UNIVERSITÀ
DEGLI STUDI
DI PADOVA

Università degli Studi di Padova

Dipartimento di Studi Linguistici e Letterari

Corso di Laurea Triennale Interclasse in

Lingue, Letterature e Mediazione Culturale (LTLLM)

Classe LT-11

Tesina di Laurea

Innovation and Reiteration. Agrobiodiversity in Margaret Atwood's Trilogy: Conservation or Innovation?

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n° matr.2015267/ LTLLM

Anno Accademico 2023/2024

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INTRODUCTION

The scientific community's warnings and the Agenda 2023 for Sustainable Development Goals, subscribed by the international community, impose social and environmental imperatives to make all food systems sustainable. This is a necessity for the possibility of addressing climate, biodiversity loss and nutrition crises. The climate crisis is evidenced by rising temperatures, changes in rainfall patterns and greater frequency of extreme weather events, which are altering the availability, access, use and stability of the entire food system. The global food system is facing a biodiversity crisis as a result of the rapid decline and extinction of species, breeds, strains and varieties. This is leading to food systems that are more vulnerable to outbreaks of pests and diseases, to degradation of soil quality and to instability in crop yields. The loss of biodiversity has been identified as the primary indicator for monitoring environmental degradation. The critical role of biodiversity in agricultural production, food security, nutrition and environmental conservation was first acknowledged by the FAO Commission on Genetic Resources for Food and Agriculture in 1983. This was followed by the global community's commitment to the goals of conserving plant genetic resources, which was formalised by the entry into force of the International Treaty on Plant Genetic Resources for Food and Agriculture[1] in 2004[2]. The *2021 Rome Manifesto: Using Agrobiodiversity to Transform Food Systems* reports that contemporary agricultural practices are a significant contributor to biodiversity loss and proposes agrobiodiversity as a strategic asset for addressing these global challenges[3]. In accordance with the definition provided by the FAO in 2020, agrobiodiversity can be defined as a heterogeneous and rich system, comprising inherent diversity between and within species and within ecosystems[4]. It is important to highlight two key points. Agrobiodiversity forms

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[1] The International Treaty on Plant Genetic Resources for Food and Agriculture. Website: https://www.fao.org/plant-treaty/overview/texts-treaty/en/, accessed 8 February 2024.

[2] Claudia Zaccari, et al. *Lessons Learned from the Second International Agrobiodiversity Congress Adopting Agricultural Biodiversity as a Catalyst for Transformative Global Food Systems*. Elsevier. Amsterdam, The Netherlands. Amsterdam, The Netherlands. 2022 (p. 2).

[3] FAO. *The 2021 Rome Manifesto: Using Agrobiodiversity to Transform Food Systems*. https://static1.squarespace.com/static/60ba6f3c74111c29f5572da2/t/61858fcf0fa6a109fcc0b7d3/1636143057956/Manifesto_brochure_final_v3.pdf, (p.1), accessed 1 January 2024.

[4] FAO. *Biodiversity for Food and Agriculture: The Perspectives of Small-scale Food Providers.* Thematic study for FAO's 2019 Report on the State of the World's Biodiversity for Food and Agriculture. 2020. Quoted in Patrick Mulvany. *Sustaining Agricultural Biodiversity and Heterogeneous Seeds*. In *Food Science,*

the foundation for a vast array of goods and resources that extend well beyond the food system. Agrobiodiversity is not a novelty; it has developed over millennia, "through the interactions and the dynamic management of thousands of species of plants and animals, which evolved in a very wide range of agricultural biodiversity"[5]**.** Four pillars can be identified as constituents of agrobiodiversity strategies: two strategies for conservation, *in situ* and *ex situ*, and two for biofortification, namely evolutionary breeding and genetically modified organisms (GMOs). In a nutshell, in 2011, the Secretariat for the Convention on Biological Diversity has defined e*x situ* conservation as the conservation of species outside their natural habitats; and *in situ* conservation the conservation of ecosystems and natural habitats and the maintenance and recovery of viable populations of species in their natural surroundings[6]. The objective of biofortification strategies is to facilitate the development aspect of genetic modification. This can be achieved through conventional breeding and selective processes, which have been developed since antiquity (e.g., evolutionary plant breeding) or through the introduction of genetic modifications in laboratory settings (genetically modified organisms, or GMOs). Agrobiodiversity plays a pivotal role in the realisation of the Sustainable Development Goals (SDGs) set out in the 2030 Agenda. Its influence can be observed in a number of areas, including its impact on ecosystems, the mitigation of the effects of climate change, the reduction of biodiversity loss and soil erosion[7]. The implementation of the four different strategies highlights that agrobiodiversity marks the interrelationships between people and the environment. This demonstrates that a less anthropocentric approach may be a viable option, contingent upon the adoption of a participatory approach with local and rural communities. These communities possess invaluable cultural and traditional knowledge that can enhance the utilisation of wild, neglected, or underutilised crops, thereby diversifying the global food supply beyond the few intensively farmed crops that have gained significant market penetration. Indeed, corn, wheat, rice and sugar collectively account for 60% of the world's

Technology and Nutrition, Rethinking Food and Agriculture". Woodhead Publishing. Sawston, Cambridge, UK. 2021 (pp. 285-321, p. 285)

[5] *Ibidem*.

[6]Secretariat for the Convention on Biological Diversity. *Convention on Biological Diversity: Text and Annexes*. Secretariat for the Convention on Biological Diversity. Montreal, Canada. 2011 (p.5).

[7] Salvatore Ceccarelli Stefania and Grando. *Evolutionary Plant Breeding, With an Introduction to Participatory Plant Breeding*. Mimesis. Milan, Italy. 2022 (pp. 9-.19).

food production[8] and represent over 66% of global crop output[9]. The international scientific community has emphasised the dramatic benefits of a varied diet, and the need to reduce intensive farming, which has been identified as one of the main drivers of biodiversity loss and soil erosion. There is a lack of consensus among scientists regarding the most effective strategy for long-term sustainability and ecological impact. However, these fields are also reflected in critical studies and provide insights into a discourse on literature.

The relevance of agrobiodiversity, as identified at the scientific level, to address the environmental crises of climate change, biodiversity loss and nutrition crises, intersects with the current debates on the Anthropocene, the relationship between humans and nature, and the search for potential solutions to prevent humanity from continuing on its self-destructive path. The role that literature can and should play in this discourse is becoming increasingly debated. One of the most prominent figures engaged in this debate is the Indian writer Amitav Ghosh. In his *The Great Derangement: Climate Change and the Unthinkable*[10], observes a notable absence of engagement with it in the realm of fiction, particularly in novels and short stories. This study focuses on the subject of agrobiodiversity in the *MaddAddam* trilogy (the *Trilogy*) of the Canadian author Margaret Atwood. The objective of this study is to ascertain whether and how agrobiodiversity has found a place in Atwood's *Trilogy*, and to identify the message she conveyed to the reader. In summary, this study aims to determine the role of agrobiodiversity in the *Trilogy* and to evaluate how the oeuvre replies to the criticism presented by Amitav Ghosh. Indeed, Ghosh's assertion is particularly relevant in the context of agrobiodiversity. The historian Hobsbawm posits that the concept of "invented traditions"[11] can be used as a device to environmental issues, to underpin acts of transformation of the environment and make it understandable, representable and, habitable for human beings[12]. Therefore, if "invented

[8] M. Ehsan, Dulloo. *Maintaining Diversity of Plant Genetic Resources as a Basis for Food Security*. 2019. In Reference Module in Food Science. Encyclopedia of Food Security and Sustainability. Vol. 3: Sustainable Food Systems and Agriculture. Elsevier. Amsterdam, The Netherlands. 2018 (p.58).

[9] *Ibidem*.

[10] Amitav Ghosh. *The Great Derangement: Climate Change and the Unthinkable*. The University of Chicago Press, Chicago, USA. 2016 (pp. 7-8).

[11] Terence Ranger, and Eric J. Hobsbawm. *The Invention of Tradition*. Cambridge University Press, Cambridge, UK. 1983 (Introduction, p. 1).

[12] Sara Protasoni. *L'invenzione della natura.* In *Cinque temi del moderno contemporaneo: Memoria, Natura, Energia, Comunicazione, Catastrofe*. Quodlibet, Macerata, Italy. 2020 (pp. 125-144, p. 126).

traditions" are a way "to inculcate certain values and norm of behaviour by repetition"[13], Amitav Ghosh's condemnation of the absence of fiction on climate change and agrobiodiversity reaches a concerning level, suggesting that the environmental issues are rendered invisible to a vast audience, fostering the notion that they do not exist, that they are not real, and that they are fantasies confined to an imaginary intergalactic world. However, Margaret Atwood's trilogy presents a compelling counterpoint to this argument. Her counter-provocation is proffered not through the genre of science fiction, but through the genre of speculative fiction, which "invents nothing we haven't already invented or started to invent"[14]. The author herself declares the *Trilogy* to belong to this genre, thereby reconsidering the concepts of genre and hierarchies in literature.

The concept of agrobiodiversity emerged in the 1980s, while critical studies of biodiversity and environmental issues only established an identity distinct from other academic disciplines towards the end of the twentieth century and the beginning of the new millennium. Consequently, a bibliography on the specific topic of agrobiodiversity could not be found, as previous studies have focused on three distinct areas: biodiversity, agriculture and the relationship between humans and the natural environment. However, a selection of illustrative examples from the extensive corpus of literature demonstrates the relevance over time of issues surrounding nature, agriculture and agrobiodiversity. It was indeed possible to discern a common thread between several of the dichotomies that define the Anthropocene, including the relationship between humans and nature, humans and (bio)diversity, and the role of agriculture and agrobiodiversity. The critical studies of the last century can be summarised in two main movements: ecocriticism and environmentalism. These two approaches represent distinct yet interrelated aspects of the utilisation of nature and diversity within critical studies, encompassing a multitude of sociological, cultural and literary perspectives. The field of ecocriticism is concerned with the examination of a range of interrelated themes, including ecology, ecosystems, landscapes and biodiversity. The environmental movement is an effort to safeguard the natural environment on the grounds of its intrinsic value. The perspective of ecocriticism

[13] Terence Ranger, and Eric J. Hobsbawm. *The Invention of Tradition*. Cambridge University Press, Cambridge, UK. 1983 (Introduction, p. 1).

[14] Margaret Atwood. *Perfect Storm: Writing Oryx and Crake*. In *Book of the month club/Bookspan* by Margaret Atwood. O.W. Toad Ldt 2003 (p. 284).

is grounded in the biblical tradition, which places human beings in the role of "*vice dei*"[15], as Francis Bacon has observed. This implies that humankind is the absolute master of nature and can use (or abuse) it according to its needs. In contrast, the environmentalist view posits that humans and all other creatures are subject to the laws of necessity and the unpredictability of chance[16]. In *Literature-and-Environment Studies and the Influence of the Environmental Justice Movement*[17] (2010), Joni Adamson identifies the challenging discourse not only between humans and nature, but also between humans themselves. The pivotal point of the ecocritical debate is a fundamental choice of priorities: whether the priority should be on saving the ecosystem and endangered species, or on saving humanity. This opposition between nature and humankind is based on the premise of anthropocentrism, which posits humankind as the ultimate purpose of the universe and all entities within it as being for its exclusive benefit. Two of the most prominent scholars in the field of literary environmental studies, Leo Marx and Lawrence Buell, have engaged in a sustained dialogue over the years. In *The Machine in the Garden* (1964), Leo Marx "urged readers to rethink categories of the pastoral, and the relationships between literature and the natural world"[18], while Buell's work, *The Environmental Imagination*[19] (mid-1990s), was instrumental in mapping a literary movement concerned with environmental crisis, which came to be known as ecocriticism[20]. Furthermore, he supported efforts to restore the concept of 'nature for its own sake', which had been marginalised by the anthropocentric hypothesis. It is worthy of note that in 2002 FAO stated that "beyond species diversity *per se*, […] agricultural biodiversity also includes biocultural and spiritual elements"[21]. In 2003, Buell advanced the argument that the celebration of 'nature for its own sake' serves

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15 Francis Bacon. *Essays or Counsels, Civil and Moral* (1625). Delphi Classics. East Sussex, UK. eBook. 2017 (Of Empire, p. 8).

16 Sara Protasoni. *op. cit.*, (pp. 128-129).

17 Joni Adamson. *Literature-and-Environment Studies and the Influence of the Environmental Justice Movement*. In *A Companion to American Literature and Culture.* Wiley-Blackwell. Hoboken, NJ, USA. 2010 (pp. 593-606).

18 *Idem,* (p. 593).

19 Lawrence Buell. *The Environmental Imagination: Thoreau, Nature Writing, and the Formation of American Culture*. Belknap press Harvard University press. Cambridge, MA, USA. 1995.

20 Joni Adamson, *op. cit.,* (p. 594).

21 Patrick Mulvany. *Sustaining Agricultural Biodiversity and Heterogeneous Seeds*. In *Food Science, Technology and Nutrition, Rethinking Food and Agriculture*". Woodhead Publishing. Sawston, Cambridge, UK. 2021 (p. 287).

to reinforce environmental beliefs among readers. Buell's assertion posits the significant function of literature in articulating the issue and in catalysing change by fostering awareness and reconnecting directly to Amitav Ghosh's thought-provoking assertion. The debate has persisted over the years. Already in 1991, the National Environmental Leadership Summit of Colored People proposed a concept of environment that extends beyond the narrow focus of conservation embraced by environmentalists and situated the environmental issue within a social context. Their definition of environment as "the places where we live, work, play, and worship"[22] was embraced by scientists and organisations working on sustainable agriculture and agrobiodiversity. In 2021, Patrick Mulvany provided a summary of the fundamental basis of biodiversity, which he defined as "biodiversity has as a fundamental base the recognition of human diversity, the acceptance that we are different and that every people and each individual has the freedom to think and to be"[23]. It is here that ecocriticism should seek to identify a sustainable compromise in the human-nature relationship, as their perspective complements environmentalism, rather than opposing it. A comparison between environmentalism and ecocriticism reveals that the two perspectives are not irreconcilable and can serve as potential starting points for further discussion. In the *Trilogy*, Margaret Atwood presents a synthesis the two positions. The new perfect humanoid species (the Crakers) are a genetically modified, utopian species created in a laboratory. The Crakers represent the pinnacle of genetic modification of the Gardeners (an environmentally focused religious sect) and are entirely integrated into the natural environment. The environmental perspective is illustrated, with an emphasis on the preservation of nature for its own sake. However, other characters intervene in the *Trilogy*, namely the survivors to the plague (the Waterless Flood) and nature. The few individuals who survived the waterless flood are also Gardeners and their approach towards the environment is more utilitarian and focused on *ex situ* conservation, seed conservation and seed storage, which reflects ecocritical theories. Two further aspects are pertinent to this analysis. Firstly, the notion of appeal to the natural world and the desire to live in harmony with a hostile environment are absent from the survivors' perspective, given that nature is portrayed as a resilient entity that is indifferent to the survival of human beings as individuals and as a community. Secondly, survivors engage in interbreeding with Crakers.

[22] Joni Adamson, *op. cit.,* (p. 595).

[23] Patrick Mulvany, *op. cit.,* (p. 288).

The resilience of nature and the crossbreeding of survivors with Crakers serve to catalyse the opposition between environmentalism and ecocriticism, forming a third category that continues the human race in some capacity. At the end of the *Trilogy*, the description of landscape evokes a sense of tranquillity and fertility, in contrast to the devastation wrought by the plague. However, the description is not entirely idyllic, as it acknowledges the persistence of challenges and difficulties. The landscape has shifted from the post-apocalyptic and the eco-dystopic one, but it retains a quality of weirdness and strangeness. It is not a romantic countryside; rather, it is an ustopian reality where the potential for the extraordinary and the unpredictable remains.

According to the *Cambridge Dictionary* nature is the whole of "plants, creatures, and things that exist in the world that are not made by people"[24]. In other words, the human beings are part of a total system of living beings, but the results of their works are not. This definition has its roots in the Bible, which places human beings both within and above creation. This interpretation, which originated in the so-called 'Old Continent' and subsequently spread globally, offers insights into the schizophrenic relationship between humanity and the natural world. In the relationship between humans and nature, there is a long-lasting, persistent actor that recurs in the historical findings and in the Trilogy: the garden. The discourse has its roots in the Bible, traverses the domain of non-fiction, from the development of ancient herbaria, and returns to reflect on the ecocritical vision of the 20th century and its representation in Atwood's work. The scientific relationship between humans and nature can be traced back to early Greek philosophical studies and to the earliest herbaria of Theophrastus in 300 BC[25] . This illustrates the evolution of the discourse on biodiversity over the centuries. The establishment of experimental science and the discovery of new species in other geographical areas of the planet led to the creation of botanical gardens as collections of exotic species[26], which subsequently evolved into parks designed to acclimatise exotic and ornamental species in the 18th century. Nowadays, botanical gardens play an instrumental role worldwide in reforestation initiatives, through the creation of tree nurseries, in *ex situ* conservation, in evolutionary breeding and in the

[24] *Cambridge Dictionary*. Website: https://dictionary.cambridge.org/dictionary/english-italian/nature, accessed 17 March 2024.

[25] Maria Adele Signorini. *Piante e fiori essiccati, tra antiche leggende e erbari scientifici*. In *Atti 1996* (VII, XLIII). Accademia dei Georgofili. Firenze, Italy. 1996 (pp. 339-341; p. 340)

[26] Sara Protasoni. *op. cit.,* (p. 128).

conservation of endangered species. In Western culture, however, there is a dialectical vision of nature that forms the basis of contemporary environmentalism and ecocriticism. The relationship between humanity and nature has become increasingly anthropocentric, with the justification of biblical interpretation and the persistent image of the first garden. Eden represents a place of absolute otherness compared to the earthly state; it is a distant, inaccessible place where all creatures live in perfect harmony, the object of eternal regret[27]. In the *Trilogy,* the Gardeners have identified agricultural activities as the primary means of achieving global and human salvation. They identify the rooftop garden as a strategy for safeguarding humanity. The "Edencliff Rooftop Garden" project is designed to emulate the Garden of Eden, with its bountiful fruits and the hopes for a reconciliation with the Creator God. However, this garden does not fall within the categories of a botanical garden, a home garden, or a vegetable garden. Rather, it brings together elements of home gardening techniques to create a vegetable garden that resembles as much as possible the Garden of Eden. This is achieved through the implementation of strategies that include conservation (both *in situ* and *ex situ*) and evolutionary breeding.

The relationship between humans and nature also marks the concept of otherness, which encompasses a broad spectrum and has undergone a significant critique and revision in the second half of the 20th century. This shift has seen the concept of otherness evolve into the concept of identities. In 2004, Rosi Braidotti provided a summary of the concept of otherness as a model imposed by the 'Old Continent', where ideals are defined in terms of both dialectical otherness and categorical otherness[28]. Furthermore, she noted that the others were "pathologized and cast on the other side of normality"[29]. The revised approach is exemplified by *Other/Otherness* (2020), by Jean-François Staszak, who proposes the rejection of the dichotomy on which the process of othering is based and the promotion of alternative identities. This approach can be applied to the analysis of Canadian literature in relation to the relationship between humans and nature. Over the centuries, there has been considerable diversity in the ways in which nature has been approached, with numerous contradictory views on its name and attributes being expressed in literary works. Nature

27 *Idem*, (p. 130).

28 Rosi Braidotti. Animals, Anomalies, and Inorganic Others. In *PMLA*, vol. 124, no. 2 (p. 526–532). PMLA, New York, USA. 2004 (p. 526).

29 *Ibidem.*

has been variously conceptualised as a source of life in the Garden of Eden or a destructive force in the context of Noah's flood[30]; as a nurturing 'mother' or an indifferent 'stepmother'; as a refuge from the chaos of urban life or as a wasteland. In the works of more recent authors, nature assumes an eco-dystopic apocalyptic aspect, depicted as an otherworldly entity, a nature that transcends the boundaries of human understanding, evoking a sense of both awe and terror. This concept of multiplicity offers an analytical framework for the distinctive response to nature in Anglo-Canadian literature which descends from the experiences of early European settlers upon their arrival in the northern lands of the American continent. In that context, the settlers had to contend with a new sense of emptiness, void and powerlessness in the face of local natural environment. As Margaret Atwood has observed, "the central symbol for Canada […] is undoubtedly survival"[31], since surviving for the early explorers and colonists was not granted due to the inhospitable land, severe and prolonged cold, wilderness and hostile natives. The relationship between humans and nature in Canada is characterised by a duality of influence: on the one hand, nature is perceived as a welcoming and nurturing force, while on the other, it is seen as a restrictive and confining element. This complex interplay between humans and nature has been a prominent theme in Canadian literature, where the struggle to survive in the face of a challenging natural environment has been a recurring motif. However, this struggle has often resulted in a futile outcome. Upon attaining a degree of dominance over nature, humans have proceeded to exploit its resources. The struggle proved a failure, since "man [is] more destructive towards Nature than Nature can be towards man"[32]. The narrative of the *Trilogy* is conveyed through a polyphonic array of voices that coalesce into a unified chorus in the concluding pages. In her work, Margaret Atwood allows the various characters to present their relationship with the otherness in a constant dual opposition that ranges from the interactions between humans and humans, humans and non-humans, the past and the present, and the real and the fake. The narrative is gradually reconstructed by a narrator whose identity is revealed only in the final pages of the third volume. This

[30] *The New American Bible*. United States Conference of Catholic Bishops. USA. 2002 (Gen 6, 6-22). https://www.vatican.va/archive/ENG0839/__P3.HTM, accessed 8 February 2024.

[31] Margaret Atwood, *Selections from Survival: a Thematic Guide to Canadian Literature.* (1972) In *Greening the Maple. Canadian Ecocriticism in Context*. University of Calgary Press, Calgary, Alberta. 2013 (p. 16)

[32] Margaret Atwood, *Selections from Survival: a Thematic Guide to Canadian Literature*. o*p. cit.*, (p. 29).

reconstruction encompasses individual identities and alternative identities derived from hybridisation.

The author's emphasis on the decline of agricultural biodiversity and, more generally, on biodiversity loss is a pervasive theme throughout the *Trilogy*. This is evidenced by the numerous references to these issues that are woven through the narrative and embedded in the everyday lives of the characters. The *Trilogy*'s narrative is permeated with descriptions of food, food security and food safety, reflecting its alignment with the imperative of Agenda 2030.

Chapter 1 AGROBIODIVERSITY: LEARNING FROM THE PAST AS A PATHWAY TO THE FUTURE

"Agrobiodiversity for Dummies" might have been a more appropriate title for this chapter. Its aim is to break down the very complex topic of agrobiodiversity, provide a systematic, summarising overview and develop some useful tools for analysing Margaret Atwood's *MaddAddam* trilogy (here now the *Trilogy*), rather than delve into genetic concepts or speculate on the scientific literature. For this reason, I will examine only a few aspects of agrobiodiversity. The chapter compares opposing positions in the scientific literature on the topic and clarifies some notorious misunderstandings and biases.

The *2021 Rome Manifesto: Using Agrobiodiversity to Transform Food Systems* (hereafter *2021 Rome Manifesto*), issued during the 2nd International Agrobiodiversity Congress, reads:

> The food we eat and the way we produce, source, handle, and process it, impact both environmental and human health. Current agricultural practices […] are a major driver of biodiversity loss. Our food systems are also failing to provide the nutrients we need. In 2020, nearly 2.37 billion people did not have access to adequate food […]. To tackle these global challenges, we have an underused strategic asset in our toolbox – agrobiodiversity[33].

Based on the concept that "actions taken or not taken in the coming decades will determine how many species and natural areas will continue to survive"[34], the key role of plant genetic resources (PGR) in the development of sustainable agriculture is outlined and examined by comparing strategies of evolutionary breeding and conservation with those promoted by the use of genetically modified organisms (GMOs), whose large-scale introduction is still under debate.

This section will explore the role that agrobiodiversity plays in achieving the Sustainable Development Goals proposed by the 2030 Agenda, its impact on ecosystems,

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[33] FAO. *The 2021 Rome Manifesto: Using Agrobiodiversity to Transform Food Systems*. https://static1.squarespace.com/static/60ba6f3c74111c29f5572da2/t/61858fcf0fa6a109fcc0b7d3/1636143057956/Manifesto_brochure_final_v3.pdf, (p. 1), accessed 1 January 2024.

[34] John W. Wilson and Richard B. Primack, *Conservation Biology in Sub-Saharan Africa* Open Book Publishers. Cambridge, UK. 2019 (p 3).

and its involvement in mitigating the effects of climate change, including but not limited to biodiversity loss and soil erosion.

1.1 Agrobiodiversity. A novelty from the past

'Biodiversity' is a relatively new and somewhat overused term. It was first used by Walter G. Rosen in 1986 as a contraction of 'biological diversity' during the National Forum on Biodiversity (USA). Although the use of acronyms and contractions can be traced back to the ancient languages, there has been a marked increase in their use in the second half of the 20th century, when their use was no longer confined to scientific or technical writing, in response to editorial needs for space and to facilitate narrative description. Acronyms and contractions have found widespread use in the neologisms of the environmental movement and a broad consensus in advertising and marketing. To date, prefixes such as 'bio' and 'eco' seem to intensify, reinforce or validate meaning, promoting organic, bio, eco products as synonymous with natural, clean and perfect. Quality and healthiness seem to be guaranteed by the use of these prefixes. Likewise, the suffix 'diversity' has a persuasive power, a kind of pennant, a banner, for gender equality, a talisman against social injustice. Thus, the combination of these two words has developed a leading role for justice and health. Biodiversity is the most effective and efficient brand since the Age of Enlightenment when 'enlightened' was an adjective synonymous with progress.

Beyond the easy misappropriation and the rhetorical sarcasm, we should ask ourselves a critical question: what is biological diversity or biodiversity? At the Second International Agrobiodiversity Congress in Rome, Italy, in 2021, the Intergovernmental Panel on Climate Change[35] demonstrated that climate change is affecting food security. Rising temperatures, changes in rainfall patterns and the greater frequency of extreme weather events are altering the availability, access, use and stability of the entire food system. In addition, biodiversity is threatened with rapid decline and extinction as the global food system relies on a shrinking list of species, breeds, strains and varieties. This

[35] The Intergovernmental Panel on Climate Change (IPCC) is an intergovernmental body of the United Nations created in 1988. Its job is to advance scientific knowledge about climate change caused by human activities. Website: https://www.ipcc.ch, accessed 8 February 2024.

results in food systems that are more vulnerable to outbreaks of pests and diseases, to degradation of soil quality, and to instability in crop yields. The critical role of biodiversity in agricultural production, food security, nutrition and environmental conservation was recognised by the FAO Commission on Genetic Resources for Food and Agriculture in 1983. The global community's commitment to the goals of conserving plant genetic resources was marked by the entry into force of the International Treaty on Plant Genetic Resources for Food and Agriculture[36] in 2004[37]. The Convention on Biological Diversity (CBD) definition in the 2011 Protocol:

> "Biological diversity" means the variability among living organisms from all sources including, inter alia, terrestrial, marine and other aquatic ecosystems and the ecological complexes of which they are part; this includes diversity within species, between species and of ecosystems[38].

This extends and consolidates earlier attempts by the scientific the community, such as that mentioned in *The Cambridge Companion to the Philosophy of Biology,* which was more synthetic, even though more precise in its definition of communities:

> Biological diversity […] describes the amazing range of species, genetic diversity within each species, and the multitude of Earth's complex biological communities with their associated ecosystem processes[39].

[36] The International Treaty on Plant Genetic Resources for Food and Agriculture, was signed in 2001 in Madrid, and entered into force on 29 June 2004. It is an international agreement that complies with the Convention on Biological Diversity and aims at guaranteeing food security through the conservation, exchange and sustainable use of the world's plant genetic resources for food and agriculture (PGRFA), the fair and equitable benefit sharing arising from its use, as well as the recognition of farmers' rights. Website: https://www.fao.org/plant-treaty/overview/texts-treaty/en/, accessed 8 February 2024.

[37] Claudia Zaccari, et al. *Lessons Learned from the Second International Agrobiodiversity Congress Adopting Agricultural Biodiversity as a Catalyst for Transformative Global Food Systems*. Elsevier. Amsterdam, The Netherlands. Amsterdam, The Netherlands. 2022 (p. 2).

[38] Secretariat for the Convention on Biological Diversity. *Convention on Biological Diversity: Text and Annexes*. Secretariat for the Convention on Biological Diversity. Montreal, Canada. 2011 (p. 4)

[39] John W. Wilson and Richard B. Primack, *op. cit.,* (p. 2).

The *2021 Rome Manifesto* adopted at the Second International Agrobiodiversity Congress calls for "Using and conserving agrobiodiversity to deliver on the 2030 Agenda for Sustainable Development"[40].

Public interest in biodiversity conservation has grown exponentially in recent decades, for scientists, governments and international agencies have become more aware of the problem of biodiversity and habitat loss, which is accelerating around the world due to changes in the use of land, unsustainable agriculture, pollution and invasive alien species. Human population growth has been identified as the main driver of most current species extinctions[41]. Indeed, whilst in 1850 the population on Earth counted around 1 billion people, by 2017 the number had surpassed 7.5 billion[42]. The exponentially increasing human population, coupled with the increment of consumptive needs[43], and associated with human activities that are altering and destroying ecological communities is considered one of the major factors for biodiversity losses. The thread that "thousands of species and millions of populations will likely go extinct"[44] has been a recurrent refrain for decades. The supportive thinking process advocating this theory is sustained by the fact that an increasing number of people will intensify the demand to survive and will produce an exploitation in the use natural resources: from harvesting to using oil, water and wildlife products, up to converting natural ecosystems for agriculture, cities, roads, and industrial activities. Therefore, the raise in human population reflects in a spike in human activities that reduce natural habitats and their associated wildlife populations. In addition, the consumption of resources also increases as countries develop and industrialise[45]. For conservation biologists and eco-activists this creates an incredibly discouraging scenario with a widespread extinction of species and destruction of natural ecosystems, which is even more alarming when we look at regions on the planet that have rich and spectacular wildlife, but are also going through significant socio-economic

[40] FAO. *The 2021 Rome Manifesto: op. cit.,* (p. 4).

[41] John W. Wilson and Richard B. Primack, *op. cit.,* (p. 2).

[42] *Ibidem*.

[43] *Ibidem*.

[44] *Idem*, (p. 3).

[45] *Idem*, (pp. 2-3).

challenges, amongst with the rapidly increasing demography, the persistent poverty, the weak governance structures, the dependence on natural resources.

The described concepts are introducing, shaping and narrowing the more specific area of biodiversity that is linked to agriculture, namely. agricultural biodiversity. The term 'agricultural biodiversity' has appeared in the literature only in the middle of the 1980s[46]; followed by its contraction 'agrobiodiversity'. What is missing from the consideration mentioned above is that agriculture, whilst it is an anthropogenic activity, it is also itself part of the diversity, of the biodiversity, that is being lost. These positions are highly anthropocentric, and they put the responsibility of the loss to agro-systems and the burden for a solution on the human beings, demanding for an immediate solution at the pace of the loss, neglecting that research and implementing findings will take time. It is pertinent to question whether it is logical to maintain a dichotomy between human beings and human activities, and the rest of the so-called 'nature', 'non-human', or other labels that may be used. Chapter 2 will examine this concept through the lens of both ecocritical positions and those of their opponents. However, this discussion will start in the following paragraphs, where the debate within the scientific for a will be explored. This will include an investigation of the diverse range of potential answers, perspectives and approaches that have been proposed.

As previously stated, the term 'agrobiodiversity' results as a contraction for 'biological diversity in agriculture'. However, this lexical definition does not explain what agrobiodiversity is and to what extent its implication is considered relevant and matches with the *Agenda 2023 for Sustainable Development Goals* subscribed by the international community. In 2020, the Food and Agriculture Organization (FAO) of the United Nations provided the following definition of agrobiodiversity:

> The way in which peasants and other small-scale food providers interact with other living beings, and the ecosystem and environment in which they live, are the root of how they perceive, use and dynamically manage biodiversity[47].

[46] Devra Ivy Jarvis, et al. *Crop Genetic Diversity in the Field and on the Farm: Principles and Applications in Research Practices*. Yale University Press. New Haven, CO, USA. 2016 (p. 37).

[47] FAO. *Biodiversity for Food and Agriculture: The Perspectives of Small-scale Food Providers.* Thematic study for FAO's 2019 Report on the State of the World's Biodiversity for Food and Agriculture. 2020. Quoted in Patrick Mulvany. *Sustaining Agricultural Biodiversity and Heterogeneous Seeds*. In *Food*

Therefore, agrobiodiversity is very heterogeneous and rich, inherent diversity both between and within species and in the ecosystems, vital subset of biodiversity that includes the seeds, breeds, and ecosystems[48]. Within this framework, we can extract two considerations. Agrobiodiversity underpins a broad range of goods that is not limited to the food system feeding human beings; it expands to many other areas such as providing fibres to the textile industry, supplying pharmaceuticals, producing fuel, supplementing building materials, and many other activities. The second consideration stresses how agrobiodiversity is not a novelty, born in recent years; it does not belong to the new millennium, neither to the last century, nor to the modern age. It has developed over millennia, "through the interactions and the dynamic management of thousands of species of plants and animals, which evolved in a very wide range of agricultural biodiversity"[49]**.** Indeed, as the following paragraphs will explore, agrobiodiversity was subject to activities called *in situ* conservation and evolutionary breeding, to enhance products and productivity and adapt to the needs of local communities; or to activities such as *ex situ* conservation (voluntary or involuntary) through the spread and exchange of seeds, plants and knowledge between communities, countries and continents. The colonization and migration over the past 500 years accelerated the dissemination of agricultural biodiversity and the *ex situ* conservation.

The *Agenda 2023 for Sustainable Development Goals*, subscribed by the international community, in concertation with the scientific community's warnings impose social and environmental imperatives to make all food systems sustainable, on which depends the possibility of addressing climate, biodiversity loss and nutrition crises. It is worth at this point introducing the definition for 'sustainable use' promoted by the *CBD Protocol* in 2011 for biological diversity:

> "Sustainable use" means the use of components of biological diversity in a way and at a rate that does not lead to the long-term decline of biological diversity,

Science, Technology and Nutrition, Rethinking Food and Agriculture". Woodhead Publishing. Sawston, Cambridge, UK. 2021 (pp. 285-321, p. 285)

[48] *Ibidem*.

[49] *Ibidem*.

> thereby maintaining its potential to meet the needs and aspirations of present and future generations[50].

This definition conveys the insidious idea that biodiversity and its management, and consequently also agrobiodiversity, are a novelty in the 21st century. However, I have demonstrated that the agrobiodiversity is broad in origin and spread globally, has evolved with human communities over millennia, and involves the diversity of all living organisms within agroecosystems. In terms of sustainability, Patrick Mulvany[51] identifies the private seed industry as one of the major and complex threat to agricultural biodiversity, since it promotes and favours the use of some crops at the expense of others, increasing the spread of monocultures, and the erosion of both soil and diversity; in agreement with other scientists, he identifies a long-term sustainable approach in defending and promoting seed diversity, promoting that high levels of agricultural biodiversity in all production systems be restored as a fundamental value of responsible food systems.

Agrobiodiversity management connects anthropocentric activities to ecosystems and to the with the overall biodiversity, as mentioned in 1998 by FAO:

> Agricultural biodiversity encompasses the variety and variability of animals, plants and micro-organisms which are necessary to sustain key functions of the agro-ecosystem, its structure and processes for, and in support of, food production and food security[52].

Therefore, "food systems depend on biodiversity; and [the way] this biodiversity is […] managed determines the security of future food supplies and the sustainability of ecosystems"[53]. Agrobiodiversity does not only include a variety of animals, plants, and microorganisms, including crops, livestock, forestry, and fisheries, that are used for food and other human activities, but also the vast diversity of other species that interact in favour or against the production, namely soil and water microorganisms, predators,

[50] Secretariat for the Convention on Biological Diversity, *op. cit.,* (p. 4)

[51] Patrick Mulvany, *op. cit.*, (p 306).

[52] *Idem,* (p 286).

[53] Patrick Mulvany, *op. cit.,* (p. 286).

pollinators, and many other agents; the connection between the agroecosystems and the ecosystem is so strong that the diversity of the agroecosystems impacts directly on the overall ecosystem. The following paragraphs will expand how most of the agrobiodiversity has evolved over the past millennia through the direct intervention of the human being in nurturing and domesticating of crop varieties and breeds of "wild" species. Agrobiodiversity is for its nature heterogeneous and, as FAO has remarked in the assessment of the *State of the World Biodiversity for Food and Agriculture*[54], it is not possible to define its boundaries, not to delimitate its area of intervention and impact. It goes beyond the sole production system which sustains human activities, as it also involves cultural and spiritual aspects of local communities that cannot be neglected as they represent the millennial relationship of the human beings with the Planet, the dependence of the first to the second. The Convention on Biological Diversity in its early years recognized "the special nature of agricultural biodiversity, its distinctive features, and problems needing distinctive solutions"[55]. Conservation and development measures for agrobiodiversity differ from those governing the preservation of wider biodiversity (e.g. Protected Areas). These measures recognize the key role of people in sustaining and managing agricultural biodiversity, and the crucial one played by indigenous populations, local knowledge, and cultures without whom many components of agricultural biodiversity, such as the diversity of the seeds of food crops, would not exist[56].

1.2 Conservative strategies: *in situ* and *ex situ* conservation

Some of the challenges that agriculture and food production are facing with have been identified and can be summarized in biodiversity loss, climate change, land and environmental degradation, malnutrition. These challenges are not a novelty, but the scale at which they are threatening the Earth System is new. In 2009, a group of scientists led by Rockström[57] identified nine planetary boundaries that determine a global sustainability

[54] FAO. Biodiversity for Food and Agriculture: The Perspectives of Small-scale Food Providers. Thematic study for FAO's 2019 Report on the State of the World's Biodiversity for Food and Agriculture. 2020.

[55] *Convention on Biological Diversity*, 1994.

[56] Patrick Mulvany, *op. cit.,* (p. 288).

[57] Salvatore Ceccarelli Stefania and Grando. *Evolutionary Plant Breeding, With an Introduction to Participatory Plant Breeding*. Mimesis. Milan, Italy. 2022 (p. 11)

framework within which human activities should stay to respect the functioning of the Earth System. According to these authors, we have already crossed three of them: climate change, rate of biodiversity loss, and changes to the global nitrogen cycle. Since species play important roles on ecosystems' functioning and their genetic diversity helps resilience, crossing the planetary boundary of the rate of biodiversity loss indicates that finding solutions has become crucial[58]. The *Rome Manifesto 2021* recognised that:

> [Agrobiodiversity] is a tool that farmers, Indigenous Peoples, and local communities can use to boost livelihoods, reduce risk, and make our food systems more sustainable, equitable, and resilient[59].

The issue of biodiversity loss has given rise to the scientific field of conservation biology, which is dedicated to ensuring the long-term preservation of biodiversity. Notably, conservation biology can be dated as a distinct scientific field in the 1970s, well before the identification of the nine planetary boundaries: it is however in the 1980s that it emerged as a distinct interdisciplinary research area with its central aim the protection of biodiversity[60]. It integrates multidisciplinary subjects and has developed in response to the challenge of preserving populations, species, ecosystems, and biological interactions. Three goals have been set up to this scope: to document Earth's biological diversity with global assessment projects (the State of the World projects promoted by FAO and other agencies at the United Nations); to investigate the influence and impact of human activities on species, evolution, and ecosystem processes; to promote practical approaches to protect and restore biological communities, maintain genetic diversity, and prevent the extinction of species. For the purpose of this study, the focus will be on the third goal, which makes conservation biology a discipline that incorporates human values, rather than addressing the typical scientific research investigations of the first two goals. The following sessions will examine the relationship between conservation biology and environmentalism. Environmentalism is the movement that aims to protect the natural

[58] M. Ehsan, Dulloo. *Maintaining Diversity of Plant Genetic Resources as a Basis for Food Security*. 2019. In Reference Module in Food Science. Encyclopedia of Food Security and Sustainability. Vol. 3: Sustainable Food Systems and Agriculture. Elsevier. Amsterdam, The Netherlands. 2018 (pp. 56-63, p. 56).

[59] FAO. *The 2021 Rome Manifesto, op. cit.,* (p. 4).

[60] Sahotra Sarkar. *From Ecological Diversity to Biodiversity*. In *The Cambridge Companion to the Philosophy of Biology*. Cambridge University Press. Cambridge, UK. 2007 (pp 388-409).

environment for its intrinsic value. This relationship will be discussed in the context of the Trilogy, where conservation biology is a key theme.

The discipline that mostly relates to this study and focuses on preventing the extinction of species is Plant Genetic Resources (PGR), which plays an important role to ensure secure food to humanity in a sustainable way. There is the need to abandon the romanticised idea that humans have been living in harmony with nature since they were wandering in Eden; a strategic balance is required and must be found. The conservative approach of PGR developed in response to the challenge of preserving populations, species, ecosystems, and biological interactions. In 1988 the *United Nations Environment Programme* (UNEP) recognised that "the Earth's biological resources are vital to humanity's economic and social development.", and that "biological diversity is a global asset of tremendous value to present and future generations"[61]. To address the world commitment to sustainable development, UNEP convened an *ad hoc* working group of experts on biological diversity, which developed into the already mentioned Convention on Biological Diversity (CBD). In 2011 the CBD Protocol highlights the "a dramatic step forward in the conservation of biological diversity, the sustainable use of its components, and the fair and equitable sharing of benefits arising from the use of genetic resources"[62]. This brief historical overview shows once again that we are not addressing a novelty, since PGR "have been the foundation for the development agriculture ever since it started 10,000 years ago"[63]. Local and indigenous communities have separated locally adapted plants, domesticated them through selection and developed the progeny of crops which nowadays are securing food all over the world. The Russian breeder Nicolai Vavilov is considered father of PGR; his scientific studies on genetic variation of crop plants in the first half of the 20th century, together with those conducted by another eminent plant explorer, Jack Harlan, led to scientific efforts to conserve plant genetic diversity. Their

[61] Secretariat for the Convention on Biological Diversity, *op. cit.,* (p. 1).

[62] "[…] the United Nations Environment Programme (UNEP) convened the Ad Hoc Working Group of Experts on Biological Diversity in November 1988 to explore the need for an international convention on biological diversity. Soon after, in May 1989, it established the Ad Hoc Working Group of Technical and Legal Experts to prepare an international legal instrument for the conservation and sustainable use of biological diversity. The experts were to take into account "the need to share costs and benefits between developed and developing countries" as well as "ways and means to support innovation by local people." *Ibidem*.

[63] M. Ehsan Dulloo, *op. cit.,* (p. 54).

results had indeed underlined the value to crop improvement and breeding, the not evenly distribution of diversity across the world, the identification of diversity-rich areas, the genetic erosion of the traditional crop varieties as a consequence of modern varieties less improved[64]. In the years that followed, the international scientific community under the promoted action of FAO explored how to define a global strategy for the conservation of PGR. Based on the overall knowledge acquired through centuries in agriculture, some conservation strategies have been identified for the conservation of genetic diversity: *ex situ*, *in situ* and on-farm conservation. For the purpose of this study, we will consider on farm conservation as part of the *in situ* strategies; while the selection agents that shape the diversity in natural habitats and on farm are different, this distinction goes far beyond the aim of this chapter. The major discussion in the second half of the century revolved around which strategy to adopt, whether *ex situ* conservation in storage facilities or *in situ,* where PGR evolved their distinctive characteristics. *Ex situ* and *in situ* conservation strategic approaches focus on the protection of species outside their natural habitats or in their natural surroundings, respectively. The Article 2 of CBD clarifies these two strategies with their definition and the specification of the respective aims:

> *Ex situ* conservation means the conservation of components of biological diversity outside their natural habitats. […]
> *In situ* conservation means the conservation of ecosystems and natural habitats and the maintenance and recovery of viable populations of species in their natural surroundings and, in the case of domesticates or cultivated species, in the surroundings where they have developed their distinctive properties[65].

Despite *ex situ* conservation has been chosen as the dominant strategy, *in situ* conservation has also been recognized as needed and complementary to ensure the conservation of the wild relatives of crop species in their natural environment. This has also been reiterated by the proposed core actions of the *Rome Manifesto 2021*, in which agrobiodiversity conservation is realized by expanding and supporting *ex situ, in situ* and

[64] *Ibidem*.

[65] Secretariat for the Convention on Biological Diversity, *op. cit.,* (p. 5).

on-farm conservation efforts to give "people the options they need to sustainably and inclusively transform food systems and improve lives, both now and in the future"[66].
It is important to emphasise that conservation is not a passive strategy whereby genetic material or seeds are stored and perhaps cultivated for the sole purpose of ensuring that this material survives for future use; nor a 'library' of seeds and genetic material. Conservation strategies promote the use of the material to conserve, and in terms of local development, the *post ante* evaluation of development funded projects has revealed that

> opening and maintaining more community seedbanks, particularly in remote rural locations, would help to strengthen links between *in situ* and *ex situ* collections and increase the number of seeds, cultivated plants, […]and their related wild species held in collections[67].

Ex situ conservation strategy is based on collections that provide backup of the genetic diversity for crops that have been identified we depend on to secure our future food. The high value of genetic material lies in the opportunity provide by each sample to possibly hold the key to solve current or future challenges like drought resilience, or a novel pest or disease. Hence, it is crucial to include also under-represented species and varieties, like crop wild relatives and ensure that Indigenous Peoples, farmers, breeders, and researchers can access the genetic diversity they need at the right time. Historically this method allowed for a relatively easy access to the materials conserved in the *ex situ* facilities (e.g. seed banks) or genebanks[68]. *In situ* conservation promotes agrobiodiversity activities that preserve crop wild relatives; it is linked to local food production systems that host a rich array of genetic diversity including traditional species and varieties that currently have no market value, but evolve with local environment, and adapt to environmental conditions. Since this agrobiodiversity is often maintained for home consumption or cultural reasons, it is essential to value the role of farmers and indigenous peoples in providing a crucial conservation service[69].

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[66] FAO. *The 2021 Rome Manifesto, op. cit.,* (p. 3).

[67] FAO. *The 2021 Rome Manifesto, op cit.,* (p. 10).

[68] *Ibidem.*

[69] *Ibidem.*

In addition to the historical development and definitions, it is interesting to understand the crucial role played by PGRs in addressing biodiversity loss, climate change and land degradation. There are about 70,000 known edible plant species worldwide. However, just four crops (corn, wheat, rice and sugar) provide 60 percent of the world's food[70] and represent over 66 percent of global crop production[71]. This means that we are neglecting thousands of nutritious crops and relying on a narrow portfolio of common, high-yielding plants that displacing rich agrobiodiversity from food systems[72]. Yet the other, less well-known crops form the basis of food security at regional and local levels and play an important role in food security, nutrition, health, income generation and cultural practices. These crops are called "Neglected and Underutilised Species" (NUS) because "they have been neglected by science and have not been the subject of breeding programmes"[73]. To contribute to the *2030 Agenda for Sustainable Development*, the use of agrobiodiversity must be strengthened. The role of NUS and traditional foods should be enhanced and revitalised, focusing on their ancient links to territories, local climates and cultures. We must conserve agrobiodiversity, that is, "protect the indigenous peoples and cultures that create and maintain diversity through biocultural interactions", if we are to provide a food-secure perspective for future generations[74].

The *Rome Manifesto 2021* stresses the urgent need to conserve agrobiodiversity and "provide options [for the sustainable and inclusive transformation of] food systems and the improvement [of livelihoods]" in order to address global challenges[75].

> Agrobiodiversity is a critical component of crop […] production systems worldwide. It is used in time-tested practices that increase production and resilience on farms […] and in landscapes. It contributes to healthy ecosystems, underpins nature-positive approaches, and improves livelihoods, […] by reducing yield loss from pest and disease outbreaks, strengthening resilience to climate

[70] M. Ehsan Dulloo, *op. cit.,* (p. 58).

[71] *The 2021 Rome Manifesto, op cit.,* (p. 5).

[72] *Ibidem.*

[73] M. Ehsan Dulloo, *op. cit.,* (p. 56).

[74] FAO. *The 2021 Rome Manifesto, op. cit.,* (p. 4).

[75] *Idem,* (p. 3).

> change, halting and reversing biodiversity loss, and diversifying income opportunities[76].

The understanding that agrobiodiversity is a critical component of sustainable food systems is underpinned by the strong imperative to find strategies that conserve, maintain, and enhance ecosystem biodiversity on the one hand, and secure future food supplies on the other. Case studies abound in the scientific literature. For example, "planting different species and varieties of crops together can reduce the damage caused by pests and diseases" and "can increase yields and farmers' incomes"[77]. The international community recommends promoting participatory research methods, where scientists, farmers and indigenous peoples work side by side, to ensure that both scientific and traditional knowledge is shared and used.

1.3 Reiteration and Innovation: Evolutionary Plant Breeding and GMOs

It has been already mentioned how, since the dawn of agriculture, agrobiodiversity has evolved over the past millennia through direct human intervention in the cultivation and domestication of crop varieties and breeds of wild species, using selective breeding. The process of selective breeding, in which organisms with desired traits (and thus with the desired genes) are used to breed the next generation and organisms, is a precursor to the modern concept of genetic modification. Some of the species now used to feed the world have originated earlier. This is the case with perennial species such as walnuts and Brazil nuts. They were established long before human agriculture, were later influenced by it, and are now cultivated through selection and grafting[78]. The selective process results in improved varieties which are used to select and improve agricultural production in terms of quality, productivity, and resistance to external agents. Several techniques such as transgenic and plant breeding, agronomic practices and genome editing are used as strategies for biofortification of crops. For the purposes of this study, these strategies will

[76] *Idem,* (p. 7).

[77] *Idem,* (p. 8).

[78] Patrick Mulvany, *op. cit.,* (p. 286).

be grouped into two main areas: evolutionary breeding and genetically modified organisms (GMOs).

Traditional food systems are cultural systems supported by rich biodiversity that have evolved in specific ecosystems and are intrinsically linked to environmental sustainability. However, they are threatened by socio-cultural and economic changes. Balancing environmental, socio-cultural, political, economic and behavioural perspectives, biofortification strategies could help address food insecurity and malnutrition by focusing on local crops and varieties with culinary and culturally defined attributes, rather than on global products and purely nutritional qualities[79]. Biofortification could thus prove to be a powerful tool to address global nutritional challenges. However, biofortification interventions need to assess their compatibility with dietary diversification and their potential impact on agricultural biodiversity, which is essential for long-term sustainability, and take into account environmental, socio-cultural, political, economic, ethical and biomedical perspectives. Particularly in developing countries, biofortification should focus on plant breeding and improvement of seed quality to enhance palatability, nutrients and agronomic constraints. The use of community-based participatory approaches should be promoted for the identification of local food resources which have nutritional, agronomic and economic benefits for smallholder farmers. Biofortification can be positioned as a sustainable approach to alleviating malnutrition and undernutrition by using agricultural biodiversity to enhance food diversity. Whether based on GMOs or evolutionary breeding, biofortification's success in benefiting the malnourished poor depends primarily on agricultural research, seed supply and consumer education. Rather than focusing on global commodities, efforts should focus on crops where smallholders have an economic advantage. The negative effects of globalisation on dietary diversity and thus on malnutrition can be reduced by supporting traditional food systems and agrobiodiversity[80].

As seen above, in the early decades of the 20th century, the father of the PGR, the Russian breeder Nicolai Vavilov, undertook a very extensive series of investigations on

[79] Timothy Johns and Pablo B. Eyzaguirre. *Biofortification, Biodiversity and Diet: A Search for Complementary Applications against Poverty and Malnutrition*. (2006). In *Food Policy. 32*. Elsevier. Amsterdam, The Netherlands. 2007 (pp. 1–24, pp. 18-19).

[80] Timothy Johns and Pablo B. Eyzaguirre, *op. cit.,* (p. 19).

a wide range of crops. He believed that crop production in Russia (later the USSR) needed to introduce and domesticate new crop diversity in order to develop improved varieties that could adapt to the range of production environments in the country[81]. His research identified the so-called centres of genetic diversity. These were the areas of origin of major crops. Further research also showed that crop diversity was unevenly distributed. He identified the causes of this spread of diversity in the movement of populations over thousands of years, from which secondary centres of diversity developed as a result of domestication[82]. By definition,

> Domestication is the selective process by which human use of plant and animal species leads to morphological and physiological changes that distinguish today's domesticated crops from their wild ancestors and relatives[83].

Domestication has therefore adapted crop species to human cultivation and this process is also called "evolutionary breeding", a selection technique that has evolved over centuries into an independent scientific discipline. Its aim is to select and improve agricultural production in terms of quality, productivity, and resistance to adverse factors such as pests and diseases, wars, famines, inhospitable soils or meteorological disasters. Indeed, major climate changes such as droughts, floods or severe cold are only new in terms of the frequency with which they are occurring. Long before the search for resilience to climate change, evolutionary breeding was the technique that allowed many agricultural products to be exported from one part of the world to another and supported the beginnings of *ex situ* conservation. The crop varieties that result from an evolutionary breeding process are called 'improved varieties', as we have seen.

This introduction leads to some interesting results from evolutionary breeding studies, which are the basis for today's renewed interest in traditional varieties. Traditional varieties are those that farmers have developed and maintained over centuries: our crop heritage. Studies have shown that, although domestication has reduced the overall genetic diversity of each crop (in comparison with its wild ancestors), the spread of crops and

[81] Jarvis, Devra Ivy, et al., *op. cit.,* (pp. 28-30).

[82] *Idem,* (p. 30-31).

[83] *Idem,* (p. 16).

their introduction into new production areas has led to adaptation to different agro-ecological environments and the creation of new varieties[84]. In the light of this study on agrobiodiversity as a tool for achieving the Sustainable Development Goals of the 2030 Agenda, it is important to report that domestication through the relatively new discipline of evolutionary breeding aims to improve seed and crop quality while conserving agrobiodiversity. Salvatore Ceccarelli and Stefania Grando, in the recently published *Evolutionary Plant Breeding, with an Introduction to Participatory Plant Breeding*[85], have conducted an extensive literature review. Their findings confirm the use of agrobiodiversity to combat the great plagues of our time, such as soil erosion, biodiversity loss and sustainable food security, and to respond to the urgent need for crop adaptation and resilience to climate change[86]. However, these evolutionary processes are essentially experimental, with a long series of failure, and time-consuming because they must adapt to harvest times. The advent of biotechnology has raised high hopes for developing agricultural techniques and strategies. Its ability to increase crop yields and reduce the use of agrochemicals could provide valuable support in reducing poverty, hunger and malnutrition, improving food security and sustaining the global economy with environmentally friendly practices that would help achieve the United Nations (UN) Sustainable Development Goals and solve global food security crises[87].

Food security is a global challenge. Threats to it include exponential global population growth and climate change. History has shown how the selection of specific agricultural traits through selective breeding and crossbreeding has influenced food production for millennia[88]. Since the use of GMOs has been a source of heated debate since their introduction in the late 1990s[89], it is important to provide a clear definition and explanation. A sufficiently simple and comprehensive definition is provided by Lanre Anthony Gbadegesin:

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[84] Jarvis, Devra Ivy, et al. *op. cit.,* (pp. 16-19).

[85] Salvatore Ceccarelli Stefania and Grando, *op. cit.,* (pp. 9-19).

[86] *Ibidem*.

[87] Lanre Anthony Gbadegesin, et al. *GMOs in Africa: Status, Adoption and Public Acceptance*. 2021. In *Food Control*. Elsevier. Amsterdam, The Netherlands. 2022 (Vol.141, pp. 1-16, p. 2).

[88] Devra Ivy Jarvis, et al., *op. cit.,* (p. 16-19).

[89] Herbert Boyer and Stanley Cohen made the first genetically modified organism in 1973. However, the first harvest from GMO cultivation was in 1996. Lanre Anthony Gbadegesin, et al., *op. cit.,* (p. 1).

> GMOs are plants, animals or organisms whose genetic material has been specifically modified using genetic engineering tools. [..] Genetic engineering is a precise and controlled method of gene modification that involves the removal and insertion of genes from related or unrelated species to improve agricultural productivity and production of valuable pharmaceutical products[90].

Proponents of biotechnology say that GMOs contribute to food security by increasing yields, preserving crops and improving quality. The reduction of crop losses due to pests and diseases, the introduction of GM technology through herbicide-tolerant and insect-resistant GM crops, and the improvement of the nutritional quality of food will bring enormous economic benefits over and above the costs associated with food production, pesticide use and nutritional deficiencies in the diet. These same proponents believe that "political interference and long-term public misinformation campaigns have slowed global acceptance of GM crops"[91], despite the potentially huge benefits of using GM crops. At the heart of the debate is the question of why there has been so much opposition to the introduction of GMOs. The main answers lie in the potential adverse effects of GMOs on human health and the environment. The release of GMOs into the environment has attracted a great deal of attention, both in terms of the risk of transferring modified genes to other species and in terms of the benefits that GMOs can bring to humanity. The link between biodiversity, nutrition and health is increasingly recognised as a priority issue. The conservation and use of biodiversity provide important "synergies with human nutrition, socio-cultural traditions and income generation"[92]. Biocultural diversity provides important support to traditional food and farming systems, which use and conserve biodiversity holistically[93]. The existing regulatory frameworks, the rigorous monitoring and internationally harmonised science-based risk assessment of GM crops, have not resolved all the concerns above. Despite their potential to achieve the 'zero hunger' agenda, unfavourable public opinion policies have hindered the introduction of

[90] *Idem,* (pp. 1-2).

[91] *Idem,* (p. 2).

[92] Timothy Johns and Pablo B. Eyzaguirre, *op. cit.,* (p. 16).

[93] *Ibidem*.

GMOs due to environmental and health concerns and the lack of biosafety standards to monitor the biosecurity of crops.

In 2008, some potential risks associated with GMOs were identified, including unexpected gene interactions, cancer risks due to high amounts of pesticide residues, allergenicity, horizontal gene transfer, antibiotics resistance, biodiversity threat and environmental risks[94]. To date, no confirmed adverse effects have been observed from the production and human consumption of approved GM crops in the three decades or so that GMOs have been commercialised around the world; for example, no allergenic reactions have been reported from transgenics approved for introduction to the food supply. Nonetheless foods produced through biotechnology must continue to be assessed for safety[95]; although there is still no substantiated evidence of risks from the use of GMOs compared with similar risks from non-GM counterparts, long-term effects have not yet been studied, and unconfirmed adverse effects do not mean that there ae none. However, international organisations such as the FAO and the World Health Organisation (17) have developed standardised risk assessment guidelines that play an important role in ensuring the safety of GMOs and their derived products for humans and the environment[96].

The risks posed by GMOs to the environment are also still being investigated. The main concerns relate to their potential contribution to further erosion of biodiversity, soil degradation and changes in a crop's susceptibility to pathogens[97]. The risk of transferring modified genes to other species, and therefore the issue of the coexistence of GMOs and traditional crops has been widely debated since the 1980s and has yet to reach a consensus and is a very complex one. This is linked to another important problem, also still under debate, that is the relationship between traditional products and the destination of land for GMO production needs; in the absence of agreed policies, farmers can choose between

[94] Kristina Hug. *Genetically Modified Organisms: do the Benefits Outweigh the Risks?* In "Medicina". Kaunas, Lithuania. 2008 (pp. 87-99).

[95] Timothy Johns and Pablo B. Eyzaguirre, *op. cit.,* (pp. 16-17).

[96] Gbadegesin, Lanre Anthony et al., *op. cit.,* (p. 2).

[97] Timothy Johns and Pablo B. Eyzaguirre, *op. cit.,* (p. 16).

different production sectors, including the GMOs[98]. Furthermore, concerns about the safety of products for the environment and for the nutritional profile arise from the unresolved issue of the classification of the rights of so-called authorised GMO producers[99]. The marked instability of prices for traditional agricultural products, and the exponential shift towards more profitable products have led to the relocation of agriculture from one part of the world to another, resulting in the abandonment of traditional agriculture with devastating the social and environmental consequences. This phenomenon has also occurred where the use of GMOs has led to intensive monocultures at the expense of the environment, with little or no attention paid to environmental protection and conservation of natural resources[100]. Therefore, hopes of improving food security and livelihoods by addressing the very serious problems of malnutrition, food crises and inadequate food production technologies in some developing countries have not been matched by the commercialisation and adoption of GM crops in many of the countries that would benefit most, such as many countries in Africa. From an economic point of view, the debate becomes even more serious when we consider that the amount of land needed for intensive monocultures ends up in the hands of a few investors, often foreigner ones; investors who suffocate local agriculture by relegating traditional production processes to an irreversible marginal role and who do not really contribute to economic growth process of the beneficiary country, especially in developing countries.

To better understand the problem of economic growth in developing countries, we should answer to the following question: what causes malnutrition or undernourishment in these countries? "Malnutrition is not defined primarily by availability of nutrients, but rather their accessibility and acceptability to the poor"[101]. Therefore, the real problem is physical and economic accessibility. In other words, the problem is not that there is no food, but that the vast majority of the population lacks the economic capacity for purchasing food, and that the infrastructure for transporting food into the most remote

[98] Oliver T. Coomes, et al. *Farmer Seed Networks Make a Limited Contribution to Agriculture? Four Common Misconceptions*. In *Food Policy*. Elsevier. Amsterdam, The Netherlands. 2015 (Vol. 56, pp. 41-50, p. 47).

[99] Maria Pia Ragionieri. *The Problem of the Coexistence of Genetically Modified Crops with Conventional and Organic Agriculture*.In *GMO's in the EU Law* . Wolters Kluwer. Milano, Italy. 2016 (pp. 157-174, p. 159).

[100] Oliver T. Coomes, et al., *op. cit.,* (pp. 45-46).

[101] Timothy Johns and Pablo B. Eyzaguirre, *op. cit.,* (p. 11).

regions is lacking. Moreover, the infrastructure is not being built because "no one would be able to buy food anyway". It is at this point that the protection of local areas, crops and cultures comes into play. The needs of families and populations in remote and rural areas are met by private cultivation, the so-called home gardens. At present, the best response to small-scale production seems to be the strategy of evolutionary breeding, which allows both environmental protection and productive growth. Small communities and farmers can then face crises and disasters through a support network such as seed networks. The market is now shaking up the age-old relationship between agriculture, food and the environment. Protecting people and nature are closely intertwined, and the solutions are not always convergent. Proponents of GMOs argue that these organisms contribute to food security by increasing crop yield, quality and shelf life. They point to the benefits of their use in reducing malnutrition and pollution. Indeed, the amount of feed produced from genetically modified crops and less polluting agriculture due to reduced chemical treatments for pests and diseases are strong assets for the achievement of at least two SDGs in the 2030 Agenda. However, a broader concept of the environment sums up the collective needs for the preservation of traditional agriculture; that is, a cultural heritage of the local populations and the entire world, especially from the point of view of biodiversity[102].

The debate on transgenic plants and genetically modified food continues. The main arguments put forward against them are of a more political nature and are difficult to refute. These are largely in the interests of large-scale national and international companies and big farmers, which further increase the dependence of small farms and undermine renewable and alternative agriculture.

1.4 A chance for the future: Agrobiodiversity's role

The previous paragraphs have drawn a historical path of biodiversity, agriculture and agrobiodiversity, from their origins to the most recent strategies for conservation and innovation, marking the red line that connects them to the use of plant genetic resources. It was also outlined the concept that agrobiodiversity has a crucial role to play in the achievement of the Sustainable Development Goals proposed in the *2030 Agenda*,

[102] Oliver T. Coomes, et al., *op. cit.,* (p. 45).

through its impact on ecosystems, mitigation of the effects of climate change, reduction of biodiversity loss and soil erosion[103]. The descriptions above have also highlighted that agrobiodiversity marks the interrelationships between people and the environment and have emphasised that a less anthropocentric approach can be an option, provided that a participatory approach is adopted with local and rural communities. These communities provide cultural and traditional knowledge that enhances the use of wild, neglected, or underutilized crops, beyond the few intensively farmed crops that have invaded the global market. The international scientific community has highlighted the dramatic benefits of a varied diet, both for the health of the individual and the wealth of the planet; and the need to reduce intensive farming, which has been identified as one of the main drivers of biodiversity loss and soil erosion. Some details of these two aspects will be explored below, that is, the importance of traditional varieties as a part of the agrobiodiversity that "revitalise[s] agriculture and feed[s] a growing world population [which are] crucial to produce solutions that will contribute to healthy and resilient ecosystems for future generations"[104]; and the contribution of farmers' seed networks " to agriculture through the effective transfer of seeds from farmer to farmer, and from nature, local markets, national seed agencies, research stations, agricultural traders and the agribusiness to farmers [across] the countryside"[105].The importance of agrobiodiversity for food security, increasing farm incomes and reducing the risk of yield losses has been reported and the concept that biodiversity makes agriculture more resilient to climate changes has been developed[106].

Recent research attributes the loss of biodiversity to changes in plant breeding practices, which have evolved from traditional methods employed by farmers for millennia to more sophisticated techniques used by scientific institutions and corporations. Historically, farmers selected seeds for specific adaptation to local conditions and broad adaptation over time. They obtained seeds for the subsequent cropping season by collecting seeds from selected plants and mixing them to obtain sufficient planting material. It was in this way that they maintained the diversity within

[103] Salvatore Ceccarelli and Stefania Grando., *op. cit.,* (pp. 9-.19).

[104] Jarvis, Devra Ivy, et al., *op. cit.,* (p. ix).

[105] Oliver T. Coomes, et al., *op. cit.,* (p. 47).

[106] Ceccarelli, Salvatore and Grando, Stefania, *op. cit.,* (p. 11).

their fields and created what we now call the traditional varieties[107]. As early as the second half of the 1900s, the exponential growth of development projects in the context of international cooperation highlighted the importance of a participatory approach. In this approach, different stakeholders contribute dialogic perspectives and ensure the sustainability and efficiency of the projects themselves. In sustainable agriculture development projects, stakeholder expertise ranges from the biological (agronomic, ecological, genetic, etc.) to the social, economic and cultural. Such an approach firmly links research on crop diversity with conserving that diversity, using it for sustainable production and supporting rural livelihoods[108]. Agrobiodiversity of traditional varieties, including neglected and underutilized crop species, is maintained by local farmers and communities around the world. Their interactions with the evolutionary process and agrobiodiversity are the most important heritage we have, so it is crucial to focus on farmers and the crop diversity they manage[109]. Current efforts to improve agricultural sustainability and meet the challenges of the 2030 Agenda SDGs suggest that traditional crop varieties are critical to improving rural livelihoods, and their diversity contributes to improving the sustainability of local agricultural systems[110].

The importance of seed supply is critical to food security and nutrition, agricultural development and rural livelihoods, agrobiodiversity and conservation strategies[111]. In fact, confirming the global effort to improve seed supply to farmers and increase agricultural productivity, nutrition and rural well-being in developing countries, fifty percent of the World Bank's 191 sustainable agriculture projects between 2007 and 2012 had a seed systems component[112]. These projects emphasised the strengthening of the seed sector promoting the adoption of improved crop varieties, aimed to enable farmers' access to certified seed and to support the informal seed sector, invested in supporting community-based initiatives for local farmer seed enterprises, seed production and seed sharing. However, the role of farmer seed networks is still neglected due to some

[107] *Idem,* (p. 19).

[108] Jarvis, Devra Ivy, et al., *op. cit.,* (p. xi).

[109] *Idem,* (p. ix-x).

[110] *Idem,* (p. xii).

[111] Oliver T. Coomes, et al., *op. cit.,* (p. 42).

[112] *Idem,* (p. 41).

common misconceptions regarding their nature and importance. On a global economic perspective, seed networks are closed and conservative systems, providing a ready, egalitarian access to seeds that is weak, unstable and therefore destined to disappear[113]. The problem about farmer seed networks and seed circulation merit broader discussion, because "farmer seed systems are embedded in social relations and institutions that constitute the social, economic and political fabric of rural life"[114]. For the scope of this study, we will only focus on the misconceptions mentioned above, to clarify the tremendous contribution provided by farmers' seed networks to agriculture through the effective transfer of seeds at local, national and country level. Seed networks are not closed and conservative. The origins of these systems lie in evolutionary breeding. They are open systems that make use of both wild and improved varieties and allow farmers to conserve and reshape cultivated populations and varietal diversity, with transformative effects on agrobiodiversity and farmers' livelihoods. It also worth to clarify that open systems does not mean free systems. "Seeds have social costs and values"[115]. Access to planting material tends to be inequitable rather than egalitarian; exchange among farmers follows and reinforces social relations of identity, status, and wealth. Seed networks complement physical storage in granaries and is a critical safety net for farmers' security in the face of seed loss and disasters[116]. Access to these networks can mitigate sudden losses caused by natural disasters (such as floods and famines), pests and diseases, and catastrophes such as earthquakes or fires. The devastating earthquake in Morocco on 8 September 2023 provides a significant case study. In the most severely affected districts of the Atlas Mountains, farmers' seed stocks were destroyed. The impact of this loss of household seed stocks on food security and agricultural livelihoods is very high, as most households in these areas depend for their livelihoods on self-saved and locally exchanged seeds, samples of traditional and improved locally adapted crop varieties, local vegetables and local fruit and nut tree varieties. In these remote regions, many of the varieties developed from formal breeding programmes are either not available or not adapted to local production systems. Moreover, private seed companies are not very

[113] *Idem,* (p. 42).

[114] *Ibidem*.

[115] *Idem,* (p. 45).

[116] *Idem,* (p. 47).

operational in these areas because they do not see remote smallholders as a potential market considering the small market size and high overhead cost of marketing there. Seeds are predominately exchanged among neighbours or purchased at local markets. International organizations are mobilizing to revive, rescue, conserve and distribute planting materials, enable farmers and producers to get their businesses back on track, while at the same time strengthening linkages among local community seed banks[117].

To comply with the common goals of promoting food security and sustainable agriculture, of conserving agrobiodiversity for future generations, and enhancing the well-being of farmers around the world, it is crucial to develop an understanding of seed networks structures, of how they evolve and respond to change, relate to key emergent properties such as diversity or resilience, examining factors that affect their functioning, the diverse ways in which they engage entrepreneurially with markets, including but not limited to local seed value chains and creolized "stealth seeds"[118].

[117] Details are captured from the project proposal "National and local genebank support for the collection, conservation, multiplication and repatriation of native crop seeds in earthquake affected areas of the High Atlas Mountains, Morocco", developed by The Raffaella Foundation Platform for Agrobiodiversity Research (https://www.raffaellafoundation.org/ https://www.agrobiodiversitypar.org/) and submitted in partnership with other international organizations and local entities to the Global Crop Trust (https://www.croptrust.org/).

[118] Oliver T. Coomes, et al., *op. cit.,* (p. 47).

Chapter 2 ECOCRITICISM: A STORY OF CONSERVATION AND REITERATION

The Canadian author Margaret Atwood, her *Trilogy* and the focus on agrobiodiversity in the Trilogy are the subjects of this study. The objective is to ascertain whether and how agrobiodiversity has found a place in the Trilogy and the message conveyed to the reader. In a nutshell, what is the role that agrobiodiversity plays in the Trilogy? To analyse this, I will quote the author herself: "To know ourselves, we must know our own literature; to know ourselves accurately, we need to know it as part of literature as a whole"[119]. In the case of Canadian literature and its relationship to nature, this is all the more true. Accordingly, this chapter examines the concept of "literature as a whole," subsequently narrowing the focus to Canadian literature, and concluding with the work of Margaret Atwood. In The first section of this chapter, the fields of ecocriticism and environmentalism will be analysed. These two concepts represent distinct and interrelated aspects of the utilisation of nature and diversity within critical studies, encompassing a multitude of sociological, cultural and literary perspectives. It should first be noted that I have been unable to identify a specific bibliography on the topic of agrobiodiversity. Nonetheless, literary production has demonstrated the existence of a common thread between several dichotomies that have been promoted and supported by the Anthropocene, including the relationship between human beings and nature, human beings and (bio)diversity, and the role of agriculture and agrobiodiversity. As agrobiodiversity is a relatively recent concept, previous studies have focused on three distinct areas: biodiversity, agriculture and the relationship between humans and the natural environment. In order to gain a deeper understanding of the scope of incorporating agrobiodiversity within the literary canon, a selection of illustrative examples from the extensive corpus of literature on this subject has been chosen for analysis. This demonstrates the level of consideration that has been given over time to the issues surrounding nature, agriculture and agrobiodiversity. The subsequent section presents a detailed examination of the ways in which Canadian literature has engaged with the

[119] Margaret Atwood. *Selections from Survival: a Thematic Guide to Canadian Literature*. (1972) In *Greening the Maple. Canadian Ecocriticism in Context*. University of Calgary Press, Calgary, Alberta. 2013 (pp. 13-30, p. 13).

human-nature dichotomy, with a particular focus on the distinctive relationship between Canada's natural environment and its literature. The third section continues the Canadian discourse with one of the most prominent voices in Canadian literature: Margaret Atwood. Her interpretation of nature, diversity and human relationships merges with a deep understanding of the Canadian literature and its role in the larger international panorama.

2.1 Ecocriticism, Environmentalism and Biblical Roots: The Garden

The international panorama of contemporary literature is a vast and crowded arena of diverse themes, topics, and genres which offers fertile ground for critics, philosophy, and authors. The focus of this study will remain on the environmental debate, although the connections between the various themes are very strong and the tendency to maintain a broad and inclusive approach is widespread. As noted in the previous chapter, the environmental crisis is a key issue at the level of the international community (scientific, political and otherwise) and is the core of the Agenda 2030 strategy. This interest includes the current debates on the Anthropocene, the relationship between humans and nature, and the search for possible solutions to prevent humanity from continuing on its self-destructive path. The role that literature can and should play in this discourse is also becoming increasingly debated. One of the most prominent figures in this debate is the Indian writer Amitav Ghosh. In his non-fiction book *The Great Derangement: Climate Change and the Unthinkable*[120], he discusses climate change and notes the lack of engagement with it in novels and short stories.

> When the subject of climate change occurs […], it is almost always in relation to nonfiction; novels and short stories are very rarely to be glimpsed within this horizon. […] it would even be said that fiction that deals with climate change is almost by definition not of the kind that is taken seriously by serious literary journals: the mere mention of the subject is often enough to relegate a novel or a short story to the genre of science fiction. […] as though […] climate change were somehow akin to extraterrestrials or interplanetary travel. […] Climate

[120] Amitav Ghosh. *The Great Derangement: Climate Change and the Unthinkable*. The University of Chicago Press, Chicago, USA. 2016 (pp. 7-8).

> change [should be] the principal preoccupation of writers the world over – and this […] is very far from being the case[121].

Amitav Ghosh's assertion is particularly relevant in the context of agrobiodiversity. In *The Invention of Tradition*, the historian Hobsbawm defines the concept of "invented traditions"[122], as a way "to inculcate certain values and norm of behaviour by repetition, which automatically implies continuity with the past", and affirms that it can apply to environmental issues. He says that this concept can be extended to the idea of nature that helps to underpin acts of transformation of the environment, in order to make it understandable, representable and, above all, habitable for human beings[123]. From this perspective, Amitav Ghosh's aforementioned perplexity can be seen to take on a tone of disturbing denouncement. The absence of fiction on climate change and agrobiodiversity makes these issues invisible to the vast audience. As a consequence, the idea is fostered that they do not exist, that they are not real, or even worse, that they are fantasies for children confined to an imaginary intergalactic world.

It is only towards the end of twentieth century and the beginning of the new millennium that critical studies of biodiversity and environmental issues have established an identity distinct from other academic disciplines[124]. This section will provide an overview of the ongoing debate between ecocriticism and environmentalism. It will demonstrate how these two approaches to environmental issues highlight the dichotomies previously outlined. By framing the discourse in terms of the relationship between Humans and Nature, I found a useful ally in an unexpected actor: the garden. The discourse will wind its way through non-fiction and return to reflect on gardens; from the development of ancient herbaria to the ecocritical vision of the 20th century.

The relationship between humans and nature has very ancient roots that can be traced back to early Greek philosophical studies and, for the subject of this study, the

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[121] *Ibidem*.

[122] Terence Ranger, and Eric J. Hobsbawm. *The Invention of Tradition*. Cambridge University Press, Cambridge, UK. 1983 (Introduction, p. 1).

[123] Sara Protasoni. *L'invenzione della natura.* In *Cinque temi del moderno contemporaneo: Memoria, Natura, Energia, Comunicazione, Catastrofe*. Quodlibet, Macerata, Italy. 2020 (pp. 125-144, p. 126).

[124] Greg Garrard. *Ecocriticism*. 2nd ed. Routledge. London, UK. 2012 (1-17).

earliest herbaria of Theophrastus in 300 BC [125]. Scientific non-fiction gives examples of how the discourse on biodiversity has evolved over the centuries and how it intersects with philosophical studies. Throughout the centuries, reflections on nature and the environment have led to the search for other places and species. This has been done through voyages of discovery which returned with atlases, herbaria, etc. The history of the creation and development of botanical gardens in or by Western countries (mainly European countries) is a good illustration of this search. Botanical gardens were created as collections of exotic species, linked to the rise of experimental science in the early modern period[126]. In the 18th century, they turned into parks designed to acclimatise exotic and ornamental species both in Europe and in the Colonies. Today they play an important role all over the world in reforestation through the creation of tree nurseries, in *ex situ* conservation, in evolutionary breeding and in the conservation of endangered species. In Western culture, therefore, there is a dialectical vision of nature, full of ambivalences that are at the heart of contemporary environmentalism and ecocriticism. The first view is rooted in the biblical tradition, elevates man (it is noteworthy that the word 'man' was used) to the role of "*vice dei*"[127], to use Francis Bacon's words; man is the absolute master of nature and can use (or abuse) it according to his needs, for "the end justifies the means", with Machiavellian appropriation. The second view sees humans and all other creatures as subject to the laws of necessity and the unpredictability of chance; all creatures exist in a cosmos governed by a precise, immutable, eternal order[128]. This view of nature, which was dominant in the ancient world, became less important in later periods and is now being recovered in environmental and ecocritical discourses. The persistent image of the first garden is the source of the dialectic between two different concepts of nature. Eden represents a place of absolute otherness compared to the earthly state; it is a distant, inaccessible place where all creatures live in perfect harmony, the object of eternal regret[129]. In 2013, the botanist Gilles Clément, in his *Jardin, Paysage et*

[125] Maria Adele Signorini. *Piante e fiori essiccati, tra antiche leggende e erbari scientifici*. In *Atti 1996* (VII, XLIII). Accademia dei Georgofili. Firenze, Italy. 1996 (pp. 339-341; p. 340).

[126] Sara Protasoni, *op. cit.,* (p. 128).

[127] Francis Bacon. *Essays or Counsels, Civil and Moral* (1625). Delphi Classics. East Sussex, UK. eBook. 2017 (Of Empire, p. 8).

[128] Sara Protasoni, *op. cit.*, (pp. 128-129).

[129] *Idem*, (p. 130).

Génie Natural, proposed a definition of garden as a fence to protect the best of fruits and vegetables, of the variety used, in one word of biodiversity[130]. By promoting an idea that I would call 'evolutionary conservation', he describes the garden as an enclosure designed to protect the biodiversity that exists in nature, the biodiversity that nourishes every human being. In order to protect this biodiversity, Gilles argues that it is necessary to establish a friendship with nature; a friendship based on knowledge, on learning its dynamics by observing it in the garden[131].

The discourse between environmentalism and ecocriticism is an ongoing one. The main aspiration of ecocriticism is to play a role, to

> […] be part of something that changes along with our awareness of it, [...] changing [our] perception [and] the way we perceive things. [A] continuous tension between the individual and the whole[132].

Ecocriticism focuses on the more general themes of ecology, ecosystems, landscape and biodiversity. Thus, this study extrapolates the general concepts of ecosystems and biodiversity and applies them to the subset of agrobiodiversity, while maintaining a specific focus on long-term processes, historical recurrence and aspects of conservation and innovation. Since the relationship between humanity and nature has become increasingly anthropocentric under the justification of biblical interpretation, and in order to understand some important roots, it is worth looking briefly at the monotheistic religions that have a common root in the *Bible*. The relationship between humans and nature is clearly expressed in the very first book of *Genesis*: "Be fertile and multiply; fill the earth and subdue it. Have dominion over the fish of the sea, the birds of the air, and all the living things that move on the earth"[133]. A divine command that seemed to legitimise any kind of exploitation of the environment. The subsequent Ptolemaic

130 Gilles Clément. *Jardins, Paysage et génie naturel*. Fayard. Paris, France. eBook. 2012 (Leçon inaugurale prononcée le jeudi 1er décembre 2011 par Gilles Clément professeur, pp. 16-20).

131 *Ibidem*.

132 Serenella Iovino. *Ecocriticism and Italy: Ecology, Resistance, and Liberation*. Bloomsbury. London, UK. 2016 (p. 5).

133 *The New American Bible*. United States Conference of Catholic Bishops. USA. 2002 (Gen 1, 28). https://www.vatican.va/archive/ENG0839/__P3.HTM, accessed 8 February 2024.

developments led to the concept of the centrality of the Earth in the universe and, consequently, to the idea of cosmic anthropocentrism, the primacy of the human being in the universe. The worshipped and deified nature of ancient pagan religions has thus been absorbed and transfigured to be seen as a resource's reservoir and its mystification as an attack by "dark and diabolical forces"[134]. Unhinging these concepts of millenary tradition is no small feat, even more when we consider that environmentalist and ecocritical thinking as we know it today is of recent origin. In *Literature-and-Environment Studies and the Influence of the Environmental Justice Movement*[135], in 2010, Joni Adamson highlights the difficult dialogue that exists today, not only between humans and nature, but also between humans themselves. In her critical analysis of Ana Castillo's novel *So Far from God*, Adamson identifies a tendency among contemporary environmentalists, in their pursuit of an anti-anthropocentric perspective, to prioritise the protection of the natural environment over the intrinsic value of human beings as part of it. This is particularly evident in the case of ethnic minorities, as illustrated in Castillo's novel:

> We hear about what environmentalists care about out there. We live on dry land but we care about saving the whales and the rain forests, too. […] But we, as a people, are being eliminated from the ecosystem, too […] like the dolphins, like the eagle; and we are trying very hard now to save ourselves before it's too late. Don't anybody care about that? [136]

At the heart of the ecocritical debate of the previous century is a fundamental choice of priorities: should the focus be on saving humanity or on preserving the natural environment? In other words, the question is whether the priority should be on saving the ecosystem and endangered species, or on saving humanity. This opposition between nature and humankind is based on the premise of anthropocentrism, which posits that "man" is the focus and ultimate purpose of the universe, and that all entities within it are for "his" exclusive benefit. This perspective ignores the fact that, as Shelley observed,

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[134] Maria Ivana Trevisani Bach *Natura, Poesia ed Etica nella letteratura italiana*. In *Eco-formazione*: https://ecoformazione.wordpress.com/2016/06/10/da-lucrezio-allecopoesia/, accessed 21 January 2024.

[135] Joni Adamson. *Literature-and-Environment Studies and the Influence of the Environmental Justice Movement*. In *A Companion to American Literature and Culture.* Wiley-Blackwell. Hoboken, NJ, USA. 2010 (pp. 593-606).

[136] Ana Castillo, *Far from God* (1993), quoted in *Idem*, (p. 593).

"the origin of man, like that of the universe of which he is a part, is enveloped in impenetrable mystery"[137].

Hence the dialogical tension between an orientation primarily concerned with conservation and preservation, and one that reads the ecological problem within the broader complexity of the Anthropocene. To expand her investigation on this dialogue, Adamson explored the work of Leo Marx and Lawrence Buell, two of the founding fathers of literary environmental studies. She highlighted that in *The Machine in the Garden*, published in 1964, Leo Marx "urged readers to rethink categories of the pastoral, and the relationships between literature and the natural world"[138]; Buell's work, *The Environmental Imagination*[139], published in the mid-1990s, "helped map [a] literary movement, concerned with environmental crisis, that [came to be known] as *ecocriticism*"[140] and supported efforts to restore 'nature for its own sake', which has been marginalised by the anthropocentric hypothesis. Remarkably, in 2002, FAO stated that "beyond species diversity *per se*, […] agricultural biodiversity also includes biocultural and spiritual elements"[141]. Adamson expanded her comparative study to the debate occurred in 2003 between Marx and Buell, which further clarified how the two movements then went their separate ways. She reported Marx's argument which defined the defence of nature 'for its own sake' as unhelpful "in resolving environmental problems, since the power of humans to modify their environments exceeds that of all other species"[142]; Marx sought to identify a sustainable human-nature mediation in which agriculture and agrobiodiversity operate. Conversely, Buell's replied that ecocriticism endorses the celebration of 'nature for its own sake' on the ground that this has the power to reinforce environmental beliefs in readers. Buell's perspective assumes the important role of literature in voicing the problem, in facilitating the change by raising awareness. Adamson, however, stressed that Buell's perspective has developed a purely environmentalist approach, in open opposition to the anthropocentric system which

[137] Percy B. Shelley, *A Vindication of Natural Diet.* (1844). Project Gutenberg. eBook. 2012 (p. 9).

[138] Joni Adamson, *op. cit.,* (p. 593).

[139] Lawrence Buell. *The Environmental Imagination: Thoreau, Nature Writing, and the Formation of American Culture*. Belknap press Harvard University Press. Cambridge, MA, USA. 1995.

[140] Joni Adamson, *op. cit.,* (p. 594).

[141] Patrick Mulvany, *op. cit.,* (p. 287).

[142] Joni Adamson, *op. cit.,* (p. 594).

"contribute to the growth of a global economy in which control over local environments, cultures, education, and health care are […] in the hands of big business" [143]. She also remarked that the equation is missing the power of industrial capitalism over the people who depend on sustainable agriculture for their very survival[144].

The debate has evolved over the years. In 1991, the National Environmental Leadership Summit of Colored People, held in Washington D.C., had already proposed a concept of "environment" that was conceived as broader than the mere conservation promoted by environmentalists. Juxtaposing the environmental issue with a social dimension, the environment was defined as "the places where we live, work, play, and worship"[145]. This vision has also been embraced by scientists and organisations working on sustainable agriculture and agrobiodiversity, and today studies on biodiversity cover a wide range of areas, both environmental and social.

> Biodiversity has as a fundamental base the recognition of human diversity, the acceptance that we are different and that every people and each individual has the freedom to think and to be. Seen in this way, biodiversity is not only flora, fauna, earth, water and ecosystems; it is also cultures, systems of production, human and economic relations, forms of government; in essence it is freedom[146].

In my view, this is where ecocriticism comes in (or should come in), in the search for a sustainable compromise in the human-nature relationship in which the human component is not perceived as outside nature, as an invading agent, but as part of it. Humans, like all living species, interact with the environment in a constant search for a balance that guarantees, first and foremost, their own survival and well-being. This perspective is not opposed to environmentalism. It complements it. The comparison between environmentalism and ecocriticism shows that the two perspectives are less irreconcilable than possible starting points.

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[143] Joni Adamson, *op. cit.,* (pp. 594-595).

[144] *Idem,* (p. 594).

[145] *Idem,* (p. 595).

[146] Patrick Mulvany, *op. cit.,* (p. 288).

Statements from the National Environmental Leadership Summit of Coloured People Fighting in 1991 show that the environmental issue is intertwined with the struggle against the unequal distribution of environmental risks in poorer communities; they seek to promote and preserve traditional ways of life and to ensure the right of all people to share equally in the benefits of a healthy environment[147]. It was within this context that the scholars Annette Kolodny and Patricia Limerick challenged the environmentalism (conservation-oriented) and ecocriticism (nature-oriented) assumptions of the 1980s, proposing a shift in focus towards the intersecting issues of race, gender, class and sexuality. In doing so, they highlighted the contradictions of Western environmentalism, which promoted a nationalist and ethnocentric view of the environment and a self-aggrandising narrative that encouraged environmentally destructive behaviour[148]. These proposals have struggled to find their place in environmental thought and to gain recognition at various levels. Adamson's work also reports that in the late 1990s many literary scholars still regarded literary environmental studies "as 'hug-the-tree stuff', [the natural world as] "a 'nostalgic, millennialist fad, a yearning to resurrect and re-explain a limited tradition of hackneyed pastoral or wilderness texts'"[149]. The support of scholars and artists to environmental issues did not weaken the debate. Ecocriticism, while acknowledging the seminal value of the environmentalist works of the 1940s and 1960s, challenges the nationalist and ethnocentric view of the environment of Western environmentalism, already pointed out by Kolodny and Limerick, as a response to the post-World War II American nationalist goals that undermined the effectiveness of conservation proposals and promoted a romantic view of threatened or endangered wilderness areas hermitages for the sublime[150].

Additional insights for this study come from the analysis of nonfiction. An interesting overview is provided by herbaria and their development from home gardens to botanical gardens. For the purposes of this study, it is also relevant to glimpse into non-English European literature, since it is European culture that has intersected and intermingled with English culture and the Empire, albeit with different results, and has

147 Joni Adamson, *op. cit.*, (p. 595).

148 *Idem*, (p. 598).

149 *Idem*, (p. 597).

150 *Idem*, (p. 598).

had a major impact on the context of the 'New World' and the development of the Anthropocene to the present day. The development of anthropocentrism, relativism and natural religion, while remaining in a typically anthropocentric perspective, offers a critical and ecocritical view of the human-nature relations.

The history of herbaria is a fascinating one. As instruments for the transmission of scientific culture, they have been at the forefront of human progress in botany, graphics and art for centuries. They are invaluable for cataloguing plants and documenting medical and agricultural biodiversity. According to a study carried out by Pignatone in 2019[151], the most remarkable and traceable examples of herbaria date back to the work of the Theophrastus in 300 BC. His work can be considered one of the earliest collections dedicated to studying and observing the botanical world, in the way that Aristotle anticipated for the animal world[152]. Beyond its historical value, Theophrastus' work reveals the first evolutionary concepts that later underpin evolutionary breeding and *ex situ* conservation. Theophrastus believed that plants are not entirely passive beings in relation to their environment. The philosopher observed two types of behaviour, based on a concept of *in situ* conservation concept. Firstly, a plant must live in its place of origin in order to live well and develop in the best possible way (concept of conservation *in situ*). However, this does not mean that it is subject to the environment; in fact, Theophrastus noted that some plants can change their nature in order to adapt to places, a concept that has developed into both *ex situ* conservation and evolutionary breeding theories. Secondly, solidarity forms develop between neighbouring plants[153]. This behavioural analysis later formed the basis of more recent theories of evolutionary breeding, which propose the use of mixed seeds to improve product quality, reduce the use of chemicals, increase agrobiodiversity and combat soil erosion[154].

In the Middle Ages, the tendency to "impose order" on nature intensified. Botanists and scholars increasingly began to collect and comment on plants, flowers and

151 Marco Antonio Pignatone. *La Botanica di Teofrasto. Un Manifesto per una Concezione Ecologica e non Antropocentrica del Vivente*. Tesi di Dottorato. Università degli Studi di Messina, Dipartimento di Scienze Cognitive, Psicologiche, Pedagogiche, della Formazione e degli Studi Culturali. Dottorato di Ricerca in filosofia. 2019 (p. 118).

152 Marco Antonio Pignatone, *op. cit.,* (p. 10).

153 *Idem,* (p. 10).

154 Devra Ivy Jarvis, et *al., op. cit.,* (pp. 309-310).

leaves, identifying and classifying them with scientific rigour, with brief notes and illuminated illustrations. The study of plants was the preserve of physicians and apothecaries, who reported only on their real (or supposed) medicinal properties. As was the case with bestiaries, in the Middle Ages the information was taken from classical texts or from popular tradition, copied and accepted uncritically, and all of this was imbued with elements of magic and superstition[155]. This mixture of ancient knowledge and the flavours of tradition, science and fantasy permeated medieval man's relationship with nature: cultivating the land, preparing food, medicine. The texts were illustrated by figures, often fanciful, and stylised symbols to represent these properties. It is only in more recent times that the scientific interest shifted from the medicinal properties of plants to the plants themselves, assessing their similarities and differences and trying to make sense of their enormous diversity. In the 1500s, botany experienced its renaissance, with the surge of scientific research and knowledge, with exploration and, as described above, with the creation of the first botanical gardens. The scientist became the new compiler of herbaria, not uncritically following the sources of the classics and tradition, but based on direct observation of nature. The botanical garden became a place of study, moving away from its original role as a garden for the cultivation of officinal plants; a kind of precursor of what today's biodiversity advocates would call a "home garden".

In this epochal transition, in which the (Western) world is expanding its boundaries and science is playing an increasingly important role, literary and philosophical trends are developing a sort of a 'return to nature'. Literature has always been a portrayer of reality, but also a prophetic admonisher. Often, with not always rosy prospects for the future, its sensitivity and acumen have led to a critical analysis of reality. This includes the work of ecocriticism. The profound changes that followed, first of all the agrarian revolution and then the industrial revolution, were accompanied in literature by elements of denunciation and alarm. One of the first proposals arrived by the Frenchman Montaigne in the sixteenth century; his *Les Essais* provided with an important bridge to the Age of Enlightenment, which profoundly marked the development of contemporary history and philosophy. In Montaigne's *Essais* (the third and last edition of which dates from 1588) the denunciation and criticism of colonial land abuses and the

[155] Maria Adele Signorini, *op. cit.,* (pp. 339-341).

importance of diversity are based on the fundamental hypothesis that man is no longer a "*vice dei*"[156]: he is part of the whole of creation, and most arguably in the lower position. Montaigne also engages with the theoretical contributions of Raymond Sebond[157], a 15th-century Catalan theologian whose work played a pivotal role in the emergence of Enlightenment thought and natural religion theories. Sebond's method of thought, which was no longer inductive but deductive, rational and empirical, initiated a cultural revolution in which the human being is no longer above creation, the "*vice dei*", but in its lowest position. In this early critique of anthropocentrism, Montaigne challenges the intimate truth of the human being as part of nature. He advocates a return to nature and refers to the "barbarian", the "cannibal" and the "savage man" as those who are close to nature[158]. Two centuries later, this concept is taken up in Rousseau's *bon sauvage*. Reflecting on land ownership and the division of conquered lands, Montaigne echoes Lucretius' "[Grande] divisere atque dedere" [159], denouncing the colonial practices occurring in the lands of conquest: "lls partagèrent les terres et les repartirent /en fonction de la beauté, de la force et de l'intelligence de chacun"[160]. A provocation that refers to the beginning of private property of the appropriation of the land. This shows that the issue of land appropriation is an ancient and recurrent one over the centuries; it also underlies the discourse of support for neglected or under-utilised wild varieties typical of local heritage. Finally, the debate about diversity as a strength is very intriguing. Montaigne argues that man is opposed to otherness and proposes a "homme mêlé"[161] (mixed, integrated). This *homme* is not afraid to travel and accepts the confrontation with the diversity of manners from one nation to another; he appreciates "le plaisir de la variété", the pleasure of diversity[162]. While Montaigne's discourse has a more political and sociological slant, it turns out to be very relevant to contemporary gender and environmental studies.

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[156] Francis Bacon. *op. cit.,* (p. 8).

[157] Christian Kheime. *Michel de Montaigne*. *Essais. Extraits*. Flammarion. Paris, France. 2013 (pp. 77-83).

[158] Michel de Montaigne, *op. cit.,* (pp. 245-249).

[159] T. Lucrezio. *De Rerum Naturae.* BUR. Milan, Italy. 1986 (Ch.5, v. 1110).

[160] Michel de Montaigne, *op. cit.,* (p. 59).

[161] *Idem*, (p. 239).

[162] *Idem,* (pp. 237-239).

2.2 Surviving Nature: Ecocriticism in Canada

Literature's responses to environmental issues have their roots in the long past. For the purposes of this study, the focus will be on aspects of agriculture and the promotion of diversity in agriculture. To this end, it is worth recalling that both the 'environmental issue' and the definition of agrobiodiversity are recent concepts. However, the dynamic between humans and nature is one that has been contemplated by humanity throughout history. This dynamic has been a source of fascination for centuries, prompting reflection on the nature of the relationship between the self and the Other. The identity crisis of the 20th century prompted a re-evaluation of the concept of identity and otherness, which in turn gave rise to a flourishing of literature on these themes from the 1960s. As Jean-François Staszak posits, "Otherness is the result of a discursive process by which a dominant in-group ("Us," the Self) constructs one or many dominated outgroups ("Them," the Other)"[163]. The relationship between different entities (human-human, human-environment, human-divinity) has been conducted for centuries from an anthropocentric perspective that has served to confirm the dominant subject as the one embodying core characteristics and the others as those who do not align with those characteristics:

> Otherness is due less to the difference of the Other than to the point of view and the discourse of the person who perceives the Other as such. Placing in opposition notions of Us, Self, Them, and the Other is to choose a criterion that allows humanity to be divided into two groups: one that embodies the norm and whose identity is valued, and another that is defined by its faults, devalued, and susceptible to discrimination. Only dominant groups (such as Westerners in the time of colonization) are in a position to impose their categories in the matter[164].

This approach was fostered and became dominant during the colonial era, thereby reinforcing Western hegemony and the stereotypical Eurocentric idea that Europe and Europeans are superior to others. In her 2004 publication, *Animals, Anomalies, and*

[163] Jean-François Staszak. *Other/Otherness*. In *Encyclopedia of Human Geography* (Second Edition). Elsevier. Amsterdam, The Netherlands. 2020 (Vol. 10, pp. 25-31, p. 25).

[164] Jean-François Staszak, *op. cit.,* (Abstract).

Inorganic Others, Rosi Braidotti presents a summary of this definition of otherness as a concept that:

> rested on an assumed [model] of ideals of whiteness, masculinity, normality, youth, and health, […] defined in the sense of both dialectical otherness (nonwhite, nonmasculine, nonnormal, nonyoung, nonhealthy) and categorical otherness (zoomorphic, disabled, or malformed)[165].

In this model, she continues, the others "were pathologized and cast on the other side of normality, that is, viewed as anomalous, deviant, and monstrous"[166]. In the second half of the XX century, this approach has undergone a sever critique and revision and is now being restructured. "A bioegalitarian turn is encouraging us to relate to animals as animals ourselves"[167], and "to contest othering [by refusing] the dichotomy on which the process is based and to promote alternative […] identities"[168].

Therefore, the notion of otherness encompasses a broad spectrum. It is helpful to recall the definition of 'nature' provided by the *Cambridge Dictionary*: "all the plants, creatures, and things that exist in the world that are not made by people"[169]. Accordingly, the human beings are part of a total system of living beings, but the results of their works are not. Once more, this definition has a biblical root, which places human beings both as part of and above creation[170]. It appears reasonable to conclude that this interpretation, which

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[165] Rosi Braidotti. Animals, Anomalies, and Inorganic Others. In *PMLA*, vol. 124, no. 2 (p. 526–532). PMLA, New York, USA. 2004 (p. 526).

[166] *Ibidem.*

[167] *Ibidem*.

[168] Jean-François Staszak, *op. cit.*, (p. 26).

[169] *Cambridge Dictionary*. Website: https://dictionary.cambridge.org/dictionary/english-italian/nature, accessed 17 March 2024.

[170] *The New American Bible*, *op. cit.*, (Gen 1, 1-31).

"Then God said: "Let us make man in our image, after our likeness. Let them have dominion over the fish of the sea, the birds of the air, and the cattle, and over all the wild animals and all the creatures that crawl on the ground." God created man in his image; in the divine image he created him; male and female he created them. God blessed them, saying: "Be fertile and multiply; fill the earth and subdue it. Have dominion over the fish of the sea, the birds of the air, and all the living things that move on the earth." God also said: "See, I give you every seed-bearing plant all over the earth and every tree that has seed-bearing fruit on it to be your food; and to all the animals of the land, all the birds of the air, and all the living

originated in the so-called 'Old Continent' and subsequently spread globally, is the root cause of a schizophrenic relationship between humanity and the natural world. The historical antecedents of this association demonstrate the profound intertwining of the connection between humankind and the natural world. Mankind's existence is contingent on the natural environment for its survival. Simultaneously, however, humans strive to alter and adapt the environment to serve their own needs and desires. The earliest forms of artistic expressions provide evidence of the needs and constraints that emerged from the interaction between humans and the natural world. These include cave paintings with graffiti of hunting scenes, the earliest mythological and religious tales, the ancient Babylonian codices describing the laws on the sale of crops and livestock, the earliest Aristotelian scientific writings on biological cycles, herbaria and scientific agricultural and medical manuals.

Today, as in the past, non-fiction, prose and poetry are the interpreters and spokesmen of the philosophy and history of their times. Poetry has become an interpreter of socio-political reality, describing nature and the countryside as places where one can find an inner peace which was undermined by the chaos of cities and progress. From the ancient Latin poets, whose depictions of the rural areas were echoed in the pastoral works of the following centuries, to the interpretations of Romanticism, with its search for the sublime, there is a direct reflection of the state of confusion in which man lives. It is worth to highlight here that the romantic proposal for a return to nature in search of the sublime lacked any real environmental critique.

As mentioned earlier, Western culture has been forcibly 'exported' all over the world: it was imposed during the Colonialism and used as the only comparative metre to evaluate the so-called level of civilization. Local realities have been submitted and wiped out. In order to understand some of the dynamics that have guided Western societies, philosophical thought and artistic production in general, and literary production in particular, it is useful to resume the religious and biblical discourse as it cannot be ignored. In the previous paragraph, in the presentation of the Botanical Gardens, it was emphasised that the idea of paradise is present in almost all cultures and religions. This

creatures that crawl on the ground, I give all the green plants for food." And so it happened. God looked at everything he had made, and he found it very good. Evening came, and morning followed - the sixth day.". (Gen 1, 26-31).

is particularly true of the monotheistic religions, which originated in the biblical texts and have exerted a tremendous influence on Western socio-cultural aspects. These socio-cultural aspects have been forcibly exported throughout the world since modern times. In this idea of paradise, the Garden of Eden is always to be found 'elsewhere', and there every resource is naturally accessible without effort"[171]. It is the place where the original state of universal harmony between human beings and the rest of creation is restored. This iconography is detectable in the literary tradition of earthly paradise, in the Book of Genesis, through the descriptions of Hesiod, Ovid, Homer and even in the *Qur'an*, or in the medieval legends of the search for Eden, which can also be read in Dante and Milton[172]. Poetry provides a comprehensive, long-term picture of the literary journey that has led to the contemporary expressions of ecocriticism. It is possible to trace a path from the Latin literature of the first century B.C. to the ecopoetry of the present day. Poetry itself is beyond the scope of this study; yet I will refer to it to explain the response to Nature in Canadian literature environment. Over the centuries, there has been considerable diversity in the ways in which nature has been approached, with numerous contradictory views on its name and attributes being expressed in literary works. In Lucretius and Leopardi, the figure of St Francis' Mother Nature[173] also assumes the role of a stepmother. In biblical texts, she is depicted as a source of life in the Garden of Eden or as a destructive force during Noah's flood[174]. In Virgil, whose bucolic and ideal vision has influenced poets for centuries, she becomes an idyllic refuge and shelter from urban chaos. In the works of more recent authors writing post-apocalyptic, eco-dystopian and other apocalyptic visions, however, she assumes an apocalyptic aspect. In these works, the natural world is depicted as an otherworldly entity, a nature that transcends the boundaries of human understanding, evoking a sense of both awe and terror.

The concept of multiplicity offers an analytical framework for understanding the distinctive response to nature in Anglo-Canadian literature. This response is the result of the experiences of early European settlers upon their arrival in the northern lands of the American continent now known as Canada. In this context, they had to contend with a

[171] Sara Protasoni. *op. cit.*, (p. 130).

[172] *Ibidem*.

[173]Francesco d'Assisi. *I Fioretti*. Istituto Editoriale Italiano. Milano, Italy. 1900. (p. 255).

[174] *The New American Bible*. o*p. cit.*, (Gen 6, 6-22).

new sense of emptiness, void and powerlessness in the face of local nature. As Margaret Atwood has pointed out, "the central symbol for Canada […] is undoubtedly survival"[175]. In *Survival: a Thematic Guide to Canadian Literature*, Atwood explains how surviving for the early explorers and colonists was not granted: an inhospitable land, natural elements such as severe and prolonged cold, the wilderness and hostile natives challenged them to find a way to stay alive. The feeling behind this survival was not one of excitement, adventure or danger as for those who explored the "Far West", not the peace and sublimity inspired by Romantic poetry. The "central idea […] generates a sense of ['grim' survival], […] an almost intolerable anxiety"[176], as a man lost in the mist without his map. Survival also had a different meaning in later times. It changed with the change of leadership and government. The French colonies were subjugated by the English, and survival took on a different meaning. It was a matter of holding on to one's own identity, of keeping one's traditions and language alive[177]. Feelings and attitudes towards nature varied over time, between a sense of danger and hostility, of a cruel and violent nature, and a perception of it as a mother, an indifferent mother, and somehow not alive, detached from man. So, nature shows two sides of the same coin: embracing and imprisoning. I would argue that the human-nature relationship in Canada has followed a similar path, or at least some of the same steps, that Western European man has taken in his discourse with God or the Divine, the Creator; feeling the size and grandeur of something or someone above him, as in a child-parent relationship, man has sought protection, shown fear, rebelled and fought for his own identity; and finally found a way to subjugate the other. It is a victory with a bitter aftertaste. Like a child who, having gained independence from his parents, suddenly realises that the price to be paid is loneliness, that his parents are about to end their lives and that the struggle was not worth it. A similar taste filled Canadian literature as soon as man began to win against nature, to dominate it and exploit its resources: the struggle proved a failure "man [is] more destructive towards Nature than Nature can be towards man; and […] the destruction of Nature is equivalent to self-destruction on the part of man"[178].

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[175] Margaret Atwood, *Selections from Survival: a Thematic Guide to Canadian Literature, op. cit.,* (p. 16).

[176] *Ibidem*.

[177] *Ibidem.*

[178] Margaret Atwood, *Selections from Survival: a Thematic Guide to Canadian Literature*. o*p. cit.*, (p. 29).

Thus, the Canadian experience of nature is a specific one, with differences and similarities to others, and have an impact on Canadian literature. There is no Paradise lost to recuperate, no Garden of Eden to return to; as the poet Rosemary Sullivan remarkably summarised in her analysis *La forêt or the Wilderness as Myth*[179]*,* there is a

> civilization lost in terrifying and alien wilderness, desperately defending [its] culture. […] Happiness and liberty, civilization itself, […] preserved nostalgically […] surrender by a huge, unthinking, menacing and formidable wilderness[180].

Another significant theme in the Canadian literature is the prevalence of violence. This violence is often depicted as a natural phenomenon, characterised by a lack of cruelty but a sense of indifference. The concept of survival is inextricably linked with violence and death in Canadian literary works. Indeed, these themes intertwin the human struggle for survival with the wilderness, which is frequently represented by the forest. The forest represents also the wilderness of the human soul, of the human mind struggling with its own nature, "trying to explain and master [the wilderness of] Nature"[181], a kind of mythological entity that echoes the primordial myth of *Beowulf* and winds its way through Margaret Atwood's *Surfacing*. At the beginning of the 20th century, urbanisation in Canada, as well as in many other Western countries, led to a feeling of nostalgia for the forest. Writers described the threatening presence of the city, which had replaced the menacing wilderness. The absence of the natural world seemed to mirror the emptiness of the human mind and soul. This is where ecocritical and environmental discourse comes in, and where it is at odds with the Canadian experience. Nature is not idealised in search of a romantic sublime; it is not the refuge from urban chaos sung of by ancient poets nostalgic for Arcadia, an archaic, idyllic world on which environmentalist theories of preservation and conservation are based; nor is there a willingness to preserve nature for nature's sake. Nature retains its identity as a savage place in which wilderness rules.

[179] Rosemary Sullivan. *La forêt or the Wilderness as Myth*. (1987) In *Greening the Maple. Canadian Ecocriticism in Context*. Eds. edited by Ella Soper and Nicholas Bradley. University of Calgary Press, Calgary, Alberta. 2013 (pp. 31-30).

[180] *Idem*, (p. 33).

[181] *Idem*, (p. 38).

Humans fight the same battle in both the wilderness and the urban chaos. Trees are replaced by buildings; isolation is replicated in cities as much as in forests; self-inflicted death in the wilderness, the madness that leads to suicide as a result of a sense of despair and isolation, is mirrored in the urban environment; accidental death, through nature rather than by nature, such as freezing or drowning, is similarly experienced in the city, where man feels as trapped as in the wilderness. The Canadian response to the theories of ecocriticism and environmentalism is unique and can be traced directly back to the roots of the Canadian relationship with nature described so far. The Canadian writer Sherrill E. Grace, in her comparative analyses of urban and rural codes[182], takes up Margaret Atwood's perspective of a polarity between the world and the self. This polarity is reflected by Atwood in *Life Before Man*[183], where she compares "the green swamps of the dinosaurs and the grey aridity of contemporary Toronto"[184]. Atwood's symbol of survival is the environmental and ecological discourse in Canadian literature.

It was put forth that poetry can be read as the literary journey that has led to the contemporary expressions of ecocriticism. The Canadian experience provides a valuable framework within which to present a few observations regarding potential limitations of both ecocriticism and environmentalism. In order to illustrate this point, references will be made to two Latin poets of the first century BC, Virgil and Lucretius, whose poems have had a significant impact on the development of pastoral and bucolic writing in subsequent centuries, and continue to do so. In these Latin poems, nature is understood as an archaic, idyllic world; environmental theories of preservation and conservation are still based on this understanding; and the ecocritical concept of multi-stakeholder participation in discourse is reflected in the rural environment with its social, political and cultural connections. In both cases, however, these approaches are either utopian or far removed from the non-anthropocentric view they advocate. In the first case, the idea of saving nature for nature's sake, inspiring respect and devotion, is fragile; the agrarian subjects offer an interpretive perspective on the conservatism of some contemporary

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[182] Sherrill E. Grace. *Quest for the Peaceable Kingdom: Urban/Rural Codes in Roy, Laurence, and Atwood*. (1984). In *Greening the Maple. Canadian Ecocriticism in Context*. Eds. edited by Ella Soper and Nicholas Bradley. University of Calgary Press, Calgary, Alberta. 2013. (pp. 52-54).

[183] Margaret Atwood. *Life Before Man*. McClelland and Stewart, Toronto, Canada. 1979.

[184] *Idem*, (p. 52).

environmentalist positions as a response to the malaise of urban life, with a nature that can reward man with its fruits. This same nature though can also be ungraceful, catastrophic and mysterious, as the above observations about Canadians' relationship with nature suggest. Perhaps environmentalists have in mind a fertile land where little labour is needed to provide food for the people who live there, or a society that satisfies only primary needs, such as nourishment, where taste, desire and pleasure are useless and undesirable excesses. Yet Canadian literature shows that the environment of North America is harsh, and other needs like warmth, shelter and winter storage are anything but secondary. In ecocriticism, on the other hand, there are models that inspire respect and encourage people to find a balance within human activities and between them and the environment; if human intervention in nature through agriculture is necessary, as it is necessary for human survival, then an ecosystemic approach must be adopted, taking into account the delicate balance on which nature rests. However, this discourse is not echoed by Canadian voices; there is no call from nature, no yearning to live in ideal harmony with a hostile environment, and nature is perceived as uncaring at best. To provide an illustrative example, in the case of Margaret Atwood's Trilogy, ecological discourse is embedded within the narrative. However, no appeal to nature nor desire to live in harmony with an unwelcoming environment is present. Instead, Atwood depicts nature as an entity that exists independently, separate from the very survival of human individuals and communities. The prevailing theme can be described as the notion of a nature that is capable of enduring the adverse effects of human activities, yet exhibits indifference towards them and towards humanity.

It can therefore be argued that the devastating approach of the Anthropocene remains the only viable one, as there is a clear failure in proposals to balance contingency, that is, the satisfaction of present needs, with projection, meaning the implementation of valuable and sustainable actions to ensure the fulfilment of future needs. This is not to say that there is no Canadian response to the international warning of climate change, biodiversity loss and the impending end of human life, nor that there is no value in what both ecocriticism and environmentalism advocate. The next section will outline one of the Canadian responses through the lens of one of its eminent voices: that of Margaret Atwood; and it will explain her crucial role in this study.

2.3 Margaret Atwood's: Converging Responses

Margaret Atwood (born 18 November 1939 in Ottawa, Ontario) is a prolific author of poetry, novels, literary criticism, and essays. As she mentions in her essay *Perfect Storm: Writing* Oryx and Crake[185], she "grew up among the scientists […] 'the boys at the lab' [being] graduate students and post-docs who worked with my father in the late 1930s and early 1940s at his forest-insect research station in northern Quebec, where I spent my early childhood"[186]. As an adolescent, indeed, her time divided between Toronto, where her family was living, and the "sparsely settled bush country in northern Canada, where her father, an entomologist, conducted research"[187]. Her exposure to science and nature was part of her daily life; as she witty remarks "Several of [her] close relatives are scientists, and the main topic at the annual family Christmas dinner is likely to be intestinal parasites or sex hormones in mice, or, when that makes the non-scientists too queasy, the nature of the Universe"[188]. Such an exposure is reflected in her novels, including, but not limited to, *Surfacing*[189] and the Trilogy. In the first one, the relationship between nature and culture is examined through the lens of a return to the northern wilderness of Quebec; the Trilogy addresses a number of pressing contemporary issues, such as climate change, biodiversity loss, genetic manipulation, and food security, among others.

Atwood has been an early writer: she began writing at age five and resumed her efforts, more seriously, a decade later. After completing her university studies at Victoria College at the University of Toronto, she earned a master's degree in English literature from Radcliffe College, Cambridge, Massachusetts, in 1962[190]. She has gained recognition as one of the most significant writers in Canadian literature and her novels have received considerable international acclaim. Since 1961, indeed, she published,

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[185] Margaret Atwood. *Perfect Storm: Writing Oryx and Crake*. In *Book of the month club/Bookspan* by Margaret Atwood. O.W. Toad Ldt. 2003 (pp. 284-286).

[186] *Ibidem,* (p. 284).

[187] Margaret Atwood. Bibliography. Website: https://margaretatwood.ca/full-bibliography-2/. Accessed 9 June 2024.

[188] Margaret Atwood. *Perfect Storm: Writing Oryx and Crake, op. cit.,* (p. 284).

[189] Margaret Atwood. *Surfacing*. McClelland and Stewart, Toronto, Canada. 1972.

[190] Margaret Atwood. Bibliography, *op. cit.*

amongst the others, 17 novels, 9 collections of short fiction, 8 children's books, 18 books of poetry, 8 books of non-fiction, and a number of small press editions of both poetry and fiction[191]. She has won numerous awards and honours for her writing, including two Governor General's Award, in 1966 for *Circle Game* and in 1986 for *The Handmaid's Tale*; two Arthur C. Clarke Award for best Science Fiction in 1987 and for Imagination in Service to Society in 2015, two Booker Prizes (*The Blind Assassin* in 2000, *The Testament* in 2019); Prince of Asturias Award for Letters, Spain, in 2008; Franz Kafka International Literary Prize in 2017[192]. In addition to writing, Atwood teaches English literature at several Canadian and American universities and is noted for her feminist advocacy and political activism[193] for which she won the PEN Pinter Prize in 2016 for the spirit of political activism threading her life and works and the PEN Center USA Lifetime Achievement Award in 2017[194]. Many of her works have been adapted for the screen in both film and television formats, such as *Surfacing* (film, 1981) and *The Handmaid's Tale*[195] (film, 1990; TV series, 2017). She is considered a prominent voice in the activism surrounding the issues of gender, ecology and human rights, which align closely with her own personal values[196] and, although she is renowned for her and as a feminist voice, her body of work encompasses an extensive range of genres and themes, including, but not limited to, subjects related to gender and identity, religion and mythology, the power of language and the impact of climate change.

Atwood, however, has consistently eschewed categorisation. She has never espoused an overtly feminist standpoint, nor has she identified herself as an explicit political writer. Likewise, she has eschewed the literary genre that has come to be known as 'science fiction'. In the non-fiction work *In Other Worlds: SF and the Human Imagination*[197], she elucidates her relationship with this literary genre, delineating the boundaries of science fiction and speculative fiction. The addresses her reply to Ursula

[191] *Ibidem*.

[192] Margaret Atwood. Awards and Recognitions. https://margaretatwood.ca/awards-recognitions/. Accessed 9 June 2024.

[193] Britannica, The Editors of Encyclopaedia. "Margaret Atwood". Encyclopedia Britannica, 14 May. 2024. Website: https://www.britannica.com/biography/Margaret-Atwood. Accessed 8 June 2024.

[194] Margaret Atwood. Awards and Recognitions, *op. cit.*

[195] Margaret Atwood. *The Handmaid's Tale*. McClelland and Stewart, Toronto, Canada. 1985.

[196] Margaret Atwood. *Margaret Atwood: Conversations*. Ed. Earl G. Ingersoll, Princeton, 1990 (pp. 27–32).

[197] Margaret Atwood. *In Other Worlds: SF and the Human Imagination*. Virago, London, UK. 2011

K. Le Guin, who blamed Atwood not to acknowledge the influence of science fiction on her own writing and to "protect her novels from being relegated to a genre still shunned by hidebound readers, reviewers and prize-awarders. She doesn't want the literary bigots to shove her into the literary ghetto"[198]. Atwood challenges the prevailing view that genres are defined by fixed and inflexible criteria. She prefers her work to be categorised as Speculative Fiction, rather than Science Fiction, and arguments her position as follows:

> Is *Nineteen Eighty-Four* as much 'science fiction' as *The Martian Chronicles*, I might reply? I would answer not, and therein lies the distinction. […] It's too bad that one term—science fiction—has served for so many variants, and too bad that this term has acquired a dubious if not downright sluttish reputation […] In brilliant hands, however, the form can be brilliant[199].

In her world of Speculative Fiction, she would not include "anything that humankind had not already done, somewhere, sometime, or for which it did not have the tools"[200]. This theme is reiterated the essay *Perfect Storm: Writing Oryx and Crake*[201] and in the collection of diverse writings and several speeches *Burning Questions: Essays and Occasional Pieces, 2004 – 2021*[202]:

> Like *The Handmaid's Tale*, *Oryx and Crake* is a speculative fiction, not a science fiction proper. It contains no intergalactic space travel, no teleportation, no Martians. As with *The Handmaid's Tale*, it invents nothing we haven't already invented or started to invent[203].

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[198] Ursula K Le Guin. *The Year of the Flood by Margaret Atwood* (2009). In *The Guardian*. Website: https://www.theguardian.com/books/2009/aug/29/margaret-atwood-year-of-flood. Accessed 10 June 2024.

[199] Daniel Lukes. *Review,* In Other Worlds—SF and the Human Imagination. In *Utopian Studies*, vol. 23 no. 1. 2012. (pp. 290-294). Project MUSE muse.jhu.edu/article/474294. (p. 291).

[200] *Idem*.

[201] Margaret Atwood. *Perfect Storm: Writing* Oryx and Crake, *op. cit.,* (pp. 284-286).

[202] Margaret Atwood. *Burning Questions: Essays and Occasional Pieces, 2004 – 2021*. Random House USA Inc. New York, USA. 2022.

[203] Margaret Atwood. *Perfect Storm: Writing* Oryx and Crake, *op. cit.,* (p. 284).

A potential solution to Amitav Ghosh's assertion that novels and short stories demonstrate a lack of engagement with climate change might be found in the aforementioned quotation. Atwood's oeuvre is frequently the consequence of her persistent contemplation of prospective scenarios, of her "thinking about 'what if' scenarios almost all [her] life […] and noting with alarm that trends derided ten years ago as paranoid fantasies had become possibilities, then actualities."[204] These observations, coupled with a keen awareness of contemporary issues, have led her to propose scenarios that challenge conventional wisdom. In her works, she often presents a near-dystopic future, emphasising the urgency of addressing critical issues and the pivotal role each individual plays in safeguarding the planet and humanity from self-destruction. As previously stated, in her work *Survival: A Thematic Guide to Canadian Literature*, Atwood examines the relationship between humans and nature within the context of Canadian literature. Indeed, her early poetry collections, such as *The Circle Game*, reflect on the complexities of human nature, exalts the beauty of the natural world, and condemns the pervasive materialism of modern society[205] and in the Trilogy, she expands the local criteria to encompass a global perspective. In her novels, themes of role reversal and new beginnings recur, focusing on women's relationships with the world and the individuals around them, as exemplified in *The Handmaid's Tale*, a narrative set in a dystopian future where a woman lives in a totalitarian state where she is compelled to engage in sexual slavery as a consequence of an ecological upheaval. These themes summarize in the Trilogy, where Atwood's activism for human rights and environment are described through a plague-induced apocalypse in the near future. Indeed, while:

> in her first novels, Surfacing and Life before Man, Atwood explores themes such as the unnaturalness and destructiveness of anthropocentric principle whereby humans relate to the surrounding environment, […] with the Trilogy [the] narrative encompasses dimensions such as individual and collective

[204] *Ibidem*.

[205] Britannica, The Editors of Encyclopaedia. "Margaret Atwood", *op. cit.*

> environmental responsibility, the spectre of consumerist oppression, advocacy for food activism, the political landscape of sustainable agriculture […].[206]

The next chapter will focus on the Trilogy and stress the significant relationship Atwood marks with agrobiodiversity and survival.

[206] Todeschini, Laura. *Are We What We Eat or What We Worship? Food Activism and Fanaticism in Margaret Atwood's The Year of the Flood.* In *Altre Modernità*, n. 31 (pp 75). Milano University Press, Milan, Italy. 2024.

Chapter 3 The role of agrobiodiversity in Margaret Atwood's Trilogy MaddAddam

The use of undefined, imaginary or hypothetical times and places enables an author to describe the present and to address controversial and challenging subjects that might otherwise be silenced by editorial censorship or disparaging criticism. Such a strategy benefits both authors and readers. It safeguards authors from censorship and enables readers to engage with content that may otherwise be excluded from their reading. Furthermore, readers are situated within a context that is both recognisable and independent of the narrative. They can disassociate themselves from the events, contemplating them in a detached and objective manner. This allows them to discern socio-cultural, ethical, and, in the case under examination in this study, ecological trends. This process fosters the development of a critical consciousness rather than a sentiment of guilt. In light of this, Amitav Ghosh's critique of the relegation of climate change literature to a domain of intergalactic monsters may therefore appear to lack its initial force of denunciation[207]. Indeed, it suggests that the inclusion within a traditional narrative structure, of a 'what if' scenario, set in a distant land or on an unknown planet in the near future, serves to downplay the seriousness of the problem. This implies the existence of a literary hierarchy based on genre, content and language.

The categorisation of literature as either 'high' or 'low' is a practice that has its roots in an older, perhaps somewhat obsolete, set of criteria. As has been previously observed, Margaret Atwood eschews the application of certain genre labels to her own work, such as science fiction, instead characterising her output as 'speculative fiction'. The initial section of this chapter is dedicated to the subject of literary genre and will ultimately serve as the foundation for the subsequent analysis of the *Trilogy*. This section will analyse the dystopian character of the *Trilogy* and Atwood's position on this issue. The analysis will elucidate the lens through which to investigate the role that Atwood assigned to agrobiodiversity within the eco-dystopian discourse. To this end, different approaches to biodiversity will be mapped, including conservation and development. However, the analysis of the *Trilogy* will not examine biofortification activities with genetically modified

[207] Amitav Ghosh, o*p. cit.,* (pp. 7-8).

organisms (GMOs), as while the *Trilogy* expresses clear concerns about biofortification, the arguments are more related to animal genetic engineering in livestock, which goes beyond the scope of this study.

3.1 Speculative Fiction: Utopia, Dystopia e Ustopia

The term "genre" is generally employed to delineate the classification and organization of literary works into categories based on their form, content, and style. Since antiquity, the epic poem has been regarded as the pinnacle of the hierarchical scale of genres. The advent of the novel was not met with enthusiasm by critics, who regarded it as an inferior form of literature, particularly if written by women or featuring women as protagonists. As illustrated in the preceding section, the term fiction may encompass a vast array of sub-genres, distinguished by their content, form, adherence to an aesthetic current, and literary aspect. A vast array of sub-genres can be found across the spectrum of genres, including epistolary novels, travel novels, historical novels, Gothic fiction, fantasy and science fiction, in addition to short stories and a multitude of other literary forms. The interweaving of content, form, and aesthetics has resulted in the emergence of a strikingly heterogeneous body of literature. It has also become evident that literary critics, readers, and the publishing market have, to varying extents, established a hierarchy among the various genres. In this context, the extensive range of works categorised within the broader domain of Speculative Fiction often encounters difficulties in securing the recognition that they deserve, although there are exceptions. In 2017 Marek Oziewicz clarified:

> the term "speculative fiction" has three meanings: a subgenre of science fiction that deals with human rather than technological problems; a genre distinct from and opposite to science fiction in its exclusive focus on possible futures; and a super category for all genres that deliberately depart from imitating "consensus reality" of everyday experience[208].

[208] Marek Oziewicz. *Speculative Fiction*. (2017). In *Oxford Research Encyclopedia of Literature*. (2022) Website: https://oxfordre.com/literature/display/10.1093/acrefore/9780190201098.001.0001/acrefore-9780190201098-e-78, accessed on 28 June 2024. (p. 1).

According to Oziewicz, thus, Speculative Fiction is a term that has expanded its semantic register[209]. It was coined as a name for a genre in the 1940s in response to the need to subvert the post-Enlightenment mindset, as a tool to "dismantle the traditional Western cultural bias in favour of literature imitating reality, [to] recovery the sense of awe and wonder"[210]. Nowadays it is "a fuzzy set super category that houses […] fantasy, science fiction, and horror […] and also their cognate genres like the gothic, dystopia, weird fiction, post-apocalyptic fiction, […], and more"[211]. It is therefore unsurprising that Margaret Atwood considers this label a more appropriate description of her work. The Trilogy addresses a multitude of "cognate genres derivatives", including, but not limited to, dystopia, eco-dystopia, post-apocalyptic, and utopia.

This section offers an overview of the representation of utopian, dystopian and apocalyptic themes in the *Trilogy*. In order to facilitate comprehension, it is useful to recall a few key definitions. The term 'utopia' is derived from the Greek word *ou* (not) and *topos* (place), and can be defined as 'a place that does not exist'. It is used to describe "an imaginary country that has a perfect social and political system"[212]. It was first coined by the Englishman Sir Thomas More in 1516 in his Latin text *Utopia*. However, the concept of utopia has existed for centuries in various forms, including references in the *Bible* (the Garden of Eden in Genesis) and in Plato's *Republic*, which describes a perfect state ruled by philosopher-kings[213]. Other early examples of fictional utopias include Jonathan Swift's *Gulliver's Travels* (1726), which presents an idealised vision of an island nation, and the idea of utopias continued to be popular during the 19th century up to the first half of the 20th century. The concept of a utopia represents an ideal society characterised by superior quality standards and exemplary moral conduct. During the nineteenth century in the United States, there were even attempts to establish actual utopian societies. Despite their good intentions, however, none of the communities achieved the level of success that their

[209] *Ibidem.*

[210] *Ibidem.*

[211] *Ibidem.*

[212] *Cambridge Dictionary*. Website: https://dictionary.cambridge.org/dictionary/english-italian/utopia?q=Utopia, accessed 28 June 2024.

[213] Suzanne Pavlos. *CliffsNotes on* The Giver. Website: <https://www.cliffsnotes.com/literature/g/the-giver/book-summary>. Accessed on 28 Jun 2024.

founders had hoped for[214]. Over time, "the word's meaning has shifted to describe a non-existent society viewed as considerably better than the contemporary one".[215] In the *Trilogy*, utopia is performed by the desire of one of the main characters (Crake) to create a new perfect humanoid species (the Crakers) and replace humankind, which he considered/considers? selfish, greed and corrupted. A genetically modified, utopian species created in a laboratory called "Paradice"[216], where researchers were "working on immortality"[217]. Like the entire world created by Margaret Atwood in the *Trilogy*, set in the pre-apocalyptic eco-dystopian, the Crakers exemplify the paradoxical nature of the fake and real:

> […] they were standing in front of a large picture window. No: a one-way mirror. […] There was a large central space filled with trees and plants, above them a blue sky. (Not really a blue sky, only the curved ceiling of the bubble-dome, with a clever projection device that simulated dawn, sunlight, evening, night. There was a fake moon […] [218].

The concept of a hybridised reality, in which the utopian and dystopian elements coexist, is central to the first book of the *Trilogy*, *Oryx and Crake.* This intermingling can be observed as a recurring theme, serving to blur the boundaries between these two worlds: "[…] over drinks in the Paradice Lounge (fake palm trees, canned music, real Campari, real soda). […]"[219]. Typically, utopias emphasise the values of equity and equality in economic, governmental and judicial systems, with proposed implementations varying according to the author's ideology.[220] This fictional realm draws inspiration from various reality-based disciplines and concepts, yet it has encountered opposition and criticism over time. Lyman Tower Sargent posits that the nature of a utopia is inherently contradictory

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[214] *Ibidem*.

[215] Lyman Tower Sargent. *Utopianism: A Very Short Introduction*. Oxford University Press. Oxford, UK. 2010. (p. 11).

[216] Margaret Atwood. *Oryx and Crake*, *op. cit*. (pp 178, 328…).

[217] *Idem*, (p. 344).

[218] *Idem*, (p. 355).

[219] *Idem*, (p. 356).

[220] Henry A. Giroux. *Utopian Thinking Under the Sign of Neoliberalism: Towards a Critical Pedagogy of Educated Hope*. In *Democracy & Nature*. Vol. 9, N. 1. (pp. 91–105). Routledge. London, UK. 2003.

because societies are not homogeneous, and their conflicting desires cannot simultaneously be satisfied:

> There are socialist, capitalist, monarchical, democratic, anarchist, ecological, feminist, patriarchal, egalitarian, hierarchical, racist, left-wing, right-wing, reformist, free love, nuclear family, extended family, gay, lesbian and many more utopias [Naturism, Nude Christians, ...] Utopianism, some argue, is essential for the improvement of the human condition. But if used wrongly, it becomes dangerous. Utopia has an inherent contradictory nature here[221].

In the period following the Second World War, it was widely held that the utopia genre had reached its demise as a result of the erosion of trust in humanity caused by the atrocities perpetrated and endured during the two global conflicts of the early 20th century. In his work *Utopias and Anti-Utopias*, Edward James offers the following observation:

> It is sometimes said that the ability of the writer to imagine a better place in which to live died in the course of the twentieth century, extinguished by the horrors of total war, of genocide and of totalitarianism. The genre of utopia, […] died when idealism perished, a victim to twentieth-century pessimism and cynicism[222].

Nevertheless, he also put forth the argument that "utopia has not disappeared; it has merely mutated, within the field of science fiction, into something very different from the classic utopia"[223], offering thus a lifeline to contemporary writers.

The opposite of a utopia is a dystopia. Dystopia "is a term used to describe a utopian society in which things have gone wrong"[224]. Dystopias are a way in which "authors share their concerns about society and humanity [and] warn […] society to pay attention […] and to be aware of how things can go from bad to worse without anyone realizing what has

[221] Lyman Tower Sargent, *op. cit.,* (p. 21).

[222] Edward James. *Utopias and Anti-Utopias.* In *The Cambridge Companion to Science Fiction*. E. James (Ed.). Cambridge University Press. Cambridge, UK. 2003 (pp. 219-229; p. 219).

[223] *Ibidem*.

[224] Pavlos, Suzanne, *op. cit.* Website: https://www.cliffsnotes.com/literature/g/the-giver/critical-essays/what-are-utopias-and-dystopias. Accessed on 28 Jun 2024.

happened"[225]. Notable examples of fictional dystopias include, but are not limited to, Bradbury's *Fahrenheit 451* (1953), and George Orwell's *Animal Farm* (1944) and *Nineteen Eighty-Four* (1949). The concept of the dystopia can also be extended to a number of post-apocalyptic works, amongst which it is worth mentioning the more recent *The Giver* by Lois Lowry. Both utopias and dystopias are characterised by the hallmarks of science fiction, typically situated in futuristic settings, where advanced technology is employed to achieve an optimal standard of living. However, once the setting of a utopian or dystopian novel has been established, the focus shifts from the technological aspects to the psychological and emotional states of the characters inhabiting such a reality. In the *Trilogy*, Margaret Atwood presents a witty examination of the erasure of borders between utopia and dystopia and offers numerous instances of a juxtaposition between utopian and dystopian realities. For instance, in accordance with a utopian vision, Crake amused to name the Crakers "after historical figures [such as] Abraham as in Lincoln […]"[226], thereby underscoring Atwood's interest in the interplay between utopia and history. Crakers are herbivorous humanoids that coexist in perfect harmony and balance with the surrounding natural environment. A Craker is the result of a genetic manipulation process. It could be described as a Frankenstein's "Creature"[227] obtained by assembling genetic strings rather than body parts. For instance, Crakers are self-healing. This quality has been attributed to them by Crake, who imported the genetic variation from feline purring, which is believed to have the capacity to heal both bodies and souls. Crakers are a species analogous to Adam and Eve. They were created in "Paradice" to inhabit a new Eden, namely Earth, which is now too polluted for humans but is perfectly suited to this new species. The deliberate comparison between the *Bible* and the Crakers is a recurring theme throughout the *Trilogy*. Crakers are not required to engage in work or farming activities, as they are wholly dependent on their creator (Crake) and the natural environment. Mother Earth is now regarded as Crake's partner, Oryx. They have no need for clothing, as their skin has been designed to withstand the solar radiation that passes through the atmosphere, which has been adversely affected by human activities:

[225] *Ibidem*.

[226] Margaret Atwood. *Oryx and Crake*, cit. (p. 116)

[227] Mary Wollstonecraft Shelley. *Frankenstein or The Modern Prometeus.* (1818). Wisehouse Classics. Sweden. eBook 2015 (Chapter IV, p. 1).

> […] They were naked […] 228 there was no self consciousness, none at all. […] They were so beautiful. Black, yellow, white, brown, all available colours. Each individual was exquisite. […]229 They were perfectly adjusted to their habitat, so they would never have to create houses or tools or […] clothing […][230].

Of particular interest is the reproduction cycle scheme that was devised.

> Their sexuality was not a constant torment to them, not a cloud of turbulent hormones: they came into heat at regular intervals, as did most of the mammals other than man. Infact, as there would never be anything to these people to inherit, there would be no family trees, no marriages, and no divorces[231].

Crake had excised all desires and aims from the genetic map of the Crakers. They reproduce via regular hormonal cycles and are capable of empathy, yet they lack the capacity for love and emotional expression. They engage in sexual intercourse according to a pre-established natural cycle, with no long-term boundaries such as those pertaining to marriage and family. However, their reproductive activities are embedded in a sort of ritual commitment, which includes the exchange of flowers, reminiscent of the courtship rituals observed in human societies, and the use of colour variations, analogous to the courtship behaviours observed in the animal kingdom. The analytical framework proposed by Suzanne Pavlos in her essay on *The Giver* offers a fruitful lens through which to examine Margaret Atwood's *Trilogy*. Utilising Pavlos' terminology, one might posit that Atwood:

> chose to use [utopian/dystopian setting] as the most effective means to communicate the lack of awareness that human beings have about their interdependence with each other, their environment, and their world. She uses the

[228] Margaret Atwood. *Oryx and Crake*, *cit*., (p. 355).

[229] *Ibidem.*

[230] *Idem,* (p. 359).

[231] *Ibidem.*

> irony of utopian appearances but dystopian realities to provoke her readers to question and value their own freedoms and individual identities[232].

The genres of utopian and dystopian fiction have gained popularity over time. Notable works in this genre include those of Margaret Atwood, such as the *Trilogy* which depicts a plague-induced apocalypse in a near dystopic and eco-dystopic future. It illustrates the effects of an epidemic on the future of humanity, portraying a scenario in which humanity is forced to confront the limitations of the environment and the consequences of its actions. Subsequently, in the third volume, there is a vision of rebirth and the emergence of new utopian/dystopian realities. Although it may appear incongruous, the deployment of the dichotomy utopian/dystopian is not arbitrary. Indeed, Atwood herself posits that utopia and dystopia are two manifestations of a singular phenomenon. In her *Dire Cartographies*[233], she synthesises these concepts and introduces the neologism "ustopia"[234]:

> Ustopia is a word I made up by combining utopia and dystopia – the imagined perfect society and its opposite – because, in my view, each contains a latent version of the other [235].

According to Atwood's notion of ustopia, idealistic plans for reforming human society, real or imagined, can lead to unintended consequences. Escalating Edward James' words:

> Once utopia had been achieved, what then? Utopia in the classic sense of the absence of want, injustice, inequality and conflict, will have its own problems. One is the excess of leisure in a post-industrial society […]. The second problem would be that of preventing new […] elites seeking power for themselves in utopia […] and, in its most ultimate form, abundance for all, the end of strife between nations,

[232] Suzanne Pavlos, *op. cit.* Website: https://www.cliffsnotes.com/literature/g/the-giver/critical-essays/what-are-utopias-and-dystopias. Accessed on 28 Jun 2024.

[233] Margaret Atwood. *Dire Cartographies*. In *In Other Worlds: SF and the Human Imagination*, *op. cit.,* (pp. 66-98).

[234] *Idem,* (p. 66).

[235] *Ibidem*.

> races and, for all practical purposes, between individuals. And the species is dying for lack of goals and direction[236].

In *Dire Cartographies* Atwood "maps out literary trends in relation to historical events as well as technological, scientific and medical changes which have altered the topography of the twentieth-century imagination"[237] and places the *Trilogy* on this map.

3.2 *Oryx and Crake*, *The Year of the Flood*, *MaddAddam*: the Trilogy

In light of the preceding discussion, it can be posited that, contemporaneously and historically, non-fiction, prose and poetry act as interpreters and spokespeople for the philosophy and history of their respective eras. The poetic form has become a means of interpreting socio-political reality, with a tendency to depict the natural world and rural environments as sources of inner tranquillity, in opposition to the tumult of urbanisation and the drive for modernisation. The novel provides an opportunity to engage in a discourse on agriculture. The representation of agriculture in the novel was an integral aspect of its very inception. The novels considered to be the inaugural examples of the novel genre, namely *Oroonoko* by Aphra Behn and *Robinson Crusoe* by Daniel Defoe, the authors present a number of key themes, including a description of the dominant colonial strategy of intensive agriculture. The novels are set against the backdrop of the New World's vast wilderness and the extensive monoculture plantations that were characteristic of the English colonial era. While engaging with historical, political, and anthropocentric discourses, these novels also address the interactions between humans and nature in agricultural practices. The aesthetic and poetic expressions of the novels result in a convergence of perspectives on conservation and innovation. In recent times, this convergence has assumed a new identity, namely the environmental issue. Margaret Atwood herself has described the *Trilogy* as speculative fiction and adventure romance, rather than pure science fiction,

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[236] Edward James, *op. cit*., (p. 223).

[237] Amy Suzanne Crawford. *Margaret Atwood* – In Other Worlds: SF and the Human Imagination. In *Postgraduate Contemporary Women's Writing Network Newsletter*, Vol. 3, Iss. 1, Spring/Summer 2012. (p. 7). Online: https://pgcwwn.wordpress.com/wp-content/uploads/2011/03/pgcwwn-newsletter-spring-2012.pdf. Accessed 29 September 2024.

because it does not deal with things "we can't yet do or begin to do"[238], yet goes beyond the amount of realism she associates with the novel form[239]. As articulated by Laura Todeschini in her 2024 article published in *Altre Modernità*, Margaret Atwood's *Trilogy* may be summarised as follows:

> Atwood's *MaddAddam* trilogy mirrors the author's commitment in the environmental debate, articulating, through the topos of the apocalypse, future scenarios due to modern-day generational environmental amnesia[240].

The ongoing debate between environmentalism and ecocriticism, which aims to present a multifaceted response that incorporates the views of all members of civil society, is therefore addressed in the *Trilogy*. The examination of the diverse identities of the characters may offer a new perspective to this debate. In the *Trilogy*, Atwood elucidates the antecedents and consequences of a plague-induced apocalypse. The narrative is set in a near future and is conveyed through a polyphonic array of voices that coalesce into a unified chorus in the concluding pages. The various characters present their perspectives on the present and the past, filtered through their own experiences, and gradually reconstruct the individual and global history of an eco-dystopian past and a utopia. The skilful handling of the narrative by a narrator, whose identity is revealed only in the final pages of the final volume, allows the *Trilogy* to address a multitude of contemporary issues and themes in a thought-provoking manner.

3.2.1. ORYX AND CRAKE: A STORY OF MANIPULATION

The first book, *Oryx and Crake* (2003), presents a plague-induced apocalypse in a near-future context through the observations and flashbacks of a protagonist who is potentially the sole survivor of the event. The work highlights the potential for misuse of genetic engineering, examining a range of pertinent issues, including social inequality. These

[238] Margaret Atwood. *The Handmaid's Tale and Oryx and Crake "In Context"*. In *PMLA*, vol. 119, no. 3, 2004 (pp. 513-517, p. 513).

[239] *Idem,* (p. 517).

[240] Laura Todeschini. *Are We What We Eat or What We Worship? Food Activism and Fanaticism in Margaret Atwood's* The Year of the Flood. In *Altre Modernità*, n. 31 (pp. 72-88, p. 72).

include, but are not limited to, social inequality, the exercise of power, climate change and environmental exploitation. The narrative revolves around a solitary figure, designated as "Snowman"[241], who finds himself in a post-catastrophic environment. This setting is characterized by a climate and a fauna that are hostile to human life. Snowman's sole companion is a genetically engineered humanoid species, designated as "Crakers"[242]. The novel progresses through a series of flashbacks, which elucidate the prequel to the apocalypse, and the present in which Snowman must survive. The use of flashbacks is indicative of Snowman's mental instability, with paranoia and obsessive love for Oryx. Consequently, the order in which they are presented is not necessarily chronological, and is influenced by the partial perspective of the character in question. Despite the novel's plethora of characters, the primary intrigue of this inaugural book could be distilled to three key figures: Snowman, Oryx and Crake.

Flashbacks reveal that Snowman was previously known as Jimmy and had grown up in an environment characterised by the dominance of multinational corporations. These corporations developed and marketed sophisticated technology products, including medical treatments and genetically modified animals. Due to the intense competition that existed within this sector, the employees and their families were isolated in compounds that were purportedly constructed to protect them from the degenerating outside society (the "pleeblands"[243]). The narrative portrays a world on the brink of ecological collapse. Some regions had been submerged, others desertified. Most animal species were endangered or extinct. The contamination of the air, water and land had resulted in the provision of clean air and water, as well as genetically modified foodstuffs (both animal and plant). Jimmy's father was employed as a genetic engineer by one of these companies, the "HelthWyzer"[244]. Here Jimmy met and befriended Glenn, a brilliant science student. Jimmy and Glenn spent much of their leisure time playing online games, smoking weed, and watching underground videos, including live executions, graphic surgery, and other disturbing content. Jimmy began referring to Glenn as Crake when he used that name in an online trivia game called

[241] Margaret Atwood. *Oryx and Crake,* cit. (p. 3).

[242] *Idem,* (p. 46).

[243] *Idem,* (p. 31).

[244] *Idem,* (p. 60).

"Extinctathon"[245]. Their leisure time on internet included child pornography; it was during one of these viewings that Jimmy was lovestruck by the gazing eyes of a young girl, who was later identified as Oryx. The plot progresses, exploring the past of both Oryx and Crake and recalling events involving Jimmy on multiple occasions.

Crake was an excellent student in high school and became a brilliant geneticist and eventual mad scientist. He devised a plan to eradicate the species Homo sapiens from the Earth and replace such a destructive and poorly designed species with a more peaceful and environmentally friendly version: the Crakers. In a nutshell, Crake became a well-paid bioengineer at "RejoovenEsense"[246], and used his prominent position to undertake two principal projects: the creation of a peaceful, gentle, herbivorous humanoids (the Crakers), and the development of a Viagra-like super-pill called "BlyssPluss"[247], whose concealed objective was to disseminate a global pandemic and eradicate humanity. Crake was about to cause a mass plague that would kill the majority of humankind because he wished to rid the world of jealousy, hatred, and other useless emotions. He wanted to save human beings from themselves.

Oryx was a mysterious woman, recognized by Jimmy and Crake as the waif-like girl from the child pornography website. Crake hires her to help with the marketing of BlyssPluss, as a teacher to the Crakers and to be his partner. However, she also began a romantic relationship with Jimmy. Following the catastrophe, her memory continued to haunt Snowman. Crake achieved his objective with the assistance of Jimmy, Oryx and a team of bioengineers comprising the most proficient experts in the field, assembled from the online Extinctathon community. Despite lacking awareness of his intentions, each individual possessed an intuitive sense that something was amiss, yet failed to take action to avert the impending outcome. The flashbacks conclude with the advent of the pandemic, which is presumed to have resulted in the annihilation of humanity, with the exception of Jimmy. He preserved him to ensure that Crakers receive the final part of their education. Both Crake and Oryx perish. Crake kills Oryx by slitting her throat with a knife, and Jimmy promptly shoots Crake dead. In the opening passages of the novel, the protagonist is depicted alone in the aftermath of a catastrophic event. There is no evidence of other

[245] *Idem,* (p. 45).

[246] *Idem,* (p. 178).

[247] *Idem,* (p. 7).

humans, the compounds have become decaying ruins, and he lives in an environment where both climate and animals are hostile. Overnight, when the climate is more conducive to human survival, he initiates the Crakers to a mythology centring on Oryx and Crake as creation figures and assumes the name Snowman. Facing starvation, Snowman resolves to return to the ruins of RejoovenEsense's compound to search for supplies, despite the presence of dangerous genetically engineered hybrid animals. During this journey, he injuries his foot which subsequently becomes infected. He returns to the Crakers' camp and learns that three other humans are camping nearby. Snowman is unsure as to whether these other survivors would be pacific or hostile. The question of what he did remains unanswered at the end of the book.

3.2.2. THE YEAR OF THE FLOOD: A STORY OF SURVIVING

In the second volume, *The Year of the Flood* (2009), minor characters from the preceding book provide an additional perspective on the dystopian narrative. At the outset of the novel, it would seem that only two individuals have survived the lethal pandemic. Toby, a woman in her thirties, survived the lethal pandemic as a result of her confinement to the "AnooYoo"[248] spa. Ren, a young sex worker, was able to evade the fatal plague because she had been placed in a sealed quarantine area. In alternating sections, the novel outlines the circumstances that led to their current situation and survival of the plague. The novel develops and further elaborates upon several of the characters in *Oryx and Crake* and reveals the identity of the three human figures who appear at the end of the earlier book. The impact of scientific and technological advancements that have led to the creation of this plague-stricken world is examined through the lenses of these two female characters. The narrative delves into the activities of a religious sect known as the "God's Gardeners"[249] (or only 'the Gardeners'), to which both protagonists adhere. The God's Gardeners is an environmentally focused religious movement, and the plot revolves around the small community of survivors of the plague. The narrative is once more presented through flashbacks. The recollection of Ren and Toby's time in God's Gardeners and the events that led to their current circumstances allows for a reconciliation with the narration in Oryx and

[248] Margaret Atwood. *The year of the Flood*. Virago. London, UK. 2009 (p. 4).

[249] Margaret Atwood. *Oryx and Crake*, cit. (p. 221).

Crake. Similarly, the description of the present, of the post-catastrophe era, will establish a link with Snowman's present. The Year of the Flood provides a detailed account of the events of Oryx and Crake from the perspective of the lower classes in the pleeblands.

The Gardeners live in a commune at the "Edencliff Rooftop Garden"[250]. The group is described as a religious sect that incorporates elements of Biblical beliefs and practices with scientific ones. The group's members are vegetarians who adhere to the belief that all plant and animal life should be honoured and preserved. Moreover, they have postulated the imminent extinction of the human species, which they refer to as "The Waterless Flood"[251]. They seek to restore human interaction with nature and to value science as produced in nature rather than in labs deprived of a natural process. This group began with Adam, known as Adam One to the Gardeners. Adam One, the founder and leader of the God's Gardeners, is regarded as a charismatic holy man. He disseminates the theological practices and beliefs of the religious sect through his sermons and hymns, particularly in songs from "The God's Gardeners Oral Hymnbook"[252], which also serves a sort of calendar. The God's Gardeners have their own set of saints, all of whom are honoured for their environmental activism, such as "Saint Dian Fossey"[253] and "Saint Rachel Carson"[254]. The stories of Toby and Ren are intertwined with one another, as well as with the characters of the God's Gardeners and the other prominent figures from from Oryx and Crake.

Toby is a young woman who has lost her parents under tragic circumstances. As a result, she is forced to live off the grid, working as a barista at "SecretBurgers"[255], a shady meat burger joint. Upon encountering the unwelcome attentions of the psychopathic manager of the chain, Blanco, who has a reputation for sexually assaulting and murdering the women in his employ, Toby flees with the group of God's Gardeners. She follows them to the Edencliff Rooftop Gardens, where she is instructed in the construction of an

[250] *Idem,* (p. 13).

[251] *Idem,* (p. 7).

[252] *Idem,* (p. ix).

[253] *Idem,* (p. 73). Dian Fossey was an American primatologist. She undertook an extensive study of mountain gorilla groups from 1966 until her murder in 1985 in Rwanda.

[254] *Idem,* (p. 444). Rachel Louise Carson (May 27, 1907 – April 14, 1964) was an American marine biologist, writer, and conservationist. Her sea trilogy (1941–1955) and book *Silent Spring* (1962) are credited with advancing marine conservation and the global environmental movement.

[255] *Idem,* (p. 40).

"Ararat"[256], a substantial storage facility used by the Gardeners to store a considerable quantity of preserved food for use during challenging periods. The Ararat also serves as a seeds bank, which is necessary for future planting and replenished at seasonal harvesting. With the Gardeners, Toby attends a number of courses at the "Wellness Clinic"[257], including Buds and Blooms Choir, Bees and Mycology, Holistic Healing with Plant Remedies, and Wild and Garden Botanicals. The courses at the Wellness Clinic are led by tutors who have expertise in the subject matter. The majority of the tutors were previously employed as experts at Compounds and Pharmaceutical Companies before joining the Gardeners. The objective of these courses is to prepare for the Waterless Flood. The curriculum is designed to equip students with the knowledge and skills they will need during an emergency. Despite her initial scepticism about the theology and religious traditions, Toby takes her "vegivows"[258] and becomes an influential member of the Gardeners. She even rises to the official position of an Eve. Within the sect, Toby encounters Ren, a child member of the Gardeners.

Ren was initiated into the God's Gardeners as a child, following her mother, who had left her HealthWyzer scientist husband after falling in love with Zeb, a member of the sect. Ren matures within the religious sect, forming a friendship with another character from Oryx and Crake, Amanda, who is one of Jimmy's romantic partners. Upon her mother's return to the Compounds, Ren resumes her studies and encounters Jimmy (Snowman), with whom she begins a romantic relationship and subsequently falls in love. Glenn (Crake) is also present at this time and is engaged in covert collaboration with the Gardeners on an undisclosed project. It is notable that the interaction between Crake and the Gardeners offers insight into the genesis of the inspiration for the Crakers, and the resemblance between his plague and the 'Waterless Flood'. Due to her mother's inability to pay her tuition, Ren is forced to terminate her studies and subsequently engages in sex work at the Scales and Tails sex club. This pivotal decision ultimately leads to her confinement in a bio-containment unit during the pandemic, where she evades the fatal plague. Amanda also survives the plague and devises a method to facilitate Ren's release from the bio-containment unit.

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[256] *Idem,* (p. 23).

[257] *Idem,* (p. 72).

[258] *Idem,* (p. 22).

Blanco, enraged by Toby's escape, tracks her down and proceeds to raid the Gardeners, compelling Toby to flee, undergo cosmetic surgery to alter her appearance, and subsequently relocate to the AnooYoo spa. This abrupt and profound transformation proved to be a crucial factor in her survival. During the plague, she sought refuge within the opulent confines of the spa, utilising the foraging skills she had previously acquired with the Gardeners to ensure her survival. Ultimately, Blanco also survived the plague, having been apprehended and incarcerated in the "Painball"[259] forest, a televised game in which teams of criminals compete to eliminate one another within a confined arena. Following the plague, Blanco and a number of other criminals escape from the forest. Ren and Amanda encounter these violent men, who capture and torture them. Eventually, Toby is able to kill one of the criminals and Blanco frees Ren; the others, however, rape Amanda. The novel concludes with Toby, Ren and Jimmy rescuing Amanda and incapacitating the two criminals. As in the ending of Oryx and Crake, the remaining survivors witness an unknown group approaching, carrying torches and playing music.

3.2.3. MADDADDAM: AN USTOPIA

The volume *MaddAddam* (2013) concludes the *Trilogy*. While the plots of the preceding novels progressed in a parallel timeline, *MaddAddam* represents the continuation of both books. The novel *MaddAddam* is written from the perspective of Zeb and Toby, who have become a couple. The narrative alternates between past and present, in the form of storytelling to the Crakers. Jimmy has sustained significant injuries and is no longer able to fulfil his role as a storyteller to them. Consequently, Toby assumes this responsibility and begins to recount tales to the Crakers; she tells them stories of the "world in chaos"[260], which precedes the downfall of humankind, and the story of Zeb. By examining Zeb's life story, the plot becomes more complex, and the characters are shown to have played a role in the implementation of Crake's plan. Zeb and Adam One were raised as half-brothers. Their father, a preacher who was known as "The Rev"[261], espoused a message that was favourable to corporations and advocated the use of petroleum, presenting this as an

[259] *Idem,* (p. 117).

[260] Margaret Atwood. *MaddAddam.* Virago. London, UK. 2013, (p. 12).

[261] *Idem,* (p. 71).

environmentally friendly stance. Disgusted by their father's espoused ethical standards and hypocritical conduct, Zeb and Adam hacked into their father's accounts and emptied them. Aware of their father's considerable political influence, Zeb and Adam flew home, assumed different identities and separated in order to avoid detection. Ultimately, Zeb and Adam re-united and worked together in the funding of the God's Gardeners. The truth of the plague that killed humankind unfolds. It becomes evident that the "MaddAddamites"[262] (the leadership of the Gardeners) were involved in Crake's plan for the plague: Adam, Zeb, Pilar (Toby's mentor), Jimmy, and others played a role in the preparation and release of the plague, either by manipulation or kidnapping at the hands of Crake. Crake's intention was to save human beings from themselves, and Jimmy and the MaddAddamites were part of his project.

In the present of the events, the novel continues the story regaining the characters who survived the plague that has wiped out the majority of the human race. The narrative commences with Ren and Toby rescuing Amanda from her rapists (the Painballers), who manage to flee. The three women subsequently encounter Jimmy and other survivors, establish a camp and begin the process of rebuilding civilisation. Meanwhile, the Crakers who live in the nearby enter their mating season; two Craker males rape Amanda, due to a "major cultural misunderstanding*"*[263]. The narrative of the present intersects numerous parallel individual stories, situated within the broader plot of the unfolding events, Toby's day-to-day life and the challenges faced by the MaddAddamites. The MaddAddamites engage frequently in the discourse pertaining to food security. They engage in horticulture and strategize to develop innovative methods of utilizing the resources at their disposal. Toby assumes a variety of roles. In addition to her narrative duties towards the Crakers, she addresses personal challenges in her romantic relationship with Zeb. She also resumes her role as an Eve, attempting to rebuild the Ararat, which would guarantee food and seed supplies. Furthermore, she reconnects with the bees, who are regarded as messengers of life and secret keepers with the potential to save the planet. Two fundamental concepts form the bedrock of Toby's education at the Gardeners: the vital role of bees and the intrinsic value of mushrooms. The preservation of these species is essential for ensuring the continued existence of life on Earth. In addition to the aforementioned, among the

[262] *Idem,* (p. 36).

[263] *Idem,* (p. 22).

Crakers is Blackbeard, a young Craker boy who develops a fondness for Toby. Toby instructs him in the art of writing and the significance of its practice. Following Toby's demise, Blackbeard assumes the role of the new storyteller and is revealed to be the actual narrator of the *Trilogy*.

The plot of the flow of events can be described as an epic narrative, which reaches its conclusion with the main battle. This battle results in the formation of new alliances and the demise of some of the survivors. The MaddAddamites and the "pigoons"[264] present a unified front against the common enemy, forming alliances and ultimately defeating the Painballers. Each group contributes its own resources. The pigoons have been a constant presence throughout the *Trilogy*, appearing in the second chapter of *Oryx and Crake*. They are genetically modified animals, created by mapping the human prefrontal cortex brain tissue onto pigs' brains, which have rapidly evolved into hyper-intelligent pigs with their own cultures and languages. The novel concludes with Blackbeard assuming the role of storyteller, recounting the final narratives to the incoming generation of Craker children. Through his lens, the tale of the battle is presented. During the battle, Blackbeard assumes the role of an interpreter between the MaddAddamites and the pigoons. The victory is obtained at the cost of Adam One and Jimmy's lives. Zeb dies shortly after the conclusion of the battle during a scouting mission, and Toby ends her life by disappearing into the forest and poisoning herself with mushrooms. In the aftermath of the battle, Swift Fox (another MaddAddamite), Ren, and Amanda discover that they are pregnant with part-Craker children, and they give birth, thereby continuing the human race in some capacity.

3.3 Overcoming dualisms with polyphony

As previously stated, the ongoing debate between environmentalism and ecocriticism is offered a new perspective in the *Trilogy* through the identities of the several characters, which are not always to be interpreted in terms of realistic people. One might posit that the most fruitful approach to interpreting the *Trilogy* is to view it through the lens of duality, through a popular and simplified binary juxtaposition of opposites. Such oppositions may be identified as those between the present and the past, nature and humanity, men and women, and between ecocriticism and environmentalism. It must be acknowledged that

[264] Margaret Atwood. *Oryx and Crake*, cit. (p. 25).

this approach allows for a more nuanced and sophisticated comprehension of the intricate plot, characters, and events. Nevertheless, this lens does not take into account the overall structure of the *Trilogy* nor the intricate interconnections that bind together the various narrative elements. This encompasses the relationship between plot and characters, interactions between characters, the relationship between characters and their environment and the relationship between speculative fiction and readers. It is this author's opinion that a multifaceted approach, reflective of the polyphonic nature of the *Trilogy*, facilitates a connection between the narrator and the reader, thereby providing a gateway to the *Trilogy*'s ustopian reality. Upon examination of the environmental and agricultural themes, it becomes evident that a juxtaposition of past and future exists, yet it is only in the present that this juxtaposition is brought to the fore and given shape by the narrator. The *Trilogy* does not present an innovative solution to the issues of food security and food safety. However, it does illustrate how agricultural practices can be made sustainable even in the most challenging environmental and climatic conditions. The concept of Ararat, as put forth by the Gardeners and reiterated by Toby, serves to illustrate the fundamental principles of seed banking. Furthermore, Toby and the Gardeners employ both *ex situ* conservation techniques, involving the relocation and planting of seeds, and evolutionary breeding practices, selecting crops with enhanced resistance and adaptability for storage and sowing. Moreover, the characters of pigoons and Crakers transcend the duality between wild nature and sophisticated technology. While the natural world progresses independently across the *Trilogy*, seemingly indifferent to the fate of humanity, new generations are formed by the evolution of these genetically modified entities. Likewise, the adaptation of seeds and crops to the challenging environment is remarked throughout the text by the survival of bees and mushrooms, which suggests the possibility of a future. The dichotomy between survival and sustainability, confronted with the opposing forces of environmentalism and ecocriticism, resolves in the new reality that is shaping out of the birth of part-Craker children, who will continuing the human race in some capacity. The concepts of utopia and dystopia are combined to form a single, unified concept of ustopia. The dualities that collapse in ustopia are shaped and represented in various ways, through the actions, evolution and relationships of several major and minor characters. Two motifs in the *Trilogy* recur frequently and are particularly relevant to the analysis presented here: the need for food and the quality of food. In other words, food security and food safety are

important considerations. This analysis focuses on a small number of characters, examining how they exemplify polyphony.

The character of Oryx undergoes a transformation from an initially destructive force to an entity that fosters harmony between humans and the natural environment. This transition occurs within the context of the Crakers' education, during which she instructs them on how to live in harmony with their surrounding environment. Oryx's transition from antagonist to protagonist signifies a shift in perspective from one that exploits the natural world to one that protects it. This character is multifaceted and can be examined from a multitude of perspectives, as it encompasses a vast array of themes reminiscent of Atwood's oeuvre. This analysis concentrates on her dual role in relation to the destruction of the past and the construction of the future. On the one hand, she unwittingly disseminates the plague, thereby annihilating the past. Conversely, she fosters the Crakers and breeds them in harmony with nature, teaching them "Botany and zoology […] In other words, what not to eat and what could bite. And what not to hurt"[265]. Oryx embraces the tenets of environmentalism, which advocates the love of nature for its own sake. She also endorses Crake's proposal to create a new species that interacts with the environment without altering it, as this would ensure the survival of the species. In other words, it is the species that is adapted to the environment. Atwood employs the character of Amanda as a device to advance environmentalism as a key theme. In examining Amanda's artistic output, it becomes evident that it represents a response to the criticisms levied by Amitav Ghosh. Amanda puts forth the notion that art can play a salvific role with respect to the planet. Indeed, in her final body of work, she identifies "LOVE"[266] as the answer to the wellbeing of the planet and humanity alike. Amanda can be regarded as a continuation of Oryx in her efforts to convey messages of environmental stewardship and to safeguard nature as a matter of intrinsic value. It is, however, noteworthy that Amanda's character exhibits a number of differences from that of Oryx. Oryx dies at the conclusion of the initial volume, which coincides with the onset of the plague that reshapes life on the planet. In contrast, Amanda not only survives but also undergoes a significant evolution in personality throughout the subsequent two books. However, it is in Toby that the debate between

[265] *Idem,* (p. 363).

[266] *Idem,* (p. 290).

environmentalism and ecocriticism reaches its zenith. Her character and history are intricately interwoven throughout *The Year of the Flood* and assume an even more prominent role in *MaddAddam*. Environmentalism is manifested in its role of mediating between human necessities and the conservation of the natural environment. The themes of food security and food safety assume greater prominence and are explored from a variety of perspectives and by multiple characters. There is a particular focus on food storage, seed banking, home gardens and *ex situ* conservation, with a corresponding emphasis on opposing practices such as the consumption of junk food, industrial food and food produced from genetically modified organisms (mainly animals). Toby is able to survive both her broken life and the pandemic. The former is addressed through the direct intervention of Adam One and his Gardeners, while the latter is addressed by applying the knowledge gained during her time at the Gardeners. Toby, Amanda and Oryx are all female characters who have survived sexual exploitation and abuse, rape and violence. They personify the violence perpetrated by humanity against nature and their responses to these events mirror the environmental response: death (or "Extinctation"), as reflected in Oryx; adaptation, as demonstrated by Toby; resilience, as shown by Amanda. It is notable that only Amanda survives the events in question.

The God's Gardeners are an eco-religious group that plays a prominent role in the second volume of the *Trilogy*. Atwood does not spare irony and sarcasm towards the Gardeners: an activist faction led by the charismatic figure of Adam One; an extremist, pacifist group, respectful of nature, advocating a vegetarian philosophy, and a healthy life away from all forms of technology and biotechnology. The Gardeners are described as gurus dressed in caftans and rags:

> Toby was working the morning shift when a strange procession approached along the street. From the signs they were carrying and the singing they were doing, she guessed it was a religious thing, though it wasn't a sect she'd ever seen before. […] The leader had a beard and was wearing a caftan that looked as if it had been sewn by elves on hash. […] They looked like raggedy angels, or else like midget bag people. […] [267].

[267] Margaret Atwood. *The Year of the Flood,* cit. (pp. 47-48).

However, as the *Trilogy* progresses, inconsistencies emerge within their ethical framework, their philosophical outlook, and their approach to survival. The involvement of the Gardeners in Crake's pandemic strategy serves to corroborate this assertion. They frequently find themselves in a state of internal conflict, compelled to accept the consequences of their own actions. After the plagues, they are often forced to kill another living being, and sometimes even to consume it as a means of survival. In such circumstances, expressing remorse seems an inadequate response:

> [The pigoons will] dig under the at night and root up her garden in no time flat, and that will be the end of her long-term food supply. She'll have to shoot them, it's self defence. […] The boar falls down. […] Toby's hands are shaking. You've smuffled a life, she tells herself. […] You ought to feel guilty. Still, she thinks of going out with one of the kitchen knives and sawing off a ham. She had taken the Vegivows when she joined the Gardeners, but a prospect of a bacon sandwich is a great temptation right now. […] She murmurs the standard Gardener words of apology, though she doesn't feel apologetic. Or not apologetic enough[268].

The implications of various dichotomies include concepts such as cannibalism/anthropophagy versus vegetarianism, binge eating versus fasting, and the interplay of waste and storage. To illustrate, the survivors that populate the Year of the Flood consume whatever food they can find. In accordance with the tenets of the Gardeners' philosophy, "[…] We are what we eat"[269]; the consumption of "Joltbar"[270] multi-protein bars or regenerative cosmetic creams from AnooYoo Spa is considered a transgression of the vegivow, comparable to the killing of another life form and the consumption of meat. This transgression occurs when food is consumed without consideration of its source, whether it be farmed or genetically modified animals, Joltbars, or any other processed industrialised food. Contextualising the activism of the Gardeners within the broader discourse of food justice and sustainability enables an evaluation of their core beliefs and internal contradictions, including an assessment of the viability and practicality of the

[268] *Idem,* (p. 22).

[269] *Idem,* (p. 481).

[270] Margaret Atwood. *Oryx and Crake,* cit. (p. 291) and *The Year of the Flood,* cit. (p. 66).

Gardeners' form of food activism[271]. The narrative in the *Trilogy* addresses individual and collective environmental responsibility and the political discourse of sustainable agriculture through the lens of the Gardeners and their advocacy for food activism. In opposition to the spectre of consumerist oppression, the Gardeners represent a vision of environmental responsibility that challenges the status quo[272]. In her characteristic witty style, Margaret Atwood situates an eco-religious community at the narrative forefront in the second volume of the *Trilogy*, The Year of the Flood. Against the socio-political backdrop of a capitalist, technocratic, and anthropocentric dictatorship, this group, the Gardeners, disengages from mainstream societal structures with the intent of reconstituting a new Eden. The Gardeners espouse a vegetarian dietary regimen and cultivation methodologies that honour natural flowering rhythms, with the objective of fostering a harmonious alignment between producer and consumer. They are positioned as activists, particularly on the frontlines of heightening awareness regarding the unsustainability of the "Exfernal World"[273] system, where fast-food chains were flourishing. The harsher example is provided by the fast-food chain SecretBurgers:

> The secret of SecretBurgers was that no one knew what sort of animal protein was in them […]. The meat grinders weren't 100 per cent efficient; you might find a swatch of cat fur in your burger or a fragment of mouse tail. Was there a human fingernail, once? [274]

It could be argued that the characters of the Gardeners exemplify the vulnerability of the human system in its pursuit of a path to redemption throughout the *Trilogy*. This path is a way of achieving pacification with a nature that has been damaged by human actions. Their system is inherently fragile, as it is susceptible to continuous re-evaluation and inconsistent decision-making, which are characteristics typical of human behaviour. The actions of the Gardeners have resulted in unintended consequences, as their altruistic intentions have led to collaboration with Crake in the deployment of an apocalyptic epidemic that has nearly

[271] Laura Todeschini*, op. cit*., (p. 72).

[272] *Idem,* (p. 75).

[273] Margaret Atwood. *The year of the Flood,* cit. (p. 71).

[274] *Idem,* (p. 40).

annihilated humanity. The dualism in the Gardeners exists between their ambition to recreate the Eden Garden and their opposition to the Exfernal World. This dualism encompasses the conflict between the desires of the soul and those of the flesh, the aims of the mind and the instinct for survival. It can be proposed that the Gardeners represent a form of proto-Crakers, or alternatively, that the Crakers represent a kind of sublimation of the Gardeners. In the context of the *Trilogy*'s imagery, the Craker appears to embody a form of evolution that may be seen as a refinement of the Gardener. It is therefore unsurprising that there is a considerable degree of similarity in their social structures. Both groups espouse a philosophy of minimalism, striving to live in harmony with nature and adhere to a vegetarian or vegan diet. The Gardener society endeavours to mitigate the environmental impact of agriculture through the cultivation of home gardens atop abandoned edifices. Their dietary habits are vegetarian, they consume only the quantities of food necessary for sustenance, and they have developed the practice of storing food and seeds, in order to guarantee their survival in the event of an impending apocalypse. The Crakers:

> […] were neither hunters nor agriculturalists hungry for land, there was no territoriality: […]. They ate nothing but leaves and grass and roots and a berry or two; thus their foods were plentiful and always available[275]. […] They were perfectly adjusted to their habitat *[…]*[276].

They neither practice cultivation nor storage of food for future consumption. Furthermore, both societies feel uncomfortable in slaying the *Children of Oryx*[277]:

> Every week […] the women stand in the tidal pool and call the unlucky fish […]. Then they point it out and the men kill it with rocks and sticks. That way the unpleasantness is shared among them and no single person is guilty of shedding the fish's blood[278].

[275] Margaret Attwood. *Oryx & Crake*, cit. (pp. 358-359).

[276] *Idem,* (p. 359).

[277] *Idem,* (p. 110).

[278] *Idem*, (p. 116).

A multitude of additional parallels can be identified. To illustrate, both social groups are devoid of any written language, and their assembly moments are comparable. The entire *Trilogy* is characterised by an oxymoron, namely the sublimation of environmentalism based on a genetically modified species. This oxymoron reveals the constant tension between the conservation strategies promoted by the Gardeners and Crake's idea of an extreme restoration of primordial equilibrium conditions. The Crakers represent the pinnacle of genetic modification, exemplifying a genetically modified Gardener who is entirely integrated into the natural environment. This illustrates the environmentalist perspective, which emphasises the preservation of nature for its own sake, and one could conclude that Atwood supports this thesis. However, other characters intervene in the *Trilogy*, namely the survivors and nature. The few individuals who survived the waterless flood are also Gardeneres themselves. It could therefore be argued that another modification of the Gardeneres lies in the survivors, whose approach towards the environment is more utilitarian and focused on *ex situ* conservation, seed conservation and seed storage. This reflects ecocritical theories and is exemplified by Toby's practices. Furthermore, survivors feel no appeal to the natural world nor any desire to live in harmony with a hostile environment. Nature is depicted as an entity that expresses itself independently and is indifferent to the survival of human beings as individuals and as a community. It is a resilient nature that is capable of withstanding the destructive actions carried out by humankind and is indifferent to the ultimate and is not concerned with the fate of humankind. in general. The resilience of nature and the crossbreeding of survivors with Crakers serve to catalyse the opposition between environmentalism and ecocriticism, forming a third category that can be compared to Amanda's resilience.

3.4 The Gardeners: agrobiodiversity as a strategy

As previously stated, the fragility of the system proposed by God's Gardeners can be attributed to two key factors: their ambition to recreate the Eden Garden, and their opposition to the Exfernal World. Furthermore, it was observed that the prototype of the Gardeners' modifies in two ways throughout the *Trilogy*. Firstly, in the case of the Craakers, this represents the Gardeners' sublimation; secondly, in the case of the survivors, it signifies the Gardeners' evolution following the hybridization. The unsustainability and lack of

applicability of the Gardeners' proposed lifestyle are evident from the author's use of irony and sarcasm in presenting them. However, Atwood's proposal is not merely a clever provocation; the Gardeners are, in effect, the backbone of the *Trilogy* and the pivotal figures around whom the lives of the protagonists revolve. In the presentation of agrobiodiversity, it was observed that it can be a tool to combat the loss of biodiversity and the resulting environmental degradation and climate change. The Gardeners serve as its spokespersons throughout the *Trilogy*.

The discourse on the loss of biodiversity is one of the many red threads that make up the fabric of the narrative, providing a comprehensive support network for the entire story. The pre-pandemic reality is described as an eco-dystopia. The most poignant tribute paid by Atwood to the loss of biodiversity in the *Trilogy* is undoubtedly "The God's Gardeners Oral Hymnbook"[279] which mentions the biodiversity defenders (biologists, geneticists, environmentalists, etc.), who are reported as saints in the Gardener's calendar. The Hymnbook shares similarities with both the Surahs of the Koran and the Biblical Book of Psalms in the Old Testament. It contains a combination of hymns, prescriptive lifestyles, and hagiographies of saints, which present the lives, beliefs, and achievements of these individuals. Notably, among these hagiographies is that of "Saint Nikolai Vavilof, Martyr. […] who collected the seeds and preserved them through the siege of Leningrad, only to fall victim to the tyrant Stalin […]"[280], who has already been identified as the father of plant genetic resources and initiator of the studies on agrobiodiversity. In an eco-dystopian world, where anthropocentrism has resulted in significant environmental degradation, those who have dedicated their lives to the cause are honoured. In this eco-dystopian world, pollution, land exploitation and genetic manipulation have irreversibly altered the ecosystem, leading to changes in the climate, topography and the planet's overall habitability:

> […] the coastal aquifers turned salty, and the northern permafrost melted and the vast tundra bubbled with methane, and the drought in the midcontinental plains regions went on and on, and the Asian steppes turned to sand dunes […][281].

[279] Margaret Attwood. *The Year of the Flood,* cit. (p. ix).

[280] Margaret Attwood. *MaddAddam,* cit. (p. 253).

[281] Margaret Attwood. *Oryx & Crake,* cit. (p. 27).

During their teenage years, Jimmy and Crake dedicated a significant portion of their time to role-playing the Adams and the Maddadams in Extinctathon, an "interactive biofreak masterlore game […] found on the Web"[282]. The game employs a role-playing format in which "Adam named the living animals, MaddAddam names the dead ones"[283]. The disturbing element of this literary device is its effectiveness in underscoring the loss of biodiversity in an imminent eco-dystopian future. This is particularly evident in the fact that the extinct animals in the game are often those species that are currently on the verge of extinction. The author's emphasis on the decline of agricultural biodiversity is a pervasive theme throughout the Trilogy, with references that are woven through the narrative and embedded in the everyday lives of the characters. One illustrative example can be found in the description of food. In the initial two volumes of the Trilogy, there is a pervasive allusion to chemical, high-protein, non-natural foodstuffs, which serves to underscore the crisis in agricultural production that is unable to meet demand. It appears that the production of animal protein food has been superseded by the chemical industry or, alternatively, by the breeding of genetically modified farmed livestock. Furthermore, the monitoring of laws and health controls are in the hands of corrupt officials. Indeed:

> […] it was claimed that none of the defunt pigoon ended up as bacon or sausage: no one would want to eat an animal whose cell might be identical with at least some of their own. Still, as time went on and the coastal aquifers turned salty, […] and the Asian steppes turned to sand dunes, and meat became harder to come by, some people had their doubts […] Ramona would always have a salad[284].

The Gardeners only consume solely the food they cultivate in their roof gardens, thereby ensuring that they do not ingest contaminated or non-natural food. The issue is elucidated by Amanda to Toby at the "Tree of Life Natural Material Exchange"[285], a market where the gardeners bring and sell their own products from their roof gardens:

[282] *Idem*, (p. 251).

[283] *Ibidem*.

[284] *Idem*, (pp. 27-28).

[285] *Idem*, (p. 170).

> Affluents from all the SolarSpace gated communities, Fernside showoffs, even people from the Compounds, coming out for a safe pleebland adventure. They claimed to prefer our Gardener vegetables to the supermakette kinds and even the so called farmers' market, where - said Amanda – guys in farmer drug bought stuff from warehouse and tossed it into ethnic baskets and marked up the pries, so even if it said Organic you could not trust it. But the Gardener produce was the real thing. It stank of authenticity: the Gardeners might be fanatical and amusingly bizarre, but at list they were ethical[286].

The loss of biodiversity is also a significant challenge for the group of survivors, who frequently have limited access to a diverse diet due to the scarcity of raw materials. In order to survive, the survivors were forced to violate their vegivows and resort to eating pigoons:

> 'Ever since we turned a couple of them into bacon,' said Manatee. 'Frankenbacon, considering they're splices. I still feel kind of weird about eating them. They've got human neocortex tissue'[287].

Furthermore, survivors have resolved to utilize kudzu as a food source. Kuzdu is one of the most frequently occurring phytogenetic species throughout the text. It is an ancient herbaceous perennial legume crop with origins in Asia (*Pueraria phaseoloides* or tropical kudzu), which has been exported around the world over the centuries by migrating peoples. The crop has a number of potential applications, including in the production of textiles, food and medicine. In agricultural contexts, it offers effective soil erosion control and is employed in pastoral farming as a livestock feed. However, it is one of the most invasive plants in the world, exhibiting high resistance and resilience. Therefore, its monitoring is essential to prevent the complete annihilation of the local habitat and ecosystem, which would result in a significant loss of plant and animal biodiversity in the area[288]. The term recurs six times in *The Year of the Flood*[289] to underscore its resilience and invasive nature,

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[286] *Ibidem.*

[287] Margaret Attwood. *MaddAddam,* cit. (p. 28).

[288] P. S. Sarr, et al. *Phylogeny and Nitrogen Fixation Potential of Bradyrhizobium Species Isolated from the Legume Cover Crop Pueraria Phaseoloides (Roxb.) Benth. in Eastern Cameroon.* In *Soil Science and Plant Nutrition,* 62(1), (pp. 13–19). Springer, Berlin, Germany. (2015).

[289] Margaret Attwood. *The Year of the Flood,* cit. (pp. 18, 343, 373, 439, 452, 462).

indicative of its extensive propagation and utilisation. Additionally, the term is used 19 times in *MaddAddam*[290] in relation to food. Indeed, it serves as the primary sustenance for Crakers and as a contingency for survivors that are lacking access to alternative crops, such as maize and wheat. The mention of kudzu in the text appears to serve a symbolic function, underscoring the invasive nature of the crop and the deterioration of the environment. Once beyond human control, kudzu proliferates rapidly and destructively as a termitarium.

The choral and polyphonic character of the Gardeners is presented through the lens of its members, who exhibit a range of backgrounds, personal histories, and objectives. Moreover, the diversity of its members is also reflected in the way they approach, live and maintain their commitments, as well as their adherence to the sect. Despite its status as a religious sect, characterised by extreme beliefs and behaviours, members are free to join and leave at will. Faults are not met with punitive measures, and it is not the practice of the sect to ban members who have committed them. The sect considers diversity as an asset, paralleling the value of biodiversity in nature. The Gardeners have identified agricultural activities as the primary means of achieving global and human salvation. The rooftop garden agriculture advocated by the Gardeners represents a strategy for safeguarding humanity against the Exfernal World. This proposal is worthy further consideration. The Edencliff Rooftop Garden project is designed to emulate the Garden of Eden, with its bountiful fruits and the hopes for a reconciliation with the creator God. Indeed, it is evident that the Edencliff Rooftop Garden concept makes explicit references to the Garden of Eden, both in its nomenclature and in the theological framework proposed by the Gardeners. Furthermore, the garden does not fall within the categories of a botanical garden, a home garden, or a vegetable garden. The distinction between a home garden and a vegetable garden hinges firstly on the location of the garden. Home gardens are typically situated on terraces or roofs of houses or buildings in highly urbanised areas. Vegetable gardens, in contrast, are small plots of land attached to dwellings. Secondly, there is also a strategic difference: the home garden has the primary function of restoring biodiversity; therefore, the plants in a home garden are not necessarily for agricultural purposes, but may be purely ornamental, as in the case of a botanical garden. The vegetable garden, on the other hand, has the primary purpose of providing the owner with edible products, whether they are

[290] Margaret Attwood. *MaddAddam,* cit. (pp. 41, 110, 118- three mentions, 172, - two mentions, 186, 194, 251, 252, 256, 317, 330, 414, 420, 422, 462).

crops, spices or anything else. The Endencliff Rooftop Garden brings these elements together, using home gardening techniques to create a vegetable garden that is as similar as possible to the Garden of Eden, elucidates Adam One in *The Year of the Flood*:

> By covering such barren rooftop with greenery we are doing our small part in the redemption of God's Creation from the decay and sterility that lies all around us, and feeding ourselves with unpolluted food into the bargain. Some would term our efforts futile, but if all were to follow our example, what a change would be wrought on our beloved Planet![291]

The vegetable garden is also notably productive, with a yield that can be sold. Nevertheless, the limited width of the available space imposes constraints on the types of crops that can be cultivated. Only plants with roots that do not require deep soil can be cultivated, namely legumes, mushrooms, medicinal plants, and spices. From the perspective of the agricultural strategies employed by the gardeners, the text provides limited insight. It seems reasonable to suggest that the garden can be considered a combination of *in situ* and *ex situ* strategies, with elements of evolutionary breeding incorporated to enhance product quality. Additionally, the construction of the roof garden has the potential to create small, complex ecosystems, as evidenced by the presence of diverse insects, the breeding of maggots, and most notably, the close relationship between the Eves and bees. This topic would merit a more detailed examination that is beyond the scope of this analysis.

From an alternative perspective, the construction of the Ararat is of great significance. The structure serves as a storage facility for the roof garden produce and seeds, which are stored while awaiting the catastrophic Waterless Flood. The construction of seed banks and storage facilities has highlighted another significant issue that humankind is facing, namely food security. This problem is not a novel phenomenon; the existence of silos and warehouses for food storage can be traced back to ancient times, as evidenced by archaeological excavations across various civilisations that have settled down. However, in an eco-dystopian world where biodiversity loss is a prominent concern, these facilities assume a crucial role in ensuring survival. New Gardeners are promptly instructed in the creation of an Arata. Indeed, Toby, who was compelled to flee the Eden Rooftop Garden

[291] Margaret Attwood. *The Year of the Flood,* cit. (p. 13).

and seek refuge in the AnooYoo spa, promptly initiated the preparation of a new Ararat, which proved pivotal in her survival after the plague. While the Trilogy provides a comprehensive account of knowledge sharing and transfer, it is notable that there is a dearth of participatory methods. The structure of the Gardeners is characterised by a high degree of hierarchy. This element demonstrates that there is still a paucity of interest or understanding about the relevance and impact of these methods in relation to the overall welfare of local communities and the possibility of successfully achieving the desired outcomes.

The Gardeners and the Crakers represent an extreme environmentalist vision, as opponents to the Exfernal Word, the world before the Waterless Flood. As previously discussed, conservation biology is also related to ecocriticism. The *Trilogy* addresses the ecological crises and promotes conservation, yet it does not examine the long-term sustainability of the proposed agrosystem. Indeed, the discourse on agro-ecology is present in the narrative, but it could be argued that it does not offer any solution. Atwood presents the reader with a series of potential scenarios, each of which can be considered in conjunction with a range of potential solutions. Instead of offering solutions, she poses a series of questions. In her array of questions, she does not compromise, she presents a way forward that considers the real needs of each stakeholder. It is impossible to define the solution in advance, because it is as variable and changeable as the characters in the story and as the evolution of genetically modified species. The solution may lie in a world without humans or Crakers, but perhaps with hybrid forms that represent hope. This same hybridisation and awareness are expressed in the pages that follow the epic battle:

> The garden is progressing well. The Mo'Hair[292] flock is increasing – there have been three new additions to it, one blue-haired, one red-head, and one blond – though one of the lamb was lost to a liobam[293]. The liobams, too, appear to be on

[292] Mo'Hair is a genetically modified sheep whose hair coloration is subject to a wide range of possible variations. Margaret Attwood. *The Year of the Flood,* cit. (p. 38).

[293] "Liobam […] They don't look dangerous, although they are. The lion-sheep splice was commissioned by the Lion Isaiahists in order to force the advent of the Peaceable Kingdom. […] But the result hadn't been strictly vegetarian.". *Idem*, (p. 112).

> the increase. […] Perhaps we should set a guard for the beehives? There are two hives now, as another swarm was captured. Deer are proliferating […][294].

The depiction of this landscape, which evokes a sense of tranquillity and fertility, offers a contrast to the devastation wrought by the plague and the battle. Despite this, the description is not entirely idyllic, as it acknowledges the persistence of challenges and difficulties. The landscape has shifted from the post-apocalyptic one, characterised by destruction and mortality, which Snowman had previously depicted in the first volume of the *Trilogy*:

> […] the remains of a drive-in campsite, with a picnic table and one of those outdoor-barbecue fireplaces, though nobody used hem very much once it got so warm and began to rain every afternoon. He comes upon one now, fungi spouting from the decaying table, the barbecue covered in bindweed[295].

The landscape is no longer characterised by the presence of ruins; instead, it is now imbued with a sense of blossoming nature. Nevertheless, the landscape retains a quality of weirdness, of strangeness, of incongruity, as well as a sense of vigilance. It is evident that the setting is not a romantic countryside; rather, it is an ustopian reality where the potential for the extraordinary and the unpredictable is still present.

In response to Amitav Ghosh's assertion that "When the subject of climate change occurs […], novels and short stories are very rarely to be glimpsed within this horizon. […]"[296], the *Trilogy* offers a compelling counterpoint. Rather than providing a definitive answer, it presents a thought-provoking perspective that challenges conventional wisdom. As Atwood herself would argue, this counter-provocation is offered not by the genre of science fiction, which tells of "extraterrestrials or interplanetary travel"[297], but by the genre of speculative fiction, which "invents nothing we haven't already invented or started to invent" [298].

[294] Margaret Attwood. *MaddAddam,* cit. (p. 458).

[295] Margaret Attwood. *Oryx & Crake,* cit. (p. 193).

[296] Amitav Ghosh, *op. cit.,* (p. 7).

[297] *Idem,* (p. 8).

[298] Margaret Atwood. *Perfect Storm: Writing* Oryx and Crake, *op. cit.,* (p. 284).

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SUMMARY IN ITALIAN

l'Agenda 2023 per gli Obiettivi di Sviluppo Sostenibile, adottata dalle comunità scientifica e internazionale, impone imperativi sociali e ambientali per rendere sostenibili tutti i sistemi alimentari. Si tratta di una necessità per affrontare i cambiamenti climatici, la perdita di biodiversità e le crisi alimentare. La crisi climatica è evidenziata dall'aumento delle temperature e dalla maggiore frequenza di eventi meteorologici estremi, che stanno alterando la disponibilità, l'accesso, l'uso e la stabilità dell'intero sistema alimentare. Il sistema alimentare globale sta affrontando una crisi della biodiversità a causa della rapidità con cui specie, razze, ceppi e varietà stanno scomparendo. Le conseguenze nei sistemi alimentari si riscontrano in una maggiore vulnerabilità degli stessi a parassiti e malattie, nel degrado della qualità del suolo e nell'instabilità dei raccolti. La perdita di biodiversità è stata identificata come l'indicatore principale del degrado ambientale. Il ruolo critico della biodiversità nella produzione agricola, nella sicurezza alimentare, nella nutrizione e nella conservazione dell'ambiente è stato riconosciuto per la prima volta dalla Commissione FAO sulle risorse genetiche per l'alimentazione e l'agricoltura[299] nel 1983. A ciò ha fatto seguito l'impegno della comunità mondiale verso gli obiettivi di conservazione delle risorse fitogenetiche, formalizzato con l'entrata in vigore nel 2004[300] dell'International Treaty on Plant Genetic Resources for Food and Agriculture[301]. Il *2011 Rome Manifest: Using Agrobiodiversity to Transform Food Systems* riporta che le odierne pratiche agricole di produzione intensiva contribuiscono in modo significativo alla perdita di biodiversità e propone l'agrobiodiversità come risorsa strategica per affrontare queste sfide globali[302].

L'interesse della comunità scientifica all'agrobiodiversità come veicolo per combattere la crisi ambientale si inserisce nel contesto degli studi sull'Antropocene e sul rapporto tra uomo e natura. Il ruolo della letteratura in questo contesto è oggetto di accesi

[299] FAO Commission on Genetic Resources for Food and Agriculture.

[300] Claudia Zaccari, et al. *Lessons Learned from the Second International Agrobiodiversity Congress Adopting Agricultural Biodiversity as a Catalyst for Transformative Global Food Systems*. Elsevier. Amsterdam, The Netherlands. Amsterdam, The Netherlands. 2022 (p. 2).

[301] The International Treaty on Plant Genetic Resources for Food and Agriculture. Website: https://www.fao.org/plant-treaty/overview/texts-treaty/en/, accessed 8 February 2024.

[302] FAO. *The 2021 Rome Manifesto: Using Agrobiodiversity to Transform Food Systems*. https://static1.squarespace.com/static/60ba6f3c74111c29f5572da2/t/61858fcf0fa6a109fcc0b7d3/1636143057956/Manifesto_brochure_final_v3.pdf, (p.1), accessed 1 January 2024.

dibattiti. Lo scrittore indiano Amitav Ghosh affronta la questione in *The Great Derangement: Climate Change and the Unthinkable*[303], denunciando l'assenza di narrativa sui temi inerenti alla crisi climatica; denuncia che può quindi essere estesa anche al tema dell'agrobiodiversità. Lo storico Eric Hobsbawm introduce il concetto di "invented traditions"[304] (le tradizioni inventate) come mezzo per inculcare valori, e lo propone come mezzo per la diffusione dei temi ambientali. Alla luce di questa proposta, l'accusa mossa da Ghosh prende ancor più rilevanza, implicando che le questioni ambientali siano invisibili, fantasie da relegare a viaggi intergalattici[305]. Questo studio mostra come la *Trilogia* della Atwood rappresenti un contrappunto convincente all'argomentazione di Ghosh. Dall'ambientazione eco-distopica e post-apocalittica della *Trilogia*, o, per usare le parole della Atwood, da questa ustopia, l'autrice propone la sua contro-provocazione attraverso il genere speculative fiction, che "non inventa nulla che non abbiamo già inventato o iniziato a inventare [306], proponendo così nuovi approcci e visioni nella letteratura e riconsiderando i concetti di genere e di gerarchie in ambito letterario.

La rilevanza scientifica dell'agrobiodiversità nel contesto delle crisi ambientali viene analizzata attraverso l'esame dei suoi quattro pilastri principali: *in situ* conservation, *ex situ* conservation, la biofortificazione con i metodi evolutivi (evolutionary breeding) e gli organismi geneticamente modificati (OGM). Nonostante i diversi punti di vista degli scienziati, questi campi sono rappresentati negli studi critici sulla sostenibilità e sull'impatto ecologico. Nella trilogia di Atwood si pone l'accento sul declino della biodiversità agricola e sulla perdita di biodiversità, che riflette l'impegno dell'autrice nei confronti delle tematiche dell'Agenda 2030.

Il concetto di agrobiodiversità è emerso negli anni '80, mentre gli studi critici sulla biodiversità e sulle questioni ambientali lo hanno consacrato come disciplina distinta solo alla fine del XX secolo. Di conseguenza, non è stato possibile trovare una bibliografia sull'agrobiodiversità. Tuttavia, la continua rilevanza delle questioni relative alla natura, all'agricoltura e all'agrobiodiversità può essere dimostrata attingendo all'ampia letteratura

[303] Amitav Ghosh. *The Great Derangement: Climate Change and the Unthinkable*. The University of Chicago Press, Chicago, USA. 2016 (pp. 7-8).

[304] Terence Ranger, and Eric J. Hobsbawm. *The Invention of Tradition*. Cambridge University Press, Cambridge, UK. 1983 (Introduction, p. 1).

[305] Amitav Ghosh, o*p. cit.,* (pp. 7-8).

[306] Margaret Atwood. *Perfect Storm: Writing Oryx and Crake*. In *Book of the month club/Bookspan* by Margaret Atwood. O.W. Toad Ldt 2003 (p. 284).

e agli studi critici che hanno identificato l'ecocritica e l'ambientalismo come due movimenti principali. Uno degli studiosi più importanti degli studi letterari sull'ambiente, Lawrence Buell, ha affermato che la celebrazione della natura per il suo valore intrinseco, della natura per la natura, serve a rafforzare le convinzioni ambientali dei lettori[307]. Questa affermazione riafferma il ruolo della letteratura nell'articolare i problemi e nel catalizzare il cambiamento, e riporta ancora una volta all'appello lanciato da Amitav Ghosh. Questo studio ha rivelato la sintesi proposta da Margaret Atwood nella *Trilogia*, sottolineando il rapporto tra uomo e natura e un tema ricorrente e duraturo nella letteratura e nella trilogia: il giardino.

Il rapporto tra l'uomo e la natura segna anche il concetto di alterità, che nel XX secolo è stato oggetto di critiche e revisioni significative. Questo cambiamento ha portato alla identificazione di un nuovo concetto, quello di identità. Nel 2020, Jean-François Staszak ha proposto di sostituire il concetto di alterità con la promozione di identità alternative[308]. Questo approccio si presta per un'analisi del rapporto tra uomo e natura nella letteratura canadese, in cui la natura si manifesta in maniera peculiare e specifica. La narrazione della *Trilogia* si sviluppa attraverso una polifonia di voci. Margaret Atwood lascia che i suoi personaggi presentino il loro rapporto con l'alterità in opposizione binaria, per poi far convergere la narrazione verso la costituzione di identità ibridate.

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[307] Joni Adamson. *Literature-and-Environment Studies and the Influence of the Environmental Justice Movement*. In *A Companion to American Literature and Culture.* Wiley-Blackwell. Hoboken, NJ, USA. 2010 (pp. 593-606, p. 594).

[308] Jean-François Staszak. *Other/Otherness*. In *Encyclopedia of Human Geography* (Second Edition). Elsevier. Amsterdam, The Netherlands. 2020 (Vol. 10, pp. 25-31, p. 26).