scabland" (McCarthy, 2006, p.13), "graying landscape" (McCarthy, 2006, p.83), showing "no sign of life" (McCarthy, 2006, p.21).

The father scans the dead landscape trying to find glimpses of life and hope, but there is almost nothing to see besides burnt, dead trees and the sweeping ash. It is a world without lively colors except for the persisting grayness that permeates everything. The setting is strongly characterized by the silence and the emptiness left by the absence of life. Indeed, the mysterious cataclysmic event has physically turned the American landscape into a cauterized and desolate country featuring charred trees, burnt buildings, and ash covering almost everything.

The description of the charred landscape of *The Road* is in accordance with the nuclear winter scenario hypothesized by Paul Crutzen & John Birks in their paper *The Atmosphere after a Nuclear War: Twilight at Noon*, where they noted that because of nuclear war:

Several types of fires may rage. Besides the fires in urban and industrial centers, vast forest fires would start, extensive grasslands and agricultural land would burn, and it is likely that many natural gas and oil wells would be ruptured as a result of the nuclear explosions, releasing huge quantities of oil and natural gas, much of which would catch fire. (Crutzen & Birks, 1982, p. 116)

The devastation of the ecosystem of *The Road* is presumably the outcome of the massive burning of the land resulting from multiple nuclear explosions. Indeed, the burnt trees and the pervading ash are apparently by-products of a world set on fire. As endless forests and buildings have gone up in flames, a massive quantity of ash has been generated covering the land. Indeed, the blazing fire of the nuclear bombs has turned the world of *The Road* into a burning inferno where divine mercy seems to be totally absent. Facing these unforgiving conditions, the two travelers must head south, desperately hoping to find a more hospitable environment. However, as they continue to travel through the blasted forests and the ghost towns, the landscape remains the same, charred, dead, and desolate.

The death of the biosphere in the world of *The Road* is evident in the absence of living flora and fauna. In this burnt-out post-apocalyptic setting, plant and animal life have been radically destroyed by the devastating nuclear war and the resulting climate change. The trees represent a major element of flora in McCarthy's ecodystopian world. However, most of the trees are scorched and about to fall to the ground. The narrative draws special attention to the phenomenon of dead trees, referring to "the trees dead and black" (McCarthy, 2006, p.80). The trees in this wasteland are either dead or doomed to death. The post-apocalyptic ecosystem does not support life anymore. It is a dying world devastated by fire, toxicity, and the absence of the sun. In these unforgiving conditions, the two brave protagonists kept walking through an unchanging landscape of dead and burnt trees. Place after place, there's nothing for them to see but endless clusters of burnt forests and gray piles of ash.

The death of the biosphere in *The Road* is also evidenced by the absence of fauna. This ecologically collapsed setting is represented as a post-animal world, as the nuclear apocalypse has eradicated all animal life. The blazing fires of the nuclear war have wiped the animal species, and the ones still alive have been killed by toxic ash or consumed as food by the remaining human survivors. During their long journey, the protagonists kept encountering ashen bones and remains of dead animals, a horrible reminder that they may face the same fate of annihilation in their perilous quest for survival. Indeed, the blasted world of *The Road* has witnessed a mass extinction of animal species. The lack of movement is a clear indicator of the absence of animals as it is emphasized throughout the novel that: "nothing moved in that world" (McCarthy, 2006, p.31) since there is "nothing living anywhere" (McCarthy, 2006, p.29).

The absence of fauna and the loss of the pastoral past continue in the novel with the death of the fish population in all waters, including lakes, rivers, and seas. The toxic ash resulting from the nuclear apocalypse has eradicated the fish population. While standing upon a river, the man notices the pollution of the waters which have turned gray because of the ash and dust. The ocean is depicted as sterile and devoid of life, becoming a rotten cemetery of millions of dead fish.

The air after the nuclear cataclysm has become extremely polluted with toxic ash. The two protagonists constantly wear facemasks throughout their journey. Also, most of the other remaining human survivors wear face masks to protect themselves against the radiation that fills the air. Indeed, toxicity seems to spare no place and nobody in McCarthy's suffocating wasteland. The only solution for the survivors to keep breathing is to wear masks to filter the air. The two protagonists are shown to constantly suffer just to keep breathing. The father, most notably, has developed a chronic cough possibly caused by the toxic ash in the air.

Overall, McCarthy presents a terribly haunting portrait of the ruined and dead biosphere of post-apocalyptic America due to the overwhelming amounts of ash generated by the nuclear blasts and the blazing fires. The fallout carried by the winds has covered everything, spreading toxicity everywhere and poisoning the natural ecosystem of all living organisms, including flora, fauna and humans. The merciless anthropogenic climate change has brought a tragic end to the world's biosphere, making it extremely hard for the remaining humans to survive. McCarthy, thus, presents a very terrifying picture of what the world could be in the midst of a nuclear winter. He portrays an utterly broken world probably beyond repair as the natural environment, upon which human life is dependent, seems to have no ability of revival.

7. CONCLUSION

This article attempted to explore nuclear winter in Cormac McCarthy's highly acclaimed post-apocalyptic novel *The Road* through an ecocritical lens. The research used evidence from

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the textual clues and hints in the novel that are in line with the TTAPS original nuclear winter theory to prove its main contention. The nuclear winter aspects dealt with in more depth were the perpetual darkness, the extreme cold, death of the biosphere due to toxicity including the natural elements of flora, fauna, soil, water and air.

Recommendations for future research about *The Road* is to explore pertinent critical aspects such as psychological trauma and resilience, environmental and human ethical challenges, pastoral memory and identity. Future studies could also address the effects of nuclear winter on what it means to be human in the dark post-human world of *The Road*.

This research matters significantly given the imminent danger of nuclear war and the ensuing nuclear winter. Because of the ongoing fierce nuclear arms race, the world today faces the existential threat of nuclear annihilation. In *The Road*, McCarthy paints a dire picture of what the aftermath of nuclear war might look like: a horribly dark, cold, lifeless post-human wasteland. Therefore, this novel could be considered as a cautionary tale and an alarm call to eliminate nuclear weapons and curtail anthropogenic climate change.

The novel's horrible nuclear apocalyptic events remind us of what is at stake in the Anthropocene era if the international community keeps down the road of accumulating weapons of mass destruction and neglecting the wellbeing of planet Earth. *The Road* imagines a possible nightmarish future and showcases humanity's worst fears about nuclear war and climate change. In other words, it is a warning that humans may end up in an utterly devastated biosphere, like the one depicted in the novel, wearing face masks and biohazard suits, pushing their belongings in creaking carts in a horribly dark and cold post human world.

It is important to note that the concept of nuclear winter has been based largely on calculations involving a major war between the two superpowers, Russia and the United States. However, Climate scientists claim that even a limited nuclear war between two nuclear-armed countries such as India and Pakistan over the disputed Kashmir region may have devastating effects on the world's climate and living organisms. (Mills et al.,2008; Toon et al., 2008).

So, where do we go from here? Cormac McCarthy's vision of a post-apocalyptic America following a nuclear apocalypse in *The Road* is both chilling and petrifying. It seems that the abolition of nuclear arms is the optimal solution to avoid such a horrible fate. Therefore, people of science and people of art should work together to make people aware of the danger of nuclear war and anthropogenic climate change to propel policymakers to work towards the complete elimination of weapons of mass destruction and ensure the preservation of our beautiful planet Earth.

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