Chapter 3
Civil Society, Climate Change, Security Risks Management and Peacebuilding in the Anthropocene

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Abstract The field of peace studies is seeing an increased interest in environmental peace-making or peace ecology. This chapter explores the security threats and conflicts induced by climate change on humanity while advocating available tools aimed to attenuating environmental instability in several regions of the globe and maintaining the sustainability of biodiversity. The pursuit of peace in climate change context requires a pluridisciplinary approach that encompasses a better understanding of environmental conflicts, environmental justice, peace ecology, ecoeducation, ecoethics, and developing climate-sensitive adaptation and conflict-sensitive mechanisms to alleviate the effects of conflicts induced by climate change. The chapter argues that a synergic cooperation between civil society, business, corporations and political actors has the potential to lead a global and concerted implementation of healthy ecological policies. Finally, the interplay of various dimensions of human agency to protect the ecosystem are held as the pathways to mitigating the global environmental crisis we are confronted with in our time, and to achieving ecological sustainability.

Keywords Anthropocene · Climate change · Ecojustice · Environmental conflicts · Human agency · Environmental peace · Peacebuilding · Security risk management

3.1 Introduction

The last three decades have revealed growing concerns over the future of the Earth as the Earth system appears to be deteriorating, creating a new landscape of conflict

[1] "The prevalence of moderate or severe food insecurity in the population, based on the Food Insecurity Experience Scale (FIES) is an estimate of the percentage of a country's population that faces difficulties in accessing enough safe and nutritious food for normal growth and development and an active and healthy life." (*Hunger and food insecurity.* Food and Agricultural Organization of the United Nations FAO 2021). http://www.fao.org/hunger/en/. Accessed 28 July 2021.

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resulting from climate change (Bob et al. 2014; Bronkhorst 2011; Willms/Werner 2009). Thanks to research and the conceptual development of planetary boundaries (Rockström et al. 2009; Steffen et al. 2015), we are provided with scientific data and evidence of the deterioration of our planet which calls for new ways of pursuing economic development without destroying the Earth and the future of humanity.

The negative consequences of climate change in Africa are experienced in Somalia (Eklöw/Krampe 2019), in the Horn of Africa (Krampe et al.2020), in the Sahel Region (Bronkhorst 2011), in Mozambique (Artur/Hilhorst 2012; Osbahr et al. 2008), and other parts of Africa (Bob/Bronkhorst 2014; Lisk 2009). This situation requires a host of approaches and questions intended to mitigate the negative anthropogenic causes of climate change, find adequate means of climate change adaptation (Bob et al. 2014; Pius Yanda/Bronkhorst 2011), and take preemptive measures to deal with climate change-induced conflicts (Pihkala 2018), or develop conservatory preventive approaches to protect the environment, all of which are theorised as peace ecology (Brauch 2016; Brisman 2016).

In the same perspectives, new paradigms aimed at preserving the natural beauty of the environment have emerged, namely environmental peacebuilding (Hardt/Scheffran 2019), environmental justice (Schlosberg 2004, 2013; Sze/London, 2008), the whole range of activism against climate change by civil society organisations (Böhmelt 2013; Caniglia et al. 2015; Newell 2008), and individual agency such as the leading role being played by "teen green" Greta Thunberg (Kühne 2019; Thunberg 2019b, 2020).

Climate change has been acknowledged as an issue of paramount international disquietude at the UN level (Wilson 2020, p. 33). Nonetheless, finding a consensus between foreign and domestic policy priorities among powerful states have been very slow and continue to inhibit more proactive responses on the part of the Security Council, despite elevating climate change to the stage of international concern (Wilson 2020). The survival of humanity (McNeely 2020) is at stake and it is urgent to save our "common home" (Pope Francis 2015). This is a moral obligation: firstly because the atmospheric conditions become hostile to humanity; secondly because of the risks of further direct violence due to the lack of tools to handle environmental disputes related to natural resources; and lastly because climate change has become a large-scale instrument of destruction of infrastructure and the conditions for decent livelihoods.

This chapter is justified by the imperative to mitigate the risks associated with failure to deal with climate change and its consequences that may create insecurity, and hinder local, regional, transregional peace (Krampe 2017; Krampe/Mobjörk 2018). The science is crystal clear but progress towards mitigating climate change has been very slow. Humanity remains vulnerable without a real action plan or determination to prevent the worst from happening, which echoes the frustration of Rowlatt (2021), the BBC Chief Environment Correspondent who notes:

> In Paris, the world agreed to avoid the worst impacts of climate change by trying to limit global temperature increases to 2°C above pre-industrial levels by the end of the century. The aim was to keep the rise to 1.5°C if at all possible (p. n.p.).

The International Panel on Climate Change (IPCC) suggested the following direction to mitigate climate change: "Pathways consistent with 1.5°C of warming above pre-industrial levels can be identified under a range of assumptions about economic growth, technology developments and lifestyles" (Fifita et al. 2018). However, there is no substantial improvement. Rowlatt (2021)further remarks:

> We are way off track. On current plans the world is expected to breach the 1.5°C ceiling within 12 years or less and to hit 3°C of warming by the end of the century. Under the terms of the Paris deal, countries promised to come back every five years and raise their carbon-cutting ambitions (p. n.p.).

If this is the trend for the future, coupled with denialism from world leaders of the threat posed by climate change, our world and the future of humanity is in jeopardy, as pointed out by Rowlatt (2020) who noted that the Antarctic is melting and shows the devastating consequences of climate change and *the journey to the doomsday glaciers.*

For Africa, climate disruption is already having extreme consequences, according to the UNEP Global Environment Outlook 2000 report (UNEP 1999) by Clarke (1999):

> Poverty is a major cause and consequence of the environmental degradation and resource depletion that threaten the region. Major environmental challenges include deforestation, soil degradation and desertification, declining biodiversity and marine resources, water scarcity, and deteriorating water and air quality. Urbanisation is an emerging issue, bringing with it the range of human health and environmental problems well known in urban areas throughout the world. Growing 'environmental debts' in many countries are a major concern because the cost of remedial action will be far greater than preventive action (p. 6).

The main objective of this essay is to raise international awareness and urge all strata of society to become peace actors in the fight against climate change ensured from the degrading condition of the Earth System; this perspective requires a great sense of urgency and active participation of the entire human family.

The argument put forward here is drawn from literary research utilising scholarly online resources (internet web-browsing devices) which are considered as some of the many tools and techniques of literary research (Towheed 2009, p. 11). These materials were analysed and interpreted according to content analytical methods which are essentially interpretive (Hsieh/Shannon 2005; Krippendorff 2004).

This essay is structured as follows: (1) the introduction that substantiates the existing ecological and vital challenges humanity is faced with in the Anthropocene; (2) a brief conceptualisation of the Anthropocene Epoch; (3) a brief discussion of planetary boundaries framework to monitor and act against climate change and its effects on the ecosystem; (4) an overview of security issues triggered by climate change, and the need of environmental peacebuilding; (5) an exploration of innovational mechanisms of climate sensitive adaptation to prevent climate change-induced conflicts; (6) a discussion about environmental conflict and ecojustice; (7) an exploration of environmental peacemaking or peace ecology; (8) a discussion on the relation between ecological education and ecological ethics, and their relevance to action against climate change; (9) an investigation of the role played by civil society to fight

climate change; (10) a discussion on the impact of human agency in alleviating the burden of human activities on the atmospheric condition; and finally, (11) some concluding remarks are drawn from the analysis of civil society's engagement in climate action and environmental peacemaking.

3.2 The Anthropocene Epoch

The Anthropocene is a new geological epoch in Earth's history that is discernible in the set of anthropogenic perturbations on atmospheric conditions resulting from human activities, and the extent to which that effects the well-being of the ecosystem. Rafferty (n.d.) explains the Anthropocene Epoch as deriving from the Greek and means the "recent age of man". It is an unauthenticated interval of geologic time that makes up the third worldwide division of the Quaternary Period (2.6 million years ago to the present) (Rafferty n.d.) and:

> [It is identified as] the time in which the collective activities of human beings (Homo sapiens) began to substantially alter Earth's surface, atmosphere, oceans, and systems of nutrient cycling. A growing group of scientists argue that the Anthropocene Epoch should follow the Holocene Epoch (11,700 years ago to the present) and begin in the year 1950 (Rafferty n.d., n.p.).

While it is known that the American biologist Eugene Stoermer coined the concept of Anthropocene in the late 1980s, it is the Dutch chemist and Nobel Prize Laureate Paul Josef Crutzen who is predominantly credited with vulgarising this concept in 2000 (Rafferty n.d.). Later, in 2008, British geologist Jan Zalasiewicz and his colleagues advanced the first proposal to recognise the Anthropocene Epoch as a formal geological interval (Rafferty, n.d.). Finally, in the Anthropocene Working Group of the International Union of Geologic Sciences (IUGS) that took place in 2016 a vote passed recommending the Anthropocene to be acknowledged as a formal geologic epoch; that was at the 35th International Geological Congress (Rafferty n.d.).

Prof. Jos Lelieveld, the Director of Max Planck Institute for Chemistry (Otto Hahn Institute), notes that geologists have traditionally called the most recent 12,000 years the Holocene, Paul J. Crutzen contends, "in the past centuries the impact of humanity on the Earth's surface is so large, and unique, that a renaming of the geological timescale is justified" (Jos Lelieveld cited in Crutzen/Brauch 2016, p. xii).

The starting date of the great impact of anthropogenic effects on the environment is debatable. Thus, Stephen et al. (2011) propounds the following about the term Anthropocene:

> (i) that the Earth is now moving out of its current geological epoch, called the Holocene and (ii) that human activity is largely responsible for this exit from the Holocene, that is, that humankind has become a global geological force in its own right (p. 843).

Crutzen (2016) places the start of Anthropocene in the late eighteenth century; he elucidates, "when analyses of air trapped in polar ice showed the beginning of

growing global concentrations of carbon dioxide and methane" (p. 211). He expounds that further stating:

> It seems appropriate to assign the term 'Anthropocene' to the present, in many ways human-dominated, geological epoch, supplementing the Holocene—the warm period of the past 10–12 millennia. The Anthropocene could be said to have started in the latter part of the eighteenth century, when analyses of air trapped in polar ice showed the beginning of growing global concentrations of carbon dioxide and methane. This date also happens to coincide with James Watt's design of the steam engine in 1784 (Crutzen 2016, p. 211).

According to Zalasiewicz et al. (2010, p. 2231), "The Anthropocene represents a new phase in the history of both humankind and of the Earth, when natural forces and human forces became intertwined, so that the fate of one determines the fate of the other". Human agency is responsible for dramatic atmospheric transformations as pointed out by Oswald Spring /Brauch (2021):

> Direct human interventions into the Earth System through the accumulation of greenhouse gases and carbon dioxide (CO_2) in the atmosphere have caused multiple societal impacts resulting in rapid increases in production, consumption, urbanisation, pollution, migration, crises and conflicts (p. 32).

According to the industrial view, most effects occurred in the early industrialisation period around 1850, whereas the early anthropogenic opinion reckons that significant impacts date to thousands of years before (Ruddiman 2013). There are three indicators that Ruddiman discusses to define the Anthropocene; these are mainly "global-scale human influence: forest clearance (and related land use), emissions of greenhouse gases (CO_2 and CH_4), and effects on global temperature" (2013, p. 45). He contends that "anthropogenic impacts on Earth's environments" were manifest in the past 150 years, and not before 1850, since during the preindustrial era when world populations were lower than in the early industrial view, there were "very small early anthropogenic effects on land use and greenhouse-gas emissions" (Ruddiman 2013). In contrast, it is argued:

> [H]istorical and archeological data reveal much larger forest clearance in preindustrial times because early farmers used much more land per capita than those in recent preindustrial centuries […]. This early deforestation, along with other effects of early agricultural activities, resulted in large greenhouse-gas emissions […] consistent with the anomalous CO_2 and CH_4 increases seen when compared with decreases during previous interglaciations (Ruddiman 2013, p. 64).

Ruddiman (2013) considers two periods of the Anthropocene, based on the historical and archeological evidence, showing that deforestation in preindustrial times was much more sizeable that it appears during the industrial era; also, the emissions of greenhouse gases during the preindustrial epoch were smaller, though substantial; and finally, he remarks that "the net anthropogenic effect on global temperature was probably larger in preindustrial than industrial times" (p. 65). He proposes a two-phase Anthropocene to resolve the timing (start) of this new geological epoch. They are:

- An early phase with anthropogenic effects that began at a very small level thousands of years ago but slowly grew to considerable size by the end of preindustrial times.
- A later explosive phase of wide-ranging anthropogenic impacts during the industrial era.

It is plausible to assert that agricultural activities, besides other human searches for better living conditions prompted by complex human existential needs, have caused the degradation of the Earth system along with world population increase, the development of civilisations, the onset of the industrial revolution, and the looming super interglacial climate, thus making the informal use of the term Anthropocene more meaningful (Ruddiman 2013). According to Steffen et al. (2011), the beginning of the Anthropocene Era coincides with advent of the industrial revolution around 1800.

Conceding that humans' actions are at the origin of the Anthropocene Epoch, it is also straight-thinking to reckon that the pernicious after-effects of this geological period can be controlled by humanity to slow further ecological deterioration. To deal with the anthropogenic repercussions of atmospheric perturbation, Crutzen has already appealed to scientists and engineers to lead society through this new geological time with adequate information and behavioural adaptation to the new epoch; he writes:

> A daunting task lies ahead for scientists and engineers to guide society towards environmentally sustainable management during the era of the Anthropocene. This will require appropriate human behaviour at all scales, and may well involve internationally accepted, large-scale geo-engineering pro-jects, for instance to 'optimize' climate. At this stage, however, we are still largely treading on terra incognita (Crutzen 2016, p. 212).

In the Anthropocene, we are navigating in "terra incognita" as Paul Crutzen expresses it. Africa is no exception because it is already highly vulnerable. The northern Mauritania is a case in point as people experience first-hand the impact of global warming; this is reported by BBC (2021): "The rising temperatures and desertification are wiping out communities and as the Life at 50C series has discovered, many are being forced to leave their ancestral homes in search of a better life" (BBC News 2021). That calls for an increase in research, and engaging actors at various levels of society; political leaders, business and corporations, and civil society (non-governmental organisations, religious leaders, grassroots leadership, think tanks, academics, intellectuals, etc.). Building a global partnership and cooperation among all these components of society will assist in reading the signs of the time, studying and analysing the development of incidences associated with past, present and future atmospheric conditions in order to maintain peace and harmony within the ecosystem, more practically on the Earth. One agent this chapter is concerned with is civil society; it has been participating in climate action and it can achieve more to alleviate the burden of human activities on the Earth system.

Thus, it is necessary to follow scientific data that research puts at our disposal via the evidence of planetary boundaries that is explored in the next section. The planetary boundaries framework is useful to assess the impact of human action on

the Earth system and to envisage the series of interventions required to lessen the risks of complete disintegration of our planet and eventually to avert the disastrous consequences of anthropogenic climate change on peace, security and livelihoods of humanity. The framework that provides a scientific ground and proven evidence of how human activities, since the dawn of the Industrial Revolution, have become the major cause of global environmental change is known as planetary boundaries (PBs; Steffen et al. 2015).

3.3 Planetary Boundaries and the Survival of Humanity

The concept of planetary boundaries was introduced by Johan Rockström and colleagues; it refers to:

> The approach recognizes the severe risks associated with trying to deliberately manipulate the Earth system to counteract deleterious human influences, given the lack of knowledge of the functioning of the Earth system and the possibility of abrupt and/or irreversible changes, some of them very difficult to anticipate, when complex systems are perturbed. The planetary boundaries approach is thus explicitly based on returning the Earth system to the Holocene domain, the environmental envelope within which contemporary civilisation has developed and thrived (Steffen et al. 2011, p. 860).

The planetary boundaries framework indicates the 'safe operating space' for humanity, with care for the Earth system; they are founded on a handful of subsystems or processes, the multitude of which display abrupt change performance when critical thresholds are crossed (Steffen et al. 2011, p. 860). It follows then that need to create viable and satisfactory living conditions which depends on development gets scientist entangled in a dilemma of how to use Earth's resources to pursue humanity's sustainability and well-being without endangering the ecosystem and prompting its further disintegration (Steffen et al. 2011, p. 860) (Fig. 3.1).

Steffen et al. (2015) define planetary boundaries as follows:

> [They are] scientifically based levels of human perturbation of the ES beyond which ES functioning may be substantially altered. Transgression of the PBs thus creates substantial risk of destabilising the Holocene state of the ES in which modern societies have evolved (p. 736).

Humanity needs natural resources such as forest, bush, water, air space, etc., which are made available through technological innovations; how to restrain technological impulse to protect and present the environment? (Steffen et al. 2011, p. 860). The lack or insufficiency of those natural resources are becoming the driver to insecurity, conflicts and violence.

With the UN 2030 Sustainable Development Goals (SDG) Agenda, we are faced with the growing challenge to operate without destabilising further the natural regulation of climate. The dilemma we are faced with is providing for the needs of the whole world, and simultaneously attenuate the devastating effects of climate change (Morton et al. 2019). It is important to argue that the UN SDGs constitutes a project

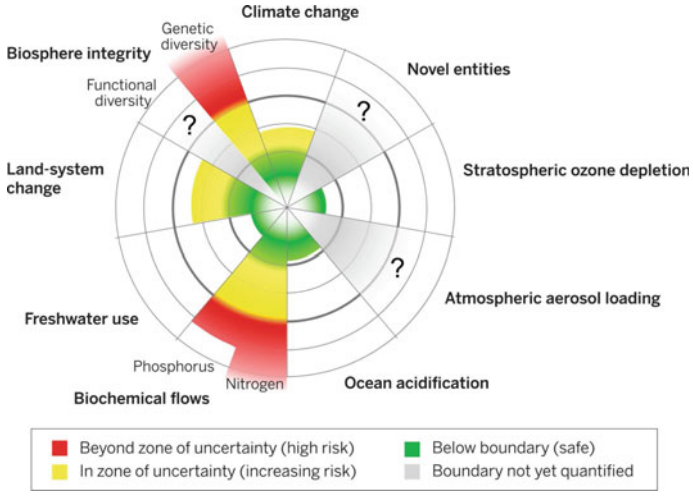

Fig. 3.1 Planetary boundaries. *Source* Steffen et al. (2015, p. 6)

of global development that puts in place the mechanisms to ensure the goals poverty eradication, protection of the environment and social justice are attained without hurting our planet; this agenda intends to make the Earth a habitable home, and make sure that all people relish peace and prosperity (Morton et al. 2019). Thus:

> The SDGs integrate the three dimensions of sustainable development (economic, environmental and social), they apply to high-income countries as well as developing countries and there are mechanisms to hold countries to account (Morton et al. 2019, p. 65).

The real existential and vital conundrum humanity is confronted with in the Anthropocene is to attain a greater quality of life and satisfy various human needs such as water, electricity and nutrition for the overall world population (estimated at 9 billion) without infringing planetary ethical standards or destabilising planetary processes (O'Neill et al. 2018). These scholars examined the possibility of having a "safe and just" development space; they evaluated the quantified resource use that is susceptible of meeting basic human needs; and they compared this to downscaled planetary boundaries of an estimated 150 nations. They came up with the following findings: "no country meets basic needs for its citizens at a globally sustainable level of resource use. Physical needs such as nutrition, sanitation, access to electricity, and the elimination of extreme poverty could likely be met for all people without transgressing planetary boundaries" (O'Neill et al. 2018, p. 1). The challenge remains significant in any strategy to ameliorate "physical and social provisioning systems" in order to move nations towards sustainability (O'Neill et al. 2018).

Human activities injure the sacred Erath system space as the ozone layer is wounded. The invasive activity of humans in the environment has damaged the ozone layer; the consequence of this renders humans and non-human creations vulnerable. To illustrate this point, Steffen et al. (2011) remarked:

> Following the discovery of the ozone hole over Antarctica, with its undeniably anthropogenic cause, the realization that the emission of large quantities of a colourless, odourless gas such as carbon dioxide (CO_2) can affect the energy balance at the Earth's surface has reinforced the concern that human activity can adversely affect the broad range of ecosystem services that support human (and other) life [1,2] and could eventually lead to a 'crisis in the biosphere' ([3], cited in Grinevald [4]) (pp. 842–843).

It appears that the invasion of the atmosphere by substances that toxify the ozone is a multiplier factor that occasions global warming and the rise in sea levels and threatens the survival of all oxygen-dependent creatures (humans, flora, fauna, and all vegetal and animal species). The Earth's degradation is far, far more concerning than the destruction resulting warfare. If such violence is avoidable and controllable (as has been shown with the notion of "democratic peace", antimilitarism and other forms of pacifism, conflict mediation, and diplomacy, in the face of ecological violence such as "tsunami" wild fires, global warming, and the rise in sea levels), the sole rational defence left for humanity remains a concerted engagement to which Pope Francis and his predecessors have called the world: a radical change in behaviour and use of the resources that nature provides (Pope Francis 2015). This requires a conscientious use of technological innovations and the recognition of the sacredness of the ozone that regulates climate and atmospheric conditions. All these matters not only concern human security but moreover entail environmental security (Kyrou 2007); to some extent, the lack of food security is also a cause of concern in the Anthropocene (Steffen et al. 2011). Thus, global warming will significantly affect humans (Zalasiewicz et al. 2010). Therefore, we now briefly examine global-warming-induced climate change, the extent to which peace and security are fragilised, and how peacebuilding initiatives can alleviate the burden of atmospheric perturbation on both humans and non-human beings and their natural environment.

3.4 Climate Change, Security and Peacebuilding

From the perspectives of Bob et al. (2014), borrowed from Houghton and the World Meteorological Organization (2002), the concept of climate is described as "the average state of the atmosphere for a given time scale (hour, day, month, season, year, decades and so forth) and generally for a specified geographical zone" (Bob et al. 2014, p. 27). This atmospheric condition has caused conflicts and is likely to generate more disputes in the future, which will require some adaptation and risk management that would call for the participation of several international and regional actors and partners. This view is raised by Pius Yanda/Bronkhorst (2011) who remark:

> Climate change and climate-related conflict are at once a challenge to livelihoods, for natural resource management and for peacebuilding. Conflict-sensitive climate change adaptation is and should remain at the core of existing and future work in the fields of sustainable [development], the environment and peace. Given that the linkages between climate change and conflict are complex, and operate at different scales across time and space, there is a need

> for different scientific disciplines to work together on research, including local knowledge from communities who have already shown resilience (p. n.p.).

Civil wars, insurrections, and regional conflicts have fallen in number and intensity, but climate change may re-ignite such wars. A new front of conflicts is opening up, namely environment-related conflicts, where sustainable development and peace are at stake because of climate change.

Thus research and reflection are needed to frame a more comprehensive agenda to manage natural resources in the aftermath of conflicts, namely an inclusive environmental peacebuilding scheme that embraces environmental cooperation and resource risk management and the necessity to mitigate resource-induced instability by carrying through environmental cooperation projects (Krampe 2017).

It is worth noting, for instance, that such cooperation has grown between the UN Peacebuilding Commission and the UN Environment Programme (UNEP) to generate a synergic research project aimed at overseeing resource risks, and which incorporates the Environmental Law Institute, the University of Tokyo, and McGill University (Krampe 2017, p. 4). It is argued, finally:

> Future research needs to acknowledge the complexity of the post-conflict landscape and advance environmental peacebuilding research to realize the potential and the risks of natural resource management. This is urgently needed, because this complexity lies at the core of the SDGs that will guide UN policies in the coming decades and is instrumental to building a sustainable peace (Krampe 2007, pp. 6–7).

Due to the fact that "Climate-related security risks are increasingly transforming the security landscape in which multilateral peacebuilding efforts are taking place" (Eklöw/Krampe 2019, p. vii), environmental peacebuilding research is growing as in important area of inquiry in the Anthropocene. The work carried out by Krampe/Mobjörk (2018)demonstrates the significance of responding to climate-related security risks in four regional intergovernmental organisations (IGOs) in Asia and Africa—ASEAN (South East Asia), SAARC (South Asia), ECOWAS (West Africa), and IGAD (East Africa). The ability of the world to deal with the complexities of peace and security at various levels of society and prevent the vulnerability that is being prompted by climate change that is likely to affect livelihood conditions and development too, relies not only on civil society organisations, but also on IGOs (Krampe/Mobjörk 2018). There is an increasing awareness among IGOs about security risks related to climate which need to be addressed via international cooperation because of the transnational dimension of climate-related security risks and the emerging challenges the world has to face; this requires further studies on the effective implementation of climate-management risk policy frameworks that are relevant in regional adaptation processes (Krampe/Mobjörk 2018) in order to prevent and resolve environmental conflicts nonviolently. To assuage the effects of global warming that imperils peace, and destabilises people's peaceful settlement in their natural environment, is important to consider climate conflict-sensitive adaptation theory and praxis; that is examined to the next section.

3.5 Climate Conflict-Sensitive Adaptation

The repercussions of climate disruptions include their effects on the *ecogeomorphology of coastal wetlands* (Day et al. 2008), *warming water*, *coral bleaching*, *rising sea levels* and their repercussions on different regions of the Earth (McClanahan/Cinner 2012), etc. However, new perspectives have surfaced, naturally the "climate sensitive-adaptation" along "conflict-sensitive" concept (Bob/Bronkhorst 2014; Bob et al. 2014; Pius Yanda/Bronkhorst 2011). The thinking behind this model of response to climate crisis is to acknowledge the established fact about the irreversibility of Earth systems to their original healthy status. A number of researchers support conflict-sensitivity in the pursuit of climate change sensitive-adaptation, because it firstly climate change can engender scarcities of resources; secondly, because it can heighten existing threats to peace and security (Pius Yanda/Bronkhorst 2011). The UN Secretary-General in 2009 described climate change not only as a 'threat-multiplier' but also emphasised that adaptation to climate change can be utilised as a 'threat-minimiser' (UN Secretary-General 2009, Document A/64/350 cited in Pius Yanda/Bronkhorst 2011, p. 3).

The reality of the Anthropocene can neither be changed nor reverted by humans and technological impulses. However, following Crutzen's (2016) ecological recommendations, scientific and engineering innovations should lead humanity to a more responsible way of handling our behaviours and conducting ourselves vis-à-vis natural resources provided by the Earth.

Climate Sensitive-Adaptation has evolved as another response to environmental conflicts; it entails developing approached to sustainable development built on positive impacts of climate change. Pius Yanda/Bronkhorst (2011, p. 3) remark:

> […] conflict-sensitive adaptation is concerned with optimising the positive impacts of climate change and of adaptation, not only avoiding or mitigating the negatives. Positive impacts of climate change may include more rain in certain places, while in adaptation, positive impacts and objectives – besides conflict prevention – could be peacebuilding and sustainable development.

Bob et al. (2014) ascertain the existence of projects aimed to building mechanisms of adaptation to climate change in Africa; they are currently foremost among policymakers, donors, NGOs and researchers in view of tackling climate change issues and follows through the December 2011 COP 17 (17th Conference of the Parties to the UNFCCC), during which funding instruments for climate adaptation were sanctioned. Because of the linkages between climate change and conflicts (Pius Yanda/Bronkhorst 2011), it has become imperative to study adaptation prospects to prevent and deal with such conflicts when they arise (Bob/Bronkhorst 2014; Bob et al. 2014; Pius Yanda/Bronkhorst 2011). Several scholars maintain that climate change adaptation goes along conflict-sensitive approaches; that is essential for global peace (Babcicky 2013; Tänzler et al. 2010). Countries that are not prepared to arise above atmospheric disturbances due to insufficient capacity of adaptation could experience social tensions and potential conflict (Tänzler et al. 2013), which

can be an impediment to peace, sustainability stability in the Anthropocene. Climate sensitive-adaptation should also be conflict-sensitive (Pius Yanda/Bronkhorst 2011).

Therefore, it is mandatory that all countries in all regions of the world embark on the journey of climate-sensitive adaptation and develop the tools to address environmental conflicts when they arise. To foster environmental peacebuilding, the discipline of Peace Studies has seen the emergence of new concepts to assist its role in mitigating climate change and its consequences. These include environmental justice and peace ecology or environmental peacemaking; these concepts are examined in the section that follows.

3.6 Environmental Conflicts and Environmental Justice

Environmental conflict is the new major challenge for Africa and can further deepen her vulnerability in the decades to come. For instance, shortages of water and fertile soils and the impacts of extreme weather events could trigger more violent conflicts; these are already manifest in the southern Sahel of Sudan (Bronkhorst 2011), and in the Horn of Africa (Molvaer 1991), and they can be exacerbated by scarcity of energy resources (Ijumba/Kaya 2016). Schlosberg (2004) envisions environmental justice beyond the assumptions of equity and the distributions of environmental goods and ills, expanding it further as contended here:

> The argument is that the justice demanded by global environmental justice is really threefold: equity in the distribution of environmental risk, recognition of the diversity of the participants and experiences in affected communities, and participation in the political processes which create and manage environmental policy (p. 517).

As humanity finds itself in the midst of anthropogenic causes of environmental disasters and their consequences that affect both the Earth, our home—as it is hit by drought, wildfires, flooding, etc. and ourselves, its inhabitants, through forced displacements of population ultimately causing ecological refugees, Westra (2009) warns that this reality creates a new political and social condition to be dealt with in the future. The future of world peace is threatened, and this requires an urgent and global response, which takes into account ecology-related paradigms, analyse them, and advocate environmental justice.

The theory of environmental justice has evolved horizontally, covering a large scope of issues; vertically, it focuses on the comprehensive essence of environmental injustices; and conceptually, it looks at "the human relationship with the non-human world" (Schlosberg 2013, p. 37). This theory relates to *socio-environmental conflicts* or *ecological distribution conflicts* that have been spelled out by Temper et al. (2018); they argued from an unperceivable angle that socio-environmental conflicts can also become the catalyst of social, economic, and ecological sustainability, as asserted here:

> We contend that protests are not disruptions to smooth governance that need to be managed and resolved, but that they express grievances as well as aspirations and demands and in this

> way may serve as potent forces that can lead to the transformation towards sustainability of our economies, societies and ecologies (Temper et al. 2018, p. 573).

In view of this assertion, this chapter holds that environmental justice can serve as an instrument of stability, sustainability, and mitigation of violent conflicts that may erupt in various geographical spaces. It should also underline that it is one of the drivers of social justice, a view held by Schlosberg (2013) as well who affirmed the relevance of both the vertical and conceptual aspects of environmental justice, linking it to the understanding of it being one of the factors that "are understood to create the conditions for social justice" (p. 37). These latter perspectives justify the engagement of civil society faith-based organisations and social movements in standing against politically and economically driven policies that subjugate and subdue our planet. One of the components of environmental justice is ecojustice philosophy which "merges social and environmental justice theories by emphasising physical, spiritual, and emotional connections between an environment and the residing social group" (Tippins/Britton 2015). Unfortunately, human freedom has resulted in a disastrous intrusion into nature, thus corrupting the Earth system. Therefore, as noted by Steffen et al. (2015, p. 736), "There is an urgent need for a new paradigm that integrates the continued development of human societies and the maintenance of the Earth system in a resilient and accommodating state". Achieving this prospect demands ethical engagement with nature, responsible human agency, ethical stewardship, and developing pragmatic strategies to implement peace ecology which provides objective means of environmental justice; that is explored in the next section.

3.7 Peace Ecology

Before discussing the concept of peace ecology, it is helpful to understand peace culture, which informs it. Boulding (2002, p. 6) defined peace as "a mosaic of identities, attitudes, values, beliefs, and patterns that lead people to live nurturantly with one another and the earth itself without the aid of structured power differentials, to deal creatively with their differences and share their resources". The reference to the Earth is not accidental, but rather essential, because interpersonal relationships require an environment where these are built, without which there would be no society.

Peace ecology has emerged as a new worldview in efforts to understand the concept of peace within the context of environmental studies, environmental security, and peace studies. Kyrou (2007) described peace ecology as a new paradigm that is inspired by the concept of "environmental peacemaking"—comprehended as "a theoretical framework, broad and integrative enough to allow a full understanding, functionally as well as philosophically, of the inherent capacities of the environment to inform and sustain peace" (Kyrou 2007, p. 73). More importantly, this worldview places emphasis on the contingency of the impact of ecological degradation on human

vulnerability because of the interaction between humanity and nature and the inherent impact of environmental deterioration on the survival of humankind.

The well-being of the Earth system is inherently linked to peace and security. The threats posed by human action on the ecosystem leave the Earth and its inhabitants vulnerable and insecure. To borrow from Dalby (2007, p. 155), "Recent innovations in earth system science have added compelling arguments for the integration of environmental matters into security". There has been a shift in security concerns from scarcity- and resource-related conflicts in the Global South to worries over climate change and other consequences of environmental degradation resulting from intense human activities (Dalby 2007). This scholar emphasised the significance of reducing "the total throughput of materials and energy in the biosphere to limit disruptions while simultaneously building resilience and habits of international cooperation into human societies to better cope when disaster strikes" (Dalby 2007, p. 155). This security issue also implies the need to create an atmosphere of durable peace in regions that are worst hit by climate change and global warming. Thus, *environmental security* (Dalby 2007) and *peace ecology* can be enhanced by humankind's action and attitude towards "our common home".

Kyrou (2007) framed the interaction and interdependency of human and nature in terms of an "ecological web":

> We breathe from its air, drink from its water, are subject to and depend on its climate. We extract from it materials for utility and basic survival. There we find our spiritual resources, draw our inspiration for art, and even the raw materials of which our dreams and myths are made (pp. 79–80).

This essay is constructed on the assumption that, generally, violence has detrimental effects on humanity as well as nature, as argued here:

> [I]n the case of direct or physical violence, victims include people and the environment […]. The impacts of war on the environment do not end with a cease-fire; they persist for decades due to demolished infrastructure, movement of refugees and internally displaced people, the remaining risks from hazards such as mines and depleted uranium, and the political shortcomings of reconstruction (Kyrou 2007, p. 80).

The need for *environmental peacemaking*—building peace with nature—is sustained by the existing *ecological violence* that "is directly related to environmental studies and refers to the direct injury to the environment through pollution, degradation, overexploitation, and other forms of injury, especially in cases of severe or irreversible damage" (Kyrou 2007, p. 81). Such violence results from environmental conflicts that can be dealt with and prevented. For instance, Bronkhorst conducted a study that helped to determine to what extent environment-related conflicts can be addressed, and her investigation can be applied in areas affected by climate change, discernible in "drought, desertification, water scarcity, and competition over grazing and pasture which can contribute to conflict" (Bronkhorst 2011, p. 5). Her findings focused on the southern Sahel, stretching across Africa to the Sudan, and especially across the state of Southern Kordofan and its neighbours. With three points, she underlined how human security can be built to prevent environmental conflicts (Bronkhorst 2011, pp. 47–48):

- By putting in place legitimate mechanisms for dealing with vulnerabilities resulting from deprivations (poverty, lack of livelihood, etc.), with the involvement of NGOs to get affected communities reconciled
- By developing mechanisms susceptible of addressing environmental threats and climate changes such as "water scarcity, drought and a lack of land for farming and grazing" (Bronkhorst 2011, p. 48) that are detrimental to human security
- By creating the conditions that can assist in responding to deprivations and exclusions and other environment-related drivers of conflicts; NGOs are key partners for the success of these strategies

She argued that these elements, and other underlying factors of human insecurity, originate from unattended environmental crises that include, but which are not limited to, drought, food insecurity, poverty, a lack of livelihoods, and structural factors that create the condition of vulnerability to climate change—mainly exclusions and deprivations. These are potential causes of environmental conflicts that can lead to personal violence, and they are embedded structures that need to be transformed through development activities.

3.8 Ecoeducation, Eco-Ethics and Environmental Ethics

Ecological education is emerging as new trend in reconceptualising environmental security concerns and developing global consciousness about human agency to respond to ecological crisis in the Anthropocene. As with the conventional form of peace education that aims to prevent conflicts and violence (UNESCO 2013), ecoeducation should aim to instil individual and collective responsibility in people—to care for the ecosystem in order to prevent and deal with environment-induced conflicts nonviolently.Ecoeducation has a pluridisciplinary tendency which embraces environmental studies, philosophy, ethics and philosophy of nature and life; it aims to shape human attitudes and behaviours towards their natural environment for a sustainable living (Iovan 2014). Such as innovative pedagogy is needed today; it should be inspired by ecoethics, environmental ethics, and ecojustice philosophy.

To render these theories more intelligible, it is necessary to clarify their meanings and interconnectedness. The distinction between eco-ethics and environmental ethics can be explained by the fact that the former entails "the essential foundation for sustainable use of the planet. Such a foundation must consist of a series of value judgments to which humanity is committed" (Cairns Jr. 2002, p. 79); the latter falls under philosophical disciplines; it "studies the moral relationship of human beings to, and also the value and moral status of, the environment and its non-human contents" (Brennan/Lo 2002, p.1). Further, it incorporates environmental affairs and controversies in various ways, such as promoting equity in relation to non-Western cultures, fighting the abuse of indigenous groups that occur through land exploitation processes; scrutinising economic prosperity when land use is concerned, and

conscientising people about the danger of modifying the environment to suit certain human lifestyles (Tippins/Britton 2015).

The dawn of eco-ethics and environmental ethics can be traced in the search for a moral stance, contrasting moral consequentialism in decision-making and environmental policy-making frameworks. It is important to nuance the concept of eco-ethics and environmental ethics, only for the sake of a better understanding of the two, while in fact and pragmatically, both serves the deontological purpose of care and protection of the ecosystem. What concerns us most is the open-ended eco-ethics concept, based on the distinction made by (Skolimowski 1984):

> Environmental ethics must be distinguished from eco-logical ethics. While the former concerns itself with the appropriate management of natural resources and is often guided by cost-benefit analysis, the latter (ecological ethics) is much broader as it spells out the relationships between man and nature; and also analyses those attributes of man which can make him an ecological animal. Eco-values are based on the recognition of intrinsic values of which reverence for life is one, and perhaps the most important one (Skolimowski 1984, p. 45).

Despite the different nuances denoted by these two forms of ethics, they are anchored in similar moral values and principles which apply to either interpersonal relationships, or to human-environment relations. Thus, moral responsibility vis-à-vis the environment leads to *echo-deontology*, which can be framed as a set of morally sound normative actions towards the natural world; they universally conform to the Kantian categorical imperative, which bear on nature and environment wellness. Such moral obligations by which humans are bound is not limited to inter-human relationships but it goes beyond humanity to include moral standards regarding the ways and means by which humankind handles non-human creatures. So, ecofriendly stewardship is an imperative of interhuman and human-nature interactions.

Eco-theology also features along the same leading edge educational line or environmental ethics because it revives the natural, spiritual and ontological bonds that bind humanity together with the whole creation and foster essential interconnectedness of humans and nature; that should give rise to responsible and ethical stewardship over the Earth. In this process, it is imperative to reconnect education science and ecojustice with youth activism, cultures and natural system, environmentalism, sustainability, marketing that is concerned with the ecosystem; thus, such pedagogical innovations are susceptible to enhance ecojustice philosophy (Mueller/Tippins 2015). Ongoing youth activism or environmentalism shown by Gretta Thumberg and other youths is encouraged, and their generation should continue to put across the message on environmental justice.

To end this section, the urgency to tackle the challenges set off by climate change opens up to new teaching paradigms, namely eco-pedagogy. Ecoethics remains one of the essential approaches that can help reduce ecological vulnerability, subsequently minimise the risks of natural disasters (Etkin/Stefanovic 2005). Here comes the role of education as the chief vehicle for imparting knowledge about biosphere and geosphere; ecoeducation is a useful practice for the dissemination of eco-friendly values that underscore respect in the interactions between humans and their nature

environment. The role of civil society in environmental protection and the relief of climate change threats to peace and security is discussed in the following section.

3.9 Civil Society and Climate Change

While Environmental Non-Governmental Organisations (ENGOs) seek access to climate change-related negotiations as delegates alongside corporations and business lobbying groups at the United Nations Framework Convention on Climate Change (UNFCCC) with a view to affecting official delegates' policies, it has been found that "only business groups are likely to exert a causal influence on states' climate delegations. However, contrary to expectations, these groups appear to have enhanced states' efforts towards environmentally friendly policies" (Böhmelt 2013, p. 698). In contrast to the finding according to which business lobbying groups are more likely to leverage healthy environmental policies than ENGOs, the perspective of Ginanjar/Mubarrok (2020) provides a different perspective. They note, "civil society can provide the opportunities for the people to contribute to global governance related to climate change. Civil society here can be interpreted as a political space, where associations of people can work towards the formation of social and legal rules through non-formal political channels" (Ginanjar/Mubarrok 2020, p. 41).

The reason for the authors' optimistic view is based on the fact that "Extinction Rebellion's involvement in global governance is an indirect involvement with resistance as their mode of participation, which is indicated by the emergence of mass protest in various cities around the world" (Ginanjar/Mubarrok 2020, p. 41). Furthermore, some people, particularly at the grassroots level, are apprehensive of the inaction of global governance when it comes to climate change as perceived today; governmental stances are not adequate and effective to yield changes, and "because the nature of the global climate regime is somehow voluntary and non-binding" (Ginanjar/Mubarrok 2020, p. 41).

The IPCC (2018) acknowledges the role of civil society in climate change action; it states in Section D on *Strengthening the Global Response in the Context of Sustainable Development and Efforts to Eradicate Poverty*, D.7.:

> Strengthening the capacities for climate action of national and sub-national authorities, civil society, the private sector, indigenous peoples and local communities can support the implementation of ambitious actions implied by limiting global warming to 1.5°C (high confidence). International cooperation can provide an enabling environment for this to be achieved in all countries and for all people, in the context of sustainable development. International cooperation is a critical enabler for developing countries and vulnerable regions (high confidence) (IPCC 2018, p. 25).

The IPCC, in D.7.1 and D.7.2 of the same summary, views the partnerships of non-state public and private actors, including institutional investors, the banking system, civil society and scientific institutions as the instruments that would facilitate adequate actions and responses consistent with the policy of limiting global warming (IPCC 2018, p. 25). In D.7.2, it observes:

> Cooperation on strengthened accountable multilevel governance that includes non-state actors such as industry, civil society and scientific institutions, coordinated sectoral and cross-sectoral policies at various governance levels, gender sensitive policies, finance including innovative financing, and cooperation on technology development and transfer can ensure participation, transparency, capacity building and learning among different players (high confidence) (IPCC 2018, p. 25).

Despite cautions against the role of civil society in climate action, civil society organisations (CSOs) have remained consistent and vocal in awakening human conscience, and in confronting businesses/markets, corporations, and governments about their denial or lack of concern over the collapsing Earth system.

At the 23 September 2019 United Nations Climate Action Summit where Greta Thunberg accused world leaders of denialism, robbing her of her dreams and childhood, and failing the youth in her poignant opening speech: "I shouldn't be up here. I should be back in school on the other side of the ocean. Yet, you all come to us young people for hope. How dare you!" (Thunberg 2019a). Thunberg's activism epitomises what individual agency should look like, along with Pope Francis' exhortation to urgently work to save the Earth. He writes, "The urgent challenge to protect our common home includes a concern to bring the whole human family together to seek a sustainable and integral development, for we know that things can change" (Francis 2015). Since climate change is caused by human activities, it is also believed that human agency is indispensable in all efforts to reduce or halt the worsening atmospheric condition.

3.10 Human Agency

The new geological epoch into which the Earth has entered is an established fact, with ongoing research and scientific endeavours to uncover more implications of the Anthropocene and reimagine humanity's agency and stewardship in handling the ES. This section explores the interplay of factors between agents, actors, and stewardship of the Anthropocene that could advance innovative economic progress while safeguarding the ES and taking the edge off climate change. In the Anthropocene, individual and collective agency are required to mitigate and slow the deterioration in the ES.

The concept of human agency, in a broader sense, can be interpreted as "the capacity of individual and collective actors to change the course of events or the outcome of processes" (Pattberg/Stripple 2008cited in Otto 2020, p. 2); this is reflected in the "everyday agency of individual human agents" (Otto et al. 2020, p. 9), which is responsible for the anthropogenic cause of the atmospheric transformation of the ES with climate change as one of its consequences (Crutzen/Brauch 2016; Steffen et al. 2015; Grinevald et al. 2011).

The notion of *agency* is distinct from that of *actors*, which bears a collective connotation, such as governments, civil society, businesses, scientific communities, non-state actors, cities and their affiliated political interests, and actions in the field

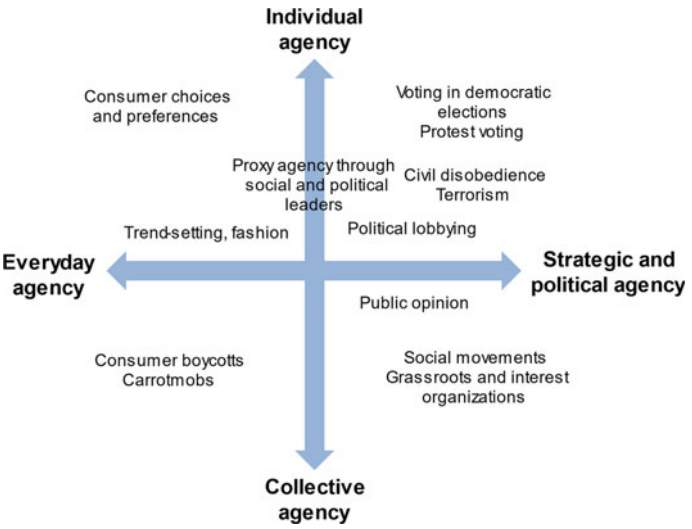

Fig. 3.2 Agency dimensions. *Source:* Otto et al. (2020, p. 9). Adapted from Lister (2004) and Coulthard (2012) with empirical examples of social phenomena

of climate governance (Pattberg/Stripple 2008). To these institutions, we can add corporations and families to form the category of actors. Unfortunately, the important role that business and non-state actors play in lessening the impact of climate change is seldom represented in international negotiations (Pattberg/Stripple 2008).

We are in a critical time where individual and collective agency, and the inclusion and participation of all in Transnational Climate Governance (TCG), are imperative to rescue the Earth from, if not to limit, the scale of atmospheric disruptions and, subsequently, to minimise climate change and its detrimental consequences for the entire creation.

The multifaceted representation of agency in Figure 3.2 shows how the degradation of the Earth system is precipitated by several agents. A remedial global action demands the involvement of all stakeholders to rebuild hope and peace; this does not entail doing away with the root of agency in Earth sciences. For instance, Latour (2014) noted:

> Geo-physiology as well as geo-morphology, geo-physics, geo-graphy, geo-politics should not eliminate any of the sources of agency—including those generated by former humans, those I call Earthbound—if they want to converge toward a common geostory (p. 14).

This proposition features in the path to a solution that is presented by Pope Francis: an all-inclusive strategy that involves actors at various degrees of agency—consumers, politicians, the business class, and civil society (social movements, grassroots and interest groups and associations, etc.). The interactions of these institutions as platforms of climate governance suggest the imperative of concerted efforts in the struggle to alleviate the burden of anthropogenic atmospheric disruptions. In this regard, Pattberg/Stripple (2008) acknowledged that varied institutions interact to

forge policies that aim to protect the environment; these include "the related norms and rules and the resulting roles and responsibilities of actors within the field of climate change as a transnational arena of climate governance" (p. 372).

The apparent agitation and lack of peace in the world can be regarded as the consequence of the crumbling ES that becomes manifest in climate change and its corollaries. This is a clear signal that the peoples of the world must rise to save Earth, although many industrialised nations have not reached the stage of trepidation as atmospheric conditions continue to deteriorate. The growing sense of disquietude revealed by increased interest in and activism towards peace ecology in our time is justified by the fact that "the earth is quaking"—causing worries, though some politicians remain in denial, as noted by Latour (2014). The anxiety echoed in "Save the Earth" advocacy is not only limited to protecting "our house on fire" (Thunberg 2019b, n.p.) and the generational conflict stemming from the failure of adults to safeguard the environment for future generations (Kühne 2019; Thunberg 2020) but also relates to the fear of violent conflict for human communities. This is well explained by Bronkhorst (2011), who provided insights into how to mitigate environment-related disputes between pastoralist and agriculturalist communities via interventions by local and international NGOs. Her research is relevant in the sense that it discovers and anticipates the problem of environmental security amidst potential environmental conflicts and, at the same time, opens the pathway to resolving such conflicts. This responsibility is incumbent upon humankind. The role of humans in healing the Earth is evident because their activities have led to the new geological epoch of the Anthropocene (Otto et al. 2020). Similarly, their agency is needed to redress the perilous turn that the Earth is facing.

Individual and collective agency are necessary and should be applied simultaneously in global efforts to save "our common home" and to ensure that humanity's response as radical commitment to redeem or rescue the disintegrating ES is more effective. The Earth system shows the nature of actions that individuals can undertake, namely, the choices made by and preferences of consumers; and, at the collective level, social movements and grassroots and interest groups can leverage boycott campaigns against certain products to protect the environment (Otto et al. 2020). Individuals are potential agents who can contribute to mitigating the effects of anthropogenic climate change; civil society and its constituent FBOs fall under "collective actors" in transnational climate governance, as highlighted by Pattberg/Stripple (2008):

> Collective actors derived from civil society, the market and various communities become effectively public with a potential to govern people and issues. As we will see in a moment, this is an accord that harmonizes with recent writings on the public and private in world politics (p. 371).

Individual agents and collective actors are the major players in the fight against anthropogenic disruptions of the Earth systems. I should point out two aspects of stewardship, namely, that which is based on advocacy and the change of lifestyles, and that which involves governments, corporations, and multinational organisations. The latter requires an international consciousness and determination to control the

factors that contribute to global warming; the following causes of rising emissions were listed by the European Commission:

> Burning coal, oil and gas produces carbon dioxide and nitrous oxide; cutting down forests (deforestation); increasing livestock farming; cows and sheep produce large amounts of methane when they digest their food; Fertilisers containing nitrogen produce nitrous oxide emissions; Fluorinated gases are emitted from equipment and products that use these gases. Such emissions have a very strong warming effect, up to 23 000 times greater than CO_2 (European Commission 2020, p. n.p.).

It is granted that trees are helpful in regulating the climate via absorbing CO_2 from the atmosphere; thus, when they are cut down, the said beneficial results are lost as the carbon stored in the trees is ultimately released into the atmosphere, with the consequence of adding to the greenhouse effect (European Commission 2020, p. n.p.). Thus, deforestation negatively affects the natural adjustment and balancing of CO_2 that protects the ecosystem. To reduce growing risks of global warming, national agency is paramount when we consider the findings of studies conducted by Matthews et al. (2014). According to the new estimate concerning national contributions to climate warming, such as CO_2 emissions originating from fossil fuels, land use change, and other greenhouse gases ("methane, nitrous oxide and sulfate aerosol emissions"), "many countries have dominant contributions from land-use CO_2 and non-CO_2 greenhouse gas emissions, emphasising the importance of both deforestation and agriculture as components of a country's contribution to climate warming" (Matthews et al. 2014, p. 1). For instance, agriculture itself "is also a significant driver of many of the PBs [planetary boundaries] still in the safe zone" (Campbell et al. 2017, p. n.p.).

This begs answers to a twofold question:

- How to overcome this conundrum while it is reported that the number of hungry people in the world approximated 690 million in 2020, and the population of undernourished people was 678.1 million in 2019, which is expected to increase to 841.4 million by 2030[1] (Food and Agricultural Organization of the United Nations (FAO 2021)
- How to achieve Goal 2 of the United Nations 2030 Sustainable Development Agenda that calls for global support for the livelihoods of small-scale food producers, ameliorating the resilience of food production systems and enhancing the sustainable use of natural resources that are deemed necessary to fulfilling the mandate of SDG2: to make the world hunger-free, and halt food insecurity and malnutrition (FAO 2021; United Nations 2015)

To respond to the ways in which human activity perturbs the ES, Pope Francis invites the world to an environmental global dialogue to save the Earth. His appeal reflects the concerns shown by faith-based organisations (FBOs) in building both societal peace and environmental peace. From a similar perspective, FBOs, as a component of civil society, have been in the forefront of the struggle for environmental justice, protection of human natural environment, livelihood and food security.

In addition, sulfate aerosol emissions, despite their short lifetime, contribute largely to climate warming, and across most developed countries, "per-capita contributions are not currently consistent with attempts to restrict global temperature change to less than 2°C above pre-industrial temperatures" (Matthews et al. 2014, p. 1). National climate policies need to improve, and this is incumbent upon each country's agency towards climate change.

Individual, communal, national, and international consciousness that is anchored in the faith-oriented understanding and practice of stewardship are required today in order to save our ecosystem. Because climate governance is not the sole responsibility of state authorities, private sectors and civil society are also partners in protecting the environment. To achieve this, responsible stewardship is needed at all levels of society.

3.11 Conclusion

This chapter sought to substantiate existing various climate-change-induced security threats and conflicts we experience in the Anthropocene. It started with presenting the overall landscape of present atmospheric transformations and the extent to which Earth systems are damaged and affect humanity and non-human beings. It was demonstrated also that climate change has become the most severe threat to the survival of humanity and the ecosystem, to global peace, world economic and social security. That is admitted as historical truth supported by science.

The need for urgent solution to climate warming, locally, regionally and internationally becomes obvious and undeniable. Action is needed to prevent total disintegration of Earth systems. Thanks to scientific advancement which is credited for developing planet boundaries framework to monitor both humans' attempts to revert the course of geosocial epochs, and to presenting new findings about atmospheric disturbances that continue to unfold in the Anthropocene.

Various interventions are underway to alleviate the burden of human activities on Earth systems, despite some cases of denialism shown by those who paradoxically decry the threats posed by climate change while simultaneously support activities that contribute to the deterioration of the ecosystem. To sustain concerns associated with climate change hypocritical and denialists behaviour patterns, how many nations admit scientific truth according to which production and use of coal, burning fossil fuels, deforestation, unregulated fishing and unlawful waste disposal, unlawful exploitation, and commercialisation of wood; deregulated farming and unfriendly use of methods to keep and maintain livestock are the predominant contributors the global worming? How many have significantly developed policy frameworks to move to renewable energy? New sources of renewable energy include wind and sunlight: they are the Earth's natural resources; they are not finite or exhaustible; they are renewable energy that need to be developed and supplied to phase out fossil fuels and their harmful effects on the environment.

Because of the gravity of ecological turmoil, it was noted that advocacy to fighting climate change has gained impetus. Various actors, including civil society are engaged in environmentalist or ecological projects. Social movements, research and think tanks have all increasing developing innovative theoretical paradigms and pragmatic solutions to save Earth planet; a case in point is the repair of the ozone hole "after the phasing out of ozone-depleting substances" (Steffen et al. 2015, p. 347). This gives hope for resilience of science, and the needed openness to turn crisis into innovative opportunity (Rockström 2019).

The planetary boundaries framework was an essential scientific innovation in terms of leading humanity to resilience and sustainable development without transgressing the boundary paradigms; because such attempt could lead to irreversible crisis and unprecedented planetary catastrophe (Rockström 2019; Steffen et al. 2015). In terms of meeting the risks of global-warming-driven security issues and conflicts, "climate change-sensitive-adaptation" and "conflicts-sensitive" concepts, approaches, praxis or philosophy are indispensable in framing ecofriendly policy frameworks which is susceptible to mitigate environmental instability, insecurity and global peace disruption. To get there, a synergic cooperation between civil society, business, corporations, political actors, science and think tanks are urged to be adopted as the pathway to leading an international and concerted implementation of healthy ecological policies. Such an enterprise cannot be successful without theoretical paradigms developed in peace studies that we discussed throughout this chapter, namely: (1) environmental justice, (2) environmental peace-making/peace ecology, and (3) ecological education which embraces ecoethics and environmental ethics.

Finally, the interplay of various dimensions of human agency to act against climate change is maintained as another essential track to follow that it would be possible to reduce the global environmental crisis of our time, to achieve ecological sustainability. All human, social, technological and scientific interventions remain a significant determinant to recreating an ecofriendly agenda of sustainable development, global peace and fostering humanity climate change-resilience for sustainable biodiverse. In all these

References

Artur, L., & Hilhorst, D. (2012). Everyday realities of climate change adaptation in Mozambique. *Global Environmental Change, 22*(2), 529–536

Babcicky, P. (2013). A conflict-sensitive approach to climate change adaptation. *Peace Review, 25*(4), 480–488

BBC News (Producer). (2021). Life at 50C: Fleeing Sahara's shifting sands. https://www.bbc.com/news/av/science-environment-58925616. Accessed 22 Oct 2021

Bob, U., & Bronkhorst, S. (2014). *Conflict-sensitive adaptation to climate change in Africa.* Berlin: Berliner Wissenschafts-Verlag

Bob, U., Bronkhorst, S., & Sala, S. (2014). Climate change and conflict: Conflict-sensitive climate change adaptation in Africa. In U. Bob & S. Bronkhorst (Eds.), *Conflict-sensitive adaptation to climate change in Africa* (pp. 27–54). Berlin: Berliner Wissenschafts-Verlag

Böhmelt, T. (2013). Civil society lobbying and countries' climate change policies: a matching approach. *Climate policy,* 13(6), 698–717

Boulding, E. (2002). Peace culture. In M. Afkhami (Ed.), *Toward a compassionate society* (pp. 8–15). Bethesda: Women's Learning Partnership

Brauch, H. G. (2016). Sustainable Peace in the Anthropocene: Towards Political Geoecology and Peace Ecology. In H. Brauch, Ú. Oswald Spring, J. Grin, & J. Scheffran (Eds.), *Handbook on Sustainability Transition and Sustainable Peace* (pp. 187–236). Cham: Springer

Brennan, A., & Lo, Y.-S. (2002). Environmental ethics. In. online: Stanford Encyclopedia of Philosophy. https://plato.stanford.edu/entries/ethics-environmental/. Accessed 23 Oct 2021

Brisman, A. (2016). Peace ecology. *Contemporary Justice Review,* 13(3), 419–421. https://doi.org/10.1080/10282580.2016.1200886

Bronkhorst, S. (2011). *Climate change and conflict: lessons for conflict resolution from the southern Sahel of Sudan.* Umhlanga Rocks: ACCORD

Cairns Jr, J. (2002). A declaration of eco-ethics. *Ethics in Science and Environmental Politics, 18*, 79–81. https://doi.org/10.3354/esep002079

Campbell, B. M., Beare, D. J., Bennett, E. M., Hall-Spencer, J. M., Ingram, J. S., Jaramillo, F., Ortiz, R, Ramankutty, N, Sayer, J A, Shindell, D. (2017). Agriculture production as a major driver of the Earth system exceeding planetary boundaries. *Ecology and Society*, 22(4). https://doi.org/10.5751/ES-09595-220408

Caniglia, B. S., Brulle, R. J., & Szasz, A. (2015). Civil society, social movements, and climate change. *Climate change and society: Sociological perspectives,* 1, 235–268

Clarke, R. (1999). *Global Environment Outlook 2000 report (UNEP 1999).* Nairobi: United Nations Environment Programme

Crutzen, P. J. (2016). Geology of mankind. In P.J. Crutzen & H.G. Brauch (Eds.), *Paul J. Crutzen: A Pioneer on Atmospheric Chemistry and Climate Change in the Anthropocene* (Vol. 50, pp. 211–215). Cham: Springer Nature Switzerland AG

Crutzen, P. J., & Brauch, H. G. (2016). *Paul J. Crutzen: a pioneer on atmospheric chemistry and climate change in the Anthropocene* (Vol. 50). Cham: Springer Nature Switzerland AG

Dalby, S. (2007). Ecology, security, and change in the Anthropocene. *The Brown Journal of World Affairs,* 13(2), 155–164

Day, J. W., Christian, R. R., Boesch, D. M., Yáñez-Arancibia, A., Morris, J., Twilley, R. R., . . . Schaffner, L. (2008). Consequences of climate change on the ecogeomorphology of coastal wetlands. *Estuaries and Coasts, 31*(3), 477–491. https://doi.org/10.1007/s12237-008-9047-6

Eklöw, K., & Krampe, F. (2019). *Climate-related security risks and peacebuilding in Somalia.* Stockholm: Stockholm International Peace Research Institute (SIPRI)

Etkin, D., & Stefanovic, I. L. (2005). Mitigating natural disasters: The role of eco-ethics. In *Mitigation of natural hazards and disasters: International perspectives* (pp. 135–158). online: Springer

European Commission. (2020). *Climate change action.* Retrieved from https://ec.europa.eu/clima/climate-change/causes-climate-change_en. Accessed 10 Oct 2021

European Union (EU). (2008). *Climate Change and International Security.* Paper from the High Representative and the European Commission to the European Council, S113/08. 14 March 2008 European Union (EU). online. https://www.consilium.europa.eu/uedocs/cms_data/docs/pressdata/en/reports/99387.pdf. Accessed 10 Oct 2021

Fifita, S., Forster, P., Ginzburg, V., Handa, C., Kheshgi, H., Kobayashi, S., . . . Vilariño, M. V. (2018). Mitigation Pathways Compatible with 1.5°C in the Context of Sustainable Development. https://www.ipcc.ch/site/assets/uploads/sites/2/2019/05/SR15_Chapter2_High_Res.pdf. Accessed 6 Oct 2021

Food and Agricultural Organization of the United Nations (FAO) (2021). Hunger and food insecurity. http://www.fao.org/hunger/en/. Accessed 15 July 2021

Ginanjar, W. R., & Mubarrok, A. Z. (2020). Civil Society and Global Governance: The Indirect Participation of Extinction Rebellion in Global Governance on Climate Change. *Journal of Contemporary Governance and Public Policy, 1*(1), 41–52

Hardt, J. N., & Scheffran, J. (2019). Environmental peacebuilding and climate change: peace and conflict studies at the edge of transformation. *Policy Brief,* 68(December 2019), 1–20

Houghton, D. D., & World Meteorological Organization. (2002). *Introduction to climate change: Lecture notes for meteorologists*. Geneva: Secretariat of the World Meteorological Organization Geneva, Switzerland

Hsieh, H.-F., & Shannon, S. E. (2005). Three approaches to qualitative content analysis. *Qualitative Health Research,* 15(9), 1277–1288

Ijumba, N., & Kaya, H. (2016). Energy Resources and Environmental Conflicts in Africa: Implications on Indigenous Knowledge Systems and Environmental Policy. *Journal of Human Ecology,* 53(2), 96–100. https://doi.org/10.1080/09709274.2016.11906960

Iovan, M. (2014). Eco-education: A required element of public policies for sustainable social and economic development. *Academicus International Scientific Journal*(09), 14–28

IPCC. (2018). Summary for Policymakers. In V. Masson-Delmotte, P. Zhai, H.-O. Pörtner, D. Roberts, J. Skea, P. R. Shukla, A. Pirani, W. Moufouma-Okia, C. Péan, R. Pidcock, S. Connors, J. B. R. Matthews, Y. Chen, X. Zhou, M. I. Gomis, E. Lonnoy, T. Maycock, M. Tignor, & T. Waterfield (Eds.), *Global Warming of 1.5°C. An IPCC Special Report on the impacts of global warming of 1.5°C above pre-industrial levels and related global greenhouse gas emission pathways, in the context of strengthening the global response to the threat of climate change, sustainable evelopment, and efforts to eradicate poverty*. Geneva: World Meteorological Organization

Krampe, F. (2017). Toward sustainable peace: A new research agenda for post-conflict natural resource management. *Global Environmental Politics,* 17(4), 1–8. https://doi.org/10.1162/GLEP_a_00431

Krampe, F., & Mobjörk, M. (2018). Responding to climate-related security risks: reviewing regional organizations in Asia and Africa. *Current Climate Change Reports,* 4(4), 330–337. https://doi.org/https://doi.org/10.1007/s40641-018-0118-x

Krampe, F., Van De Goor, L., Barnhoorn, A., Smith, E., & Smith, D. (2020). Water Security and Governance in the Horn of Africa. *Stockholm International Peace Research Institute SIPRI, SIPRI Policy (Paper No. 54).* https://www.diva-portal.org/smash/get/diva2:1424710/FULLTEXT01.pdf. Accessed 7 Oct 2021

Krippendorff, K. (2004). Content analysis: An introduction to its methodology. Thousand Oaks Calif.: Sage

Kühne R.W. (2019, September 2). Climate change: the Science behind Greta Thunberg and Fridays for Future. https://doi.org/10.31219/osf.io/2n6kj

Kyrou, C.N. (2007). Peace ecology: An emerging paradigm in peace studies. *International Journal of Peace Studies,* 12(1), 73–92. http://www.jstor.org/stable/41852955

Latour, B. (2014). Agency at the time of the Anthropocene. *New Literary History,* 45(1), 1–18. https://doi.org/10.1353/nlh.2014.0003

Lisk, F. (2009). Overview: The Current Climate Change Situation in Africa. In H. Besada & N. Sewankambo (Eds.), *Climate Change in Africa: Adaptation, Mitigation and Governance Challenges* (pp. 8–15). Waterloo: The Centre for International Governance Innovation (CIGI)

Matthews, H. D., Graham, T. L., Keverian, S., Lamontagne, C., Seto, D., & Smith, T. J. (2014). National contributions to observed global warming. *Environmental Research Letters*, 9(1), 014010. https://doi.org/10.1088/1748-9326/9/1/014010

McClanahan, T. R., & Cinner, J. (2012). *Adapting to a changing environment: confronting the consequences of climate change*: OUP USA

McNeely, J. A. (2020). Today's protected areas: supporting a more sustainable future for humanity. *Integrative zoology,* 15(6), 603–616

Molvaer, R. K. (1991). Environmentally induced conflicts? A discussion based on studies from the Horn of Africa. *Bulletin of Peace Proposals,* 22(2), 175–188

Morton, S., Pencheon, D., & Bickler, G. (2019). The sustainable development goals provide an important framework for addressing dangerous climate change and achieving wider public health benefits. *Public Health, 174*, 65–68. https://doi.org/10.1016/j.puhe.2019.05.018

Mueller, M. P., & Tippins, D. J. (2015). *Ecojustice, citizen science and youth activism.* Cham: Springer International Publishing. https://doi.org/https://doi.org/10.1007/978-3-319-11608-2

Newell, P. (2008). Civil society, corporate accountability and the politics of climate change. *Global Environmental Politics,* 8(3), 122–153

O'Neill, D. W., Fanning, A. L., Lamb, W. F., & Steinberger, J. K. (2018). A good life for all within planetary boundaries. *Nature Sustainability,* 1(2), 88–95. https://doi.org/10.1038/s41893-018-0021-4

Osbahr, H., Twyman, C., Adger, W. N., & Thomas, D. S. (2008). Effective livelihood adaptation to climate change disturbance: scale dimensions of practice in Mozambique. *Geoforum,* 39(6), 1951–1964

Otto, I. M., Wiedermann, M., Cremades, R., Donges, J. F., Auer, C., & Lucht, W. (2020). Human agency in the Anthropocene. *Ecological Economics,* 167, 1–31. https://doi.org/10.1016/j.ecolecon.2019.106463

Pattberg, P., & Stripple, J. (2008). Beyond the public and private divide: remapping transnational climate governance in the 21st century. *International Environmental Agreements: Politics, Law and Economics*, 8(4), 367–388. https://doi.org/10.1007/s10784-008-9085-3

Pihkala, P. (2018). Eco-anxiety, tragedy, and hope: psychological and spiritual dimensions of climate change, *Zygon®,* 53(2), 545–569

Pius Yanda, P., & Bronkhorst, S. (2011). Climate change and conflict: Conflict-sensitive Climate Change Adaptation in Africa. *Policy & Practice Brief,* 014 (November 2011). https://media.africaportal.org/documents/policy_practice14.pdf Accessed 5 Oct 2021

Pope Francis (2015). *Encyclical Letter Laudato Si' of The Holy Father Francis on Care for Our Common Home.* Rome: Libreria Editrice Vaticana

Rafferty, John P. (n.d.). "Anthropocene Epoch". In *Encyclopedia Britannica*, https://www.britannica.com/science/Anthropocene-Epoch. Accessed 7 Oct 2021

Rockström, J., Steffen, W., Noone, K., Persson, Å., Chapin III, F. S., Lambin, E., . . . Schellnhuber, H. J. (2009). Planetary boundaries: exploring the safe operating space for humanity. *Ecology and society, 14*(2). https://doi.org/10.1126/science.1259855originally published online January 15, 2015

Rockström, J. (2019). Safe Future for Humanity on Earth. *This is a Session at Republica19. The Thirteen Edition of the Conference (some call it a festival) took place on May 6, 7 and at Station Berlin.* https://www.youtube.com/watch?v=wJtfWZGxnGI&feature=emb_rel_end. Accessed 10 Oct 2021

Rowlatt, J. (2021). Why 2021 could be turning point for tackling climate change. *BBC News, 1 January.* https://www.bbc.com/news/science-environment-55498657. Accessed 6 Oct 2021

Ruddiman, W. F. (2013). The anthropocene. *Annual Review of Earth and Planetary Sciences,* 41, 45–68; https://doi.org/10.1146/annurev-earth-050212-123944

Schlosberg, D. (2004). Reconceiving environmental justice: global movements and political theories. *Environmental Politics,* 13(3), 517–540 (2004). https://doi.org/10.1080/0964401042000229025

Schlosberg, D. (2013). Theorising environmental justice: the expanding sphere of a discourse. *Environmental Politics,* 22(1), 37–55. https://doi.org/10.1080/09644016.2013.755387

Skolimowski, H. (1984). Eco-ethics as the foundation of conservation. *Environmentalist, 4*(7), 45–51

Spring, Ú. O., & Brauch, H. G. (2021). *Decolonising Conflicts, Security, Peace, Gender, Environment and Development in the Anthropocene.* Cham: Springer Nature Switzerland AG

Steffen, W., Grinevald, J., Crutzen, P., & McNeill, J. (2011). The Anthropocene: conceptual and historical perspectives. *Philosophical Transactions of the Royal Society A: Mathematical, Physical and Engineering Sciences,* 369(1938), 842–867

Steffen, W., Richardson, K., Rockström, J., Cornell, S. E., Fetzer, I., Bennett, E. M., Biggs, R., Carpenter, S.R., De Vries, W., . . . Sörlin, S. (2015). Planetary boundaries: Guiding human development on a changing planet. *Science,* 347(6223), 736–747. https://doi.org/10.1126/science.1259855

Sze, J., & London, J. K. (2008). Environmental justice at the crossroads. *Sociology Compass,* 2(4), 1331–1354. https://doi.org/10.1111/j.1751-9020.2008.00131.x

Tänzler, D., Maas, A., & Carius, A. (2010). Climate change adaptation and peace. *Wiley Interdisciplinary Reviews: Climate Change, 1*(5), 741–750

Tänzler, D., Carius, A., & Maas, A. (2013). The need for conflict-sensitive adaptation to climate change. *Environmental Change and Security Program Report, 14*(2), 5

Temper, L., Demaria, F., Scheidel, A., Del Bene, D., & Martinez-Alier, J. (2018). The Global Environmental Justice Atlas (EJAtlas): ecological distribution conflicts as forces for sustainability. *Sustainability Science, 13*(3), 573–584. https://doi.org/10.1007/s11625-018-0563-4

Thunberg, G. (2019a). Greta Thunberg tells world leaders 'you are failing us', as nations announce fresh climate action. https://news.un.org/en/story/2019/09/1047052. Accessed 26 July 2021

Thunberg, G. (2019b). Our house is on fire. *The Guardian,* 20. https://www.theguardian.com/books/2020/mar/04/our-house-is-on-fire-review. Accessed 29 July 2021

Thunberg, G. (2020). Greta Thunberg: 'My generation will not give up without a fight'. *Green Left Weekly,* 01 January 2020(1250), 13. https://doi.org/10.3316/informit.934151085409524. Accessed 29 July 2021

Tippins, D., & Britton, S. A. (2015). Ecojustice pedagogy. In R. Gunstone (Ed.), *Encyclopedia of Science Education. Springer, Dordrecht*. online. https://doi.org/10.1007/978-94-007-2150-0_297

Towheed, S. (2009). Tools and techniques for literary research: Using online and printed sources. In D. d. S. Correa & W. R. Owens (Eds.), *The Handbook to Literary Research* (2nd ed., pp. 9–35). London: Routledge

UNESCO. (2013). Promoting a culture of peace and non-violence in Africa through education for peace and conflict prevention Phase 1: Mapping – Final Report. https://unesdoc.unesco.org/ark:/48223/pf0000234682. Accessed 18 Jan 2020

United Nations (2015). Transforming our World: the 2030 Agenda for Sustainable Development. Resolution adopted by the General Assembly on 25 September 2015 [without reference to a Main Committee] (A/70/L.1)] 70/1. https://www.un.org/en/development/desa/population/migration/generalassembly/docs/globalcompact/A_RES_70_1_E.pdf. Accessed 25 July 2021

United Nations. (2021). UN General Assembly and Climate Week NYC to Accelerate Climate Action. https://unfccc.int/news/un-general-assembly-and-climate-week-nyc-to-accelerate-climate-action. Accessed 6 Oct 2021

Westra, L. (2009). *Environmental Justice and the Rights of Ecological Refugees* (1st Ed.). London: Routledge. https://doi.org/10.4324/9781849770088

Willms, D. G., & Werner, K. (2009). Climate change and conflict in Africa. In H. Besada & N. K. Sewankambo (Eds.), *Climate Change and Conflict in Africa: Adaptation, Mitigation and Governance Challenges* (pp. 26–30). Waterloo: The Centre for International Governance Innovation

Wilson, G. (2020). Climate Change as a" Threat to the Peace": Responding to Climate Change through the UN Collective Security System. *International Journal of Climate Change: Impacts & Responses, 12*(3)

Zalasiewicz. J., Williams, M., Steffen, W., & Crutzen, P. (2010). The new world of the Anthropocene. *Environmental Science & Technology,* 44(7), 2228–223