

Combating Climate Change in Kenya for Sustainable Development

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Abstract

Climate change is considered one of the major global challenges that countries have to contend with in their efforts towards achievement of the sustainable development agenda. Climate change affects not only national and global economy but also has a direct effect on the livelihoods of communities. It is for this reason that there have been global calls on governments and all other stakeholders to put in place climate change mitigation measures and ensure that their economies become resilient. Indeed, climate change is one of the main environmental goals under the United Nation's 2030 Agenda for Sustainable Development Goals as captured under Sustainable Development Goal 13 meant to help countries achieve resilience and build adaptive capacity. However, due to their development activities and approaches, both developed and developing countries have not managed to curb climate change. It is also acknowledged that due to their differing economies and unique challenges, developing countries have far much been affected by climate change compared to the developed countries. Kenya is no exception especially considering that its economy is considered to be agricultural based and much of its rural population is still highly dependent on agriculture and environment to meet their livelihood needs. This has resulted in environmental degradation due to pollution and indiscriminate use of available environmental and natural resources. This paper adds to the existing literature in this area on how the country can successfully combat climate change in its bid to achieve sustainable development. The major argument is that for the country to combat climate change, there is a need for an integrated approach that meaningfully involves all the stakeholders. The Government alone cannot possibly achieve this task. Climate change mitigation is an important step towards achieving sustainability in the country, without which the realisation of both the country's Vision 2030 and the United Nation's 2030 Agenda for Sustainable Development will remain a mirage.

1. Introduction

Climate change remains one of the main global challenges that has affected both developed and developing countries in their efforts towards achievement of the sustainable development agenda although it is arguable that the developing countries have been affected in greater ways.¹ This is

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¹ 'Unprecedented Impacts of Climate Change Disproportionately Burdening Developing Countries, Delegate Stresses, as Second Committee Concludes General Debate | Meetings Coverage and Press Releases' <<https://www.un.org/press/en/2019/gaef3516.doc.htm>> accessed 23 January 2021; 'Untitled'

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because, since the environment remains the main source of raw materials for national development and a source of livelihoods for many communities especially those living within the rural settings, and climate change affects the ability of the environment to supply these needs, climate change has a direct effect on the livelihoods of communities as well as countries' ability to achieve growth and development. The year 2020 indeed proved how harsh climate change can be and Corona Virus pandemic (COVID-19) did not make things any better. It has been observed that from wildfires in California and locust attacks in Ethiopia and Kenya to job losses caused by pandemic lockdowns across the world, climate change and COVID-19 disrupted food production and tipped millions more people into hunger in 2020.² In addition, Oxfam has estimated that more than 50 million people in East and Central Africa require emergency food aid – and those numbers are set to rise as the region braces for a harsh drought linked to the La Nina climate pattern, as well as more locust swarms.³ Indeed, commentators have expressed their fears that the situation could worsen from the current year 2021 as both the coronavirus crisis and wild weather exacerbate fragile conditions linked to conflicts and poverty in many parts of the globe, with the head of the U.N. World Food Program (WFP) warning that “even before COVID-19 hit, 135 million people were marching towards the brink of starvation; this could double to 270 million within a few short months”.⁴

Climate change thus remains a challenge to many because, as the United Nations Environment Programme observes, climate change is increasing the frequency and intensity of extreme weather events such as heat waves, droughts, floods and tropical cyclones, aggravating water management problems, reducing agricultural production and food security, increasing health risks, damaging critical infrastructure and interrupting the provision of basic services such water and sanitation, education, energy and transport.⁵

<<https://unfccc.int/news/impacts-of-climate-change-on-sustainable-development-goals-highlighted-at-high-level-political-forum>> accessed 23 January 2021.

² ‘COVID-19 Caused Food Insecurity to Soar, But Climate Change Will Be Much Worse – Homeland Security Today’ <<https://www.hstoday.us/subject-matter-areas/emergency-preparedness/covid-19-caused-food-insecurity-to-soar-but-climate-change-will-be-much-worse/>> accessed 17 January 2021.

³ Ibid.

⁴ Ibid; ‘WFP Chief Warns of Hunger Pandemic as COVID-19 Spreads (Statement to UN Security Council) | World Food Programme’ <<https://www.wfp.org/news/wfp-chief-warns-hunger-pandemic-covid-19-spreads-statement-un-security-council>> accessed 17 January 2021.

⁵ Environment UN, ‘GOAL 13: Climate Action’ (*UNEP - UN Environment Programme*, 2 October 2017) <<http://www.unenvironment.org/explore-topics/sustainable-development-goals/why-do-sustainable-development-goals-matter/goal-13>> accessed 17 January 2021.

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It is for this reason that there have been global calls on governments and all other stakeholders to put in place climate change mitigation measures and ensure that their economies become resilient. Climate change is one of the main environmental goals under the United Nation's *2030 Agenda for Sustainable Development Goals*⁶ (SDGs) as captured under Sustainable Development Goal 13 meant to help countries achieve resilience and build adaptive capacity. SDG Goal 13 calls on countries to take urgent action to combat climate change and its impacts.⁷ SDG Goal 13 targets require countries to: strengthen resilience and adaptive capacity to climate-related hazards and natural disasters in all countries;⁸ integrate climate change measures into national policies, strategies and planning;⁹ improve education, awareness-raising and human and institutional capacity on climate change mitigation, adaptation, impact reduction and early warning;¹⁰ implement the commitment undertaken by developed-country parties to the United Nations Framework Convention on Climate Change to a goal of mobilizing jointly \$100 billion annually by 2020 from all sources to address the needs of developing countries in the context of meaningful mitigation actions and transparency on implementation and fully operationalize the Green Climate Fund through its capitalization as soon as possible;¹¹ and promote mechanisms for raising capacity for effective climate change-related planning and management in least developed countries and small island developing States, including focusing on women, youth and local and marginalized communities¹². Notably, the 2030 Agenda acknowledges that the United Nations Framework Convention on Climate Change is the primary international intergovernmental forum for negotiating the global response to climate change.¹³

The above goals and targets are commendable and are meant to help countries come up with climate change mitigation and adaptation mechanisms to combat the challenge of climate change. However, due to their development activities and approaches, both developed and developing countries have not managed to combat climate change. Indeed, it has been observed that despite the growing amount of climate change concern, mitigation efforts, legislation, and

⁶ UN General Assembly, *Transforming our world: the 2030 Agenda for Sustainable Development*, 21 October 2015, A/RES/70/1.

⁷ Sustainable Development Goal 13.

⁸ Target 13.1, SDG Goal 13.

⁹ Target 13.2, SDG Goal 13.

¹⁰ Target 13.3, SDG Goal 13.

¹¹ Target 13.a, SDG Goal 13.

¹² Target 13.b, SDG Goal 13.

¹³ See DGS Goal 13 (asterisk).

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international agreements that have reduced emissions in some places, the continued economic growth of the less developed world has increased global greenhouse gases emission, with the time between 2000 and 2010 experiencing the largest increases since 1970.¹⁴ According to scientific reports, the Earth's mean surface temperature in 2020 was 1.25°C above the global average between 1850 and 1900, largely attributable to greenhouse gases from human activities.¹⁵ It has also been reported that human activities are estimated to have caused approximately 1.0°C of global warming above pre-industrial levels, with a likely range of 0.8°C to 1.2°C and global warming is likely to reach 1.5°C between 2030 and 2052 if it continues to increase at the current rate.¹⁶

It must also be acknowledged that due to their differing economies and unique challenges, developing countries have far more been affected by climate change compared to the developed countries.¹⁷ Kenya is no exception especially considering that its economy is considered to be agricultural based and much of its rural population is still highly dependent on agriculture and environment to meet their livelihood needs.¹⁸ This has resulted in environmental degradation due to pollution and indiscriminate use of available environmental and natural resources.¹⁹ This paper adds to the existing literature in this area on how the country can successfully combat climate change in its bid to achieve sustainable development. It is imperative that countries combat climate change urgently considering that it is estimated that without action, by 2050,

¹⁴ '15.5: Anthropogenic Causes of Climate Change' (*Geosciences LibreTexts*, 4 November 2019) <[https://geo.libretexts.org/Bookshelves/Geology/Book%3A_An_Introduction_to_Geology_\(Johnson_Affolter_Inkenbrandt_and_Mosher\)/15%3A_Global_Climate_Change/15.05%3A_Anthropogenic_Causes_of_Climate_Change](https://geo.libretexts.org/Bookshelves/Geology/Book%3A_An_Introduction_to_Geology_(Johnson_Affolter_Inkenbrandt_and_Mosher)/15%3A_Global_Climate_Change/15.05%3A_Anthropogenic_Causes_of_Climate_Change)> accessed 17 January 2021.

¹⁵ Wilby R, 'Climate Change: What Would 4°C of Global Warming Feel Like?' (*The Conversation*) <<http://theconversation.com/climate-change-what-would-4-c-of-global-warming-feel-like-152625>> accessed 17 January 2021.

¹⁶ 'Summary for Policymakers — Global Warming of 1.5 °C' <<https://www.ipcc.ch/sr15/chapter/spm/>> accessed 17 January 2021.

¹⁷ 'Unprecedented Impacts of Climate Change Disproportionately Burdening Developing Countries, Delegate Stresses, as Second Committee Concludes General Debate | Meetings Coverage and Press Releases' <<https://www.un.org/press/en/2019/gaef3516.doc.htm>> accessed 23 January 2021.

¹⁸ Alila, Patrick O., and Rosemary Atieno. "Agricultural policy in Kenya: Issues and processes." *Nairobi: Institute of Development Studies* (2006); Faling, Marijn. "Framing agriculture and climate in Kenyan policies: A longitudinal perspective." *Environmental Science & Policy* 106 (2020): 228-239; Faling, Marijn, and Robbert Biesbroek. "Cross-boundary policy entrepreneurship for climate-smart agriculture in Kenya." *Policy Sciences* 52, no. 4 (2019): 525-547; Haradhan Kumar Mohajan, 'Food and Nutrition Scenario of Kenya' (2014) 2 *American Journal of Food and Nutrition* 28.

¹⁹ Abioye O Fayiga, Mabel O Ipinmoroti and Tait Chirenje, 'Environmental Pollution in Africa' (2018) 20 *Environment, Development and Sustainability* 41.; '(PDF) Environmental Degradation: Causes, Impacts and Mitigation' (*ResearchGate*) <https://www.researchgate.net/publication/279201881_Environmental_Degradation_Causes_Impacts_and_Mitigation> accessed 23 January 2021.

68% of humanity may live in urban areas and populations in the tropics will be most exposed to extreme humid heat.²⁰ The World has been struggling with COVID-19 pandemic since March 2020 and the negative effect on economies and livelihoods has been enormous. Despite this, some commentators have argued that climate change could be more devastating than Covid-19.²¹

2. Climate Change: Definition and Causes

Climate is defined as the temperature and precipitation patterns and range of variability averaged over the long-term for a particular region.²² On the other hand, climate change has been defined as ‘a long-term shift in the average weather conditions of a region, such as its typical temperature, rainfall, and windiness’.²³ The *United Nations Framework Convention on Climate Change*²⁴ (UNFCCC) defines "climate change" to mean a change of climate which is attributed directly or indirectly to human activity that alters the composition of the global atmosphere and which is in addition to natural climate variability observed over comparable time periods.²⁵

It has been pointed out that while prehistoric changes in climate have been very slow since climate changes typically occur slowly over many millions of years, the climate changes observed today are rapid and largely human-caused.²⁶

According to the available scientific data, anthropogenic climate change, or, human-caused climate change is believed to be causing rapid changes to the climate, which will cause severe

²⁰Wilby R, ‘Climate Change: What Would 4°C of Global Warming Feel Like?’ (*The Conversation*) <<http://theconversation.com/climate-change-what-would-4-c-of-global-warming-feel-like-152625>> accessed 17 January 2021.

²¹Clifford C, ‘Bill Gates: Climate Change Could Be More Devastating than Covid-19 Pandemic—This Is What the US Must Do to Prepare’ (*CNBC*, 8 January 2021) <<https://www.cnbc.com/2021/01/08/bill-gates-climate-change-could-be-worse-than-covid-19.html>> accessed 17 January 2021.

²² ‘15.1: Global Climate Change’ (*Geosciences LibreTexts*, 26 December 2019) <[https://geo.libretexts.org/Bookshelves/Geology/Book%3A_An_Introduction_to_Geology_\(Johnson_Affolter_Inkenbrandt_and_Mosher\)/15%3A_Global_Climate_Change/15.01%3A_Global_Climate_Change](https://geo.libretexts.org/Bookshelves/Geology/Book%3A_An_Introduction_to_Geology_(Johnson_Affolter_Inkenbrandt_and_Mosher)/15%3A_Global_Climate_Change/15.01%3A_Global_Climate_Change)> accessed 17 January 2021.

²³ Canada E and CC, ‘Climate Change Concepts’ (*aem*, 26 September 2018) <<https://www.canada.ca/en/environment-climate-change/services/climate-change/canadian-centre-climate-services/basics/concepts.html>> accessed 17 January 2021.

²⁴ UN General Assembly, *United Nations Framework Convention on Climate Change: resolution / adopted by the General Assembly*, 20 January 1994, A/RES/48/189.

²⁵ Ibid, Article 1(2).

²⁶ ‘15.5: Anthropogenic Causes of Climate Change’ (*Geosciences LibreTexts*, 4 November 2019) <[https://geo.libretexts.org/Bookshelves/Geology/Book%3A_An_Introduction_to_Geology_\(Johnson_Affolter_Inkenbrandt_and_Mosher\)/15%3A_Global_Climate_Change/15.05%3A_Anthropogenic_Causes_of_Climate_Change](https://geo.libretexts.org/Bookshelves/Geology/Book%3A_An_Introduction_to_Geology_(Johnson_Affolter_Inkenbrandt_and_Mosher)/15%3A_Global_Climate_Change/15.05%3A_Anthropogenic_Causes_of_Climate_Change)> accessed 17 January 2021.

environmental damage.²⁷ This is mainly attributed to anthropogenic greenhouse gases emissions, mostly carbon dioxide (CO₂), from fossil fuel combustion and industrial processes and the following economic sectors: electricity and heat production; agriculture, forestry, and land use; industry; transportation including automobiles; other energy production; and buildings.²⁸

3. The Legal Framework on Climate Change Mitigation and Adaptation

Climate change mitigation has been defined as a human-mediated reduction of the anthropogenic forcing of the climate system that includes strategies to reduce GHG sources and emissions and enhancing GHG sinks.²⁹ At the global scene, there exist a number of related environmental legal instruments, plans and programmes aimed at combating climate change.

4. International Legal Framework on Climate Change Mitigation and Adaptation

4.1. Montreal Protocol on Substances that Deplete the Ozone Layer

The *Montreal Protocol on Substances that Deplete the Ozone Layer* was signed in 1987 and entered into force in 1989 as a global agreement to protect the Earth's ozone layer by phasing out the chemicals that deplete it, a plan that includes both the production and consumption of ozone-depleting substances.³⁰ The Protocol is believed to have successfully met its objectives thus far as it continues to safeguard the ozone layer today.³¹

4.2. Vienna Convention for the Protection of the Ozone Layer

The Vienna Convention for the Protection of the Ozone Layer was the first convention of any kind to be signed by every country involved, taking effect in 1988 and reaching universal

²⁷ Ibid.

²⁸ '15.5: Anthropogenic Causes of Climate Change' (*Geosciences LibreTexts*, 4 November 2019) <[https://geo.libretexts.org/Bookshelves/Geology/Book%3A_An_Introduction_to_Geology_\(Johnson_Affolter_Inkenbrandt_and_Mosher\)/15%3A_Global_Climate_Change/15.05%3A_Anthropogenic_Causes_of_Climate_Change](https://geo.libretexts.org/Bookshelves/Geology/Book%3A_An_Introduction_to_Geology_(Johnson_Affolter_Inkenbrandt_and_Mosher)/15%3A_Global_Climate_Change/15.05%3A_Anthropogenic_Causes_of_Climate_Change)> accessed 17 January 2021; 'How We Know Today's Climate Change Is Not Natural' (*State of the Planet*, 4 April 2017) <<https://blogs.ei.columbia.edu/2017/04/04/how-we-know-climate-change-is-not-natural/>> accessed 17 January 2021; 'The Science of Carbon Dioxide and Climate' (*State of the Planet*, 10 March 2017) <<https://blogs.ei.columbia.edu/2017/03/10/the-science-of-carbon-dioxide-and-climate/>> accessed 17 January 2021.

²⁹ Rinku Singh and GS Singh, 'Traditional Agriculture: A Climate-Smart Approach for Sustainable Food Production' (2017) 2 *Energy, Ecology and Environment* 296.

³⁰ 'The Montreal Protocol on Substances That Deplete the Ozone Layer | Ozone Secretariat' <<https://ozone.unep.org/treaties/montreal-protocol/montreal-protocol-substances-deplete-ozone-layer>> accessed 21 January 2021.

³¹ Ibid.

ratification in 2009.³² The Vienna Convention obligates the Parties to take appropriate measures in accordance with the provisions of this Convention and of those protocols in force to which they are party to protect human health and the environment against adverse effects resulting or likely to result from human activities which modify or are likely to modify the ozone layer.³³

4.3. The Kyoto Protocol

The *Kyoto Protocol* was adopted on 11 December 1997 and entered into force on 16 February 2005, currently with 192 Parties.³⁴ The Kyoto protocol was the first agreement between nations to mandate country-by-country reductions in greenhouse-gas emissions. Kyoto emerged from the UN Framework Convention on Climate Change (UNFCCC), which was signed by nearly all nations at the 1992 Earth Summit.³⁵ The Kyoto Protocol operationalizes the United Nations Framework Convention on Climate Change by committing industrialized countries and economies in transition to limit and reduce greenhouse gases (GHG) emissions in accordance with agreed individual targets,³⁶ whereas the Convention itself only asks those countries to adopt policies and measures on mitigation and to report periodically.³⁷ Notably, the Kyoto Protocol only binds developed countries, and places a heavier burden on them under the principle of “common but differentiated responsibility and respective capabilities”, because it recognizes that they are largely responsible for the current high levels of GHG emissions in the atmosphere.³⁸ While industrialized nations pledged to cut their yearly emissions of carbon, as measured in six greenhouse gases, by varying amounts, averaging 5.2%, by 2012 as compared to 1990, some almost achieved these targets while others like China and United States exceeded the targets by producing more carbon to the point of cancelling the progress made by all other states.³⁹ In addition, some countries such as India and China were never in the list of the original 37

³² ‘The Vienna Convention for the Protection of the Ozone Layer | Ozone Secretariat’ <<https://ozone.unep.org/treaties/vienna-convention>> accessed 21 January 2021.

³³ Vienna Convention for the Protection of the Ozone Layer, Article 2(1).

³⁴ ‘Untitled’ <https://unfccc.int/kyoto_protocol> accessed 21 January 2021.

³⁵ Extract from *The Rough Guide to Climate Change*, ‘What Is the Kyoto Protocol and Has It Made Any Difference?’ (*the Guardian*, 11 March 2011) <<http://www.theguardian.com/environment/2011/mar/11/kyoto-protocol>> accessed 21 January 2021.

³⁶ ‘Untitled’ <https://unfccc.int/kyoto_protocol> accessed 21 January 2021.

³⁷ Ibid.

³⁸ Ibid.

³⁹ Extract from *The Rough Guide to Climate Change*, ‘What Is the Kyoto Protocol and Has It Made Any Difference?’ (*the Guardian*, 11 March 2011) <<http://www.theguardian.com/environment/2011/mar/11/kyoto-protocol>> accessed 21 January 2021.

developed countries bound by the Protocol yet China and India together account for approximately 35% of total carbon emissions, as of 2020, while the developed nations of the UK, France, and Germany combined, only account for 4% of the world's carbon emissions.⁴⁰ The Kyoto Protocol was essentially replaced by the Paris Climate Accord in 2015.⁴¹

4.4. Doha Amendment to the Kyoto Protocol

Parties to the Kyoto Protocol adopted an amendment to the Kyoto Protocol by decision 1/CMP.8 in accordance with Articles 20 and 21 of the Kyoto Protocol, at the eighth session of the Conference of the Parties serving as the meeting of the Parties to the Kyoto Protocol (CMP) held in Doha, Qatar, on 8 December 2012.⁴² As of 28 October 2020, 147 Parties had deposited their instrument of acceptance, therefore, the threshold for entry into force of the Doha Amendment had been met.⁴³

The Doha Amendment refers to the changes made to the Kyoto Protocol in 2012, after the First Commitment Period of the Kyoto Protocol concluded. The Amendment adds new emission reduction targets for Second Commitment Period (2012-2020) for participating countries.⁴⁴

4.5. Paris Climate Accord, 2015

The Paris Agreement is a legally binding international treaty on climate change, adopted by 196 Parties at COP 21 in Paris, on 12 December 2015 and entered into force on 4 November 2016.⁴⁵ Its goal is to limit global warming to well below 2, preferably to 1.5 degrees Celsius, compared to pre-industrial levels.⁴⁶ Unlike the Kyoto Protocol, the Paris Agreement is a landmark in the multilateral climate change process because, for the first time, a binding agreement brings all nations into a common cause to undertake ambitious efforts to combat climate change and adapt to its effects.⁴⁷

⁴⁰ 'Kyoto Protocol - Overview, Components, Current State' (*Corporate Finance Institute*) <<https://corporatefinanceinstitute.com/resources/knowledge/other/kyoto-protocol/>> accessed 21 January 2021.

⁴¹ Ibid.

⁴² 'Untitled' <<https://unfccc.int/process/the-kyoto-protocol/the-doha-amendment>> accessed 21 January 2021.

⁴³ Ibid.

⁴⁴ 'Doha Amendment to the Kyoto Protocol (2012)' (*Cop23*) <<https://cop23.com.fj/knowledge/doha-amendment-kyoto-protocol-2012/>> accessed 21 January 2021.

⁴⁵ 'Untitled' <<https://unfccc.int/process-and-meetings/the-paris-agreement/the-paris-agreement>> accessed 21 January 2021.

⁴⁶ Ibid.

⁴⁷ Ibid.

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The 26th UN Climate Change Conference of the Parties (COP26) will be held in Glasgow from 1st to 12th November 2021.⁴⁸ The COP26 summit is expected to bring parties together to accelerate action towards the goals of the Paris Agreement and the UN Framework Convention on Climate Change.⁴⁹

4.6. United Nations Convention to Combat Desertification

The objective of the *United Nations Convention to Combat Desertification*⁵⁰ is to combat desertification and mitigate the effects of drought in countries experiencing serious drought and/or desertification, particularly in Africa, through effective action at all levels, supported by international cooperation and partnership arrangements, in the framework of an integrated approach which is consistent with Agenda 21, with a view to contributing to the achievement of sustainable development in affected areas.⁵¹ This is to be achieved through long-term integrated strategies that focus simultaneously, in affected areas, on improved productivity of land, and the rehabilitation, conservation and sustainable management of land and water resources, leading to improved living conditions, in particular at the community level.⁵²

4.7. Agenda 21

Agenda 21 is a comprehensive plan of action to be taken globally, nationally and locally by organizations of the United Nations System, Governments, and Major Groups in every area in which human impacts on the environment.⁵³

4.8. United Nations Framework Convention on Climate Change (UNFCCC)

The *United Nations Framework Convention on Climate Change*⁵⁴ was passed to achieve, in accordance with the relevant provisions of the Convention, stabilization of greenhouse gas

⁴⁸ 'UN Climate Change Conference (COP26) at the SEC – Glasgow 2021' (*UN Climate Change Conference (COP26) at the SEC – Glasgow 2021*) <<https://ukcop26.org/>> accessed 17 January 2021.

⁴⁹ Ibid.

⁵⁰ United Nations Convention to Combat Desertification (1994).

⁵¹ Article 2(1).

⁵² Article 2(2).

⁵³ 'Agenda 21 ... Sustainable Development Knowledge Platform'

<<https://sustainabledevelopment.un.org/outcomedocuments/agenda21>> accessed 21 January 2021.

⁵⁴ UN General Assembly, *United Nations Framework Convention on Climate Change: resolution / adopted by the General Assembly*, 20 January 1994, A/RES/48/189.

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concentrations in the atmosphere, at a level that would prevent dangerous anthropogenic interference with the climate system. Such a level should be achieved within a time-frame sufficient to allow ecosystems to adapt naturally to climate change, to ensure that food production is not threatened and to enable economic development to proceed in a sustainable manner.⁵⁵

In their actions to achieve the objective of the Convention and to implement its provisions, the Parties are to be guided, *inter alia*, by the following principles: the Parties should protect the climate system for the benefit of present and future generations of humankind, on the basis of equity and in accordance with their common but differentiated responsibilities and respective capabilities. Accordingly, the developed country Parties should take the lead in combating climate change and the adverse effects thereof;⁵⁶ the specific needs and special circumstances of developing country Parties, especially those that are particularly vulnerable to the adverse effects of climate change, and of those Parties, especially developing country Parties, that would have to bear a disproportionate or abnormal burden under the Convention, should be given full consideration;⁵⁷ the Parties should take precautionary measures to anticipate, prevent or minimize the causes of climate change and mitigate its adverse effects. Where there are threats of serious or irreversible damage, lack of full scientific certainty should not be used as a reason for postponing such measures, taking into account that policies and measures to deal with climate change should be cost-effective so as to ensure global benefits at the lowest possible cost. To achieve this, such policies and measures should take into account different socio-economic contexts, be comprehensive, cover all relevant sources, sinks and reservoirs of greenhouse gases and adaptation, and comprise all economic sectors. Efforts to address climate change may be carried out cooperatively by interested Parties;⁵⁸ the Parties have a right to, and should, promote sustainable development. Policies and measures to protect the climate system against human-induced change should be appropriate for the specific conditions of each Party and should be integrated with national development programmes, taking into account that economic development is essential for adopting measures to address climate change;⁵⁹ the Parties

⁵⁵ Ibid, Article 2.

⁵⁶ *United Nations Framework Convention on Climate Change*, Article 3(1).

⁵⁷ *United Nations Framework Convention on Climate Change*, Article 3(2).

⁵⁸ *United Nations Framework Convention on Climate Change*, Article 3(3).

⁵⁹ Ibid, Article 3(4).

should cooperate to promote a supportive and open international economic system that would lead to sustainable economic growth and development in all Parties, particularly developing country Parties, thus enabling them better to address the problems of climate change. Measures taken to combat climate change, including unilateral ones, should not constitute a means of arbitrary or unjustifiable discrimination or a disguised restriction on international trade.⁶⁰

4.9. Intergovernmental Panel on Climate Change (IPCC)

The Intergovernmental Panel on Climate Change (IPCC) is the United Nations body established in 1988 for assessing the science related to climate change.⁶¹ The Intergovernmental Panel on Climate Change (IPCC) collects, reviews, and summarizes the best information on climate change and its impacts, and puts forward possible solutions.⁶² IPCC often discharges its work through scientific reports, summarizing current and relevant findings in the field and written for policymakers and scientists, but they are available to everyone.⁶³

5. Kenya's Legal Framework on Climate Change Mitigation

5.1. Environmental Management and Co-ordination Act, 1999

The *Environmental Management and Co-ordination Act, 1999*⁶⁴ (EMCA) mandates the Cabinet Secretary in charge of environmental matters in consultation with the National Environment Management Authority, to undertake or commission other persons to undertake national studies and give due recognition to developments in scientific knowledge relating to substances, activities and practices that deplete the ozone layer to the detriment of public health and the environment.⁶⁵ The Cabinet Secretary in consultation with the Authority, is then required to issue guidelines and institute programmes concerning the: elimination of substances that deplete the stratospheric ozone layer; controlling of activities and practices likely to lead to the degradation of the ozone layer and the stratosphere; reduction and minimisation of risks to human health

⁶⁰ Ibid, Article 3(5).

⁶¹ 'IPCC — Intergovernmental Panel on Climate Change' <<https://www.ipcc.ch/>> accessed 21 January 2021.

⁶² 'The Intergovernmental Panel on Climate Change' (*MIT Climate Portal*) <<https://climate.mit.edu/explainers/intergovernmental-panel-climate-change>> accessed 21 January 2021.

⁶³ Ibid.

⁶⁴ Environmental Management and Co-ordination Act, No. 8 of 1999, Laws of Kenya.

⁶⁵ Ibid, sec. 56(1).

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created by the degradation of the ozone layer and the stratosphere; and formulate strategies, prepare and evaluate programmes for phasing out ozone depleting substances.⁶⁶

The Act also mandates the Cabinet Secretary, in consultation with relevant lead agencies, to issue guidelines and prescribe measures on climate change.⁶⁷

EMCA also provides for fiscal incentives that are designed to promote climate change mitigation. It empowers the Cabinet Secretary responsible for Finance, on the recommendation of the National Council of Public benefit organizations, to propose to Government tax and other fiscal incentives, disincentives or fees to induce or promote the proper management of the environment and natural resources or the prevention or abatement of environmental degradation.⁶⁸ The tax and fiscal incentives, disincentives or fees may include: customs and excise waiver in respect of imported capital goods which prevent or substantially reduce environmental degradation caused by an undertaking; tax rebates to industries or other establishments that invest in plants, equipment and machinery for pollution control, re-cycling of wastes, water harvesting and conservation, prevention of floods and for using other energy resources as substitutes for hydrocarbons; tax disincentives to deter bad environmental behaviour that leads to depletion of environmental resources or that cause pollution; or user fees to ensure that those who use environmental resources pay proper value for the utilization of such resources.⁶⁹

EMCA also provides for Strategic Environmental Assessments⁷⁰; Environmental Impact Assessment⁷¹; Environmental Audit⁷²; and Environmental Monitoring⁷³, all of which are meant to protect the environment from environmentally degrading human activities.

5.2. Climate Change Action Plan 2018–2022

The Climate Change Action Plan 2018–2022⁷⁴ aims to further Kenya's development goals by providing mechanisms and measures that achieve low carbon climate resilient development.

⁶⁶ Ibid, sec. 56(2).

⁶⁷ Ibid, sec. 56A.

⁶⁸ Environmental Management and Co-ordination Act, sec. 57(1).

⁶⁹ Ibid, sec. 57(2).

⁷⁰ Ibid, sec. 57A.

⁷¹ Ibid, sec. 58.

⁷² Ibid, sec. 68.

⁷³ Ibid, sec. 69.

NCCAP 2018-2022 builds on the first action plan (2013-2017), sets out actions to implement the Climate Change Act (2016), and provides a framework for Kenya to deliver on its Nationally Determined Contribution (NDC) to the Paris Agreement.⁷⁵

5.3. Climate Change Act, 2016

The Climate Change Act 2016⁷⁶ was enacted to provide for a regulatory framework for enhanced response to climate change; to provide for mechanism and measures to achieve low carbon climate development, and for connected purposes.⁷⁷ The Act is to be applied for the development, management, implementation and regulation of mechanisms to enhance climate change resilience and low carbon development for the sustainable development of Kenya.⁷⁸

5.4. Climate Change Mitigation in Kenya: Challenges and Prospects

Africa is classified as one of the continents highly vulnerable to climate change due to several reasons: high poverty level, high dependence on rain-fed agriculture, poor management of natural resources, capacity/technology limitations, weak infrastructure, and less efficient governance/institutional setup.⁷⁹ Arguably, Kenya's challenges as far as combating climate change is concerned are not any different from the ones identified above.

Climate change impacts and the associated socio-economic losses on Kenya have been exacerbated by the country's high dependence on climate sensitive natural resources.⁸⁰ The main climate hazards include droughts and floods which cause economic losses estimated at 3% of the country's Gross Domestic Product (GDP) while Kenya's total greenhouse gas (GHG) emissions are relatively low, out of which 75% are from the land use, land-use change and forestry and agriculture sectors.⁸¹ Kenya's Vision 2030 which seeks to convert the country into a newly

⁷⁴ Government of the Republic of Kenya (2018). *National Climate Change Action Plan 2018-2022*. Ministry of Environment and Forestry, Nairobi.

⁷⁵ National Climate Change Action Plan: 2018-2022, p.4.

⁷⁶ Climate Change Act, No. 11 of 2016, Laws of Kenya.

⁷⁷ Ibid, Preamble.

⁷⁸ Ibid, sec. 3(1).

⁷⁹ Kimaro, Didas N., Alfred N. Gichu, Hezron Mogaka, Brian E. Isabirye, and Kifle Woldearegay. "Climate Change Mitigation and Adaptation in ECA/SADC/COMESA region: Opportunities and Challenges." <https://www.researchgate.net/publication/346628199_Climate_Change_Mitigation_and_Adaptation_in_ECASADCCOMESA_region_Opportunities_and_Challenges> accessed 17 January 2021.

⁸⁰ GoK, I. N. D. C. "Kenya's Intended Nationally Determined Contribution." (2015).

⁸¹ Ibid.

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industrialized middle income country by 2030 is expected to increase emissions from the energy sector.⁸²

Kenya's agricultural sector has been greatly affected by climate change and has also seen growth in use of farming chemicals. The growing population in Kenya coupled with dwindling rainfall and shrinking land parcels have all led to the adoption of modern commercial approaches to agricultural production to achieve food security which has coincidentally greatly contributed to environmental degradation and climate change.⁸³

As opposed to the highly commercialized agricultural practices, indigenous agriculture systems are believed to be diverse, adaptable, nature friendly and productive through such approaches as mixed cropping which not only decreases the risk of crop failure, pest and disease but also diversifies the food supply and the higher vegetation diversity in the form of crops and trees escalates the conversion of CO₂ to organic form, thus reducing global warming.⁸⁴

Kenya submitted its Intended Nationally Determined Contribution (INDC) in 2015 as part of its obligations as a signatory and party to the United Nations Framework Convention on Climate Change (UNFCCC).⁸⁵ Their implementation is to begin in this year 2021. Some of the challenges identified are related to technical capacity and financial resource gaps.⁸⁶

Kenya's updated Nationally Determined Contribution (NDC) to the United Nations Framework Convention on Climate Change (UNFCCC) submitted on 28th December 2020 sets out two important developments from its first NDC, which was submitted in December 2016. As compared to the first NDC target of 30% GHG emission reduction, the updated NDC commits to lower GHG emissions by 32% by 2030 relative to the business as usual (BAU) scenario.⁸⁷ In addition, while the first NDC was fully conditional to international support, the updated NDC

⁸² Ibid.

⁸³ Kioko, John, and Moses M. Okello. "Land use cover and environmental changes in a semi-arid rangeland, Southern Kenya." *Journal of Geography and Regional Planning* 3, no. 11 (2010): 322-326.

⁸⁴ Rinku Singh and GS Singh, 'Traditional Agriculture: A Climate-Smart Approach for Sustainable Food Production' (2017) 2 *Energy, Ecology and Environment* 296.

⁸⁵ SusWatch Kenya, 'Nationally Determined Contributions (NDCs) Implementation: The Kenyan Scenario,' *Policy Brief*, December 2019, 1

<https://www.inforse.org/africa/pdfs/PolicyBrief_Kenya_CSO_view_on_NDCs_Dec_2019.pdf> accessed 17 January 2021.

⁸⁶ Ibid.

⁸⁷ 'NDC Update Kenya: Enhanced Reduction Target' (*Changing Transport*, 13 January 2021)

<<https://www.changing-transport.org/ndc-update-kenya-enhanced-reduction-target/>> accessed 21 January 2021.

intends to mobilize domestic resources to meet 13% of the estimated USD 62 Billion NDC implementation costs.⁸⁸

6. Combating Climate Change for Sustainable Development: Way Forward

6.1. International Cooperation on Climate Change Mitigation

The World Food Programme has in the recent past observed that the coronavirus crisis has shown how faster international action and better cooperation in areas like science and technology could help tackle the problem (food shortage and climate change).⁸⁹

There is a need for Kenya to work closely with other countries and stakeholders at the global level to combat climate change.

The Paris Agreement provides a framework for financial, technical and capacity building support to those countries that need it.⁹⁰ The Paris Agreement reaffirms that developed countries should take the lead in providing financial assistance to countries that are less endowed and more vulnerable, while for the first time also encouraging voluntary contributions by other Parties, as climate finance is needed for mitigation and adaptation.⁹¹ The Paris Agreement also encourages technology development and transfer for both improving resilience to climate change and reducing GHG emissions, by establishing a technology framework to provide overarching guidance to the well-functioning Technology Mechanism.⁹² Also, in recognition of the fact that not all developing countries have sufficient capacities to deal with many of the challenges brought by climate change, the Paris Agreement places great emphasis on climate-related capacity-building for developing countries and requests all developed countries to enhance support for capacity-building actions in developing countries.⁹³

Kenya's Government should also continually work closely with the UNEP in design and execution of climate change mitigation plans. UNEP assists countries all over the world in their

⁸⁸ Ibid.

⁸⁹ 'COVID-19 Caused Food Insecurity to Soar, But Climate Change Will Be Much Worse – Homeland Security Today' <<https://www.hstoday.us/subject-matter-areas/emergency-preparedness/covid-19-caused-food-insecurity-to-soar-but-climate-change-will-be-much-worse/>> accessed 17 January 2021.

⁹⁰ 'Untitled' <<https://unfccc.int/process-and-meetings/the-paris-agreement/the-paris-agreement>> accessed 21 January 2021.

⁹¹ Ibid; see also UN General Assembly, *United Nations Framework Convention on Climate Change*, Article 11.

⁹² Ibid.

⁹³ Ibid; 'Untitled' <<https://unfccc.int/process-and-meetings/the-paris-agreement/the-paris-agreement/key-aspects-of-the-paris-agreement>> accessed 21 January 2021.

efforts to create National Adaptation Plans (NAPs), which process seeks to identify medium- and long-term adaptation needs, informed by the latest climate science.⁹⁴ NAPs are meant to: reduce vulnerability to the impacts of climate change by building adaptive capacity and resilience; and integrate adaptation into new and existing policies and programmes, especially development strategies.⁹⁵

6.2. Integrated Approach to Reduction of Greenhouse Gases Emission

It has been argued that the Paris Agreement's goal of staying under 2° Celsius and aiming for 1.5°C global warming, as compared to pre-industrial average global temperature, scientifically translates to limiting emissions of greenhouse gases within a finite global carbon budget.⁹⁶

As already pointed out, greenhouse gas emissions account for the largest causes of anthropogenic climate change. It has been reported that globally, the economic slowdown during the coronavirus pandemic was expected to slash emissions by 4-7% in 2020, bringing them close to where global emissions were in 2010.⁹⁷ However, concentrations of greenhouse gases are still rising rapidly in the atmosphere.⁹⁸ Cutting down greenhouse gas emissions can potentially reduce the impacts and costs associated with climate change.⁹⁹

With the outbreak of COVID-19 pandemic, major cities around the world have reported an increase in the numbers of people cycling and walking in public spaces.¹⁰⁰ Cities such as Bogota, Berlin, Vancouver, New York, Paris and Berlin are reported to have expanded bike lanes and public paths to accommodate the extra cycling traffic, with Australia's New South Wales

⁹⁴ UN Environment, 'National Adaptation Plans' (*UNEP - UN Environment Programme*, 14 September 2017) <<http://www.unenvironment.org/explore-topics/climate-change/what-we-do/climate-adaptation/national-adaptation-plans>> accessed 21 January 2021.

⁹⁵ Ibid.

⁹⁶ 'Nature-Based Solutions for Better Climate Resilience: The Need to Scale up Ambition and Action | NDC Partnership' <<https://ndcpartnership.org/nature-based-solutions-better-climate-resilience-need-scale-ambition-and-action>> accessed 21 January 2021.

⁹⁷ Raymond C and Matthews T, 'Global Warming Now Pushing Heat into Territory Humans Cannot Tolerate' (*The Conversation*) <<http://theconversation.com/global-warming-now-pushing-heat-into-territory-humans-cannot-tolerate-138343>> accessed 17 January 2021.

⁹⁸ Ibid.

⁹⁹ UN Environment, 'Adaptation Gap Report 2020' (*UNEP - UN Environment Programme*, 9 January 2021) <<http://www.unenvironment.org/resources/adaptation-gap-report-2020>> accessed 20 January 2021; 'How to Boost Resilience to Climate Change - Adaptation Gap Report 2020 - YouTube' <<https://www.youtube.com/watch?v=KhZ16QPv2c&feature=youtu.be>> accessed 20 January 2021.

¹⁰⁰ Quéré CL and others, 'Coronavirus Is a "sliding Doors" Moment. What We Do Now Could Change Earth's Trajectory' (*The Conversation*) <<http://theconversation.com/coronavirus-is-a-sliding-doors-moment-what-we-do-now-could-change-earths-trajectory-137838>> accessed 17 January 2021.

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government also encouraging councils to follow suit.¹⁰¹ The result has been a decline in global daily emissions, with the fall in road traffic being the main driver of the global emissions decline.¹⁰² It is estimated that daily global CO₂ emissions decreased by –17% by early April 2020 compared with the mean 2019 levels, just under half from changes in surface transport.¹⁰³

The National and County Governments in Kenya could learn from these global trends and encourage more people to embrace cycling to and from work especially around major towns and the cities in Kenya by creating room for bike lanes and public paths as well as improving security in public places and enhancing road safety. This can potentially improve the country's chances of achieving climate mitigation due to the reduced daily emissions from traffic.

It has been suggested that encouraging cycling and working from home to continue beyond the current pandemic is likely to help countries in meeting their climate goals.¹⁰⁴

There is also a need for the country to embrace vehicle technology that emits less greenhouse gases such as electric vehicles and trains. While this will certainly require massive amount of investments and time, the investment will be worth it in the long run as far as reduction of greenhouse gas emissions is concerned.

The country has however shown some intended positive steps towards this. Notably, the transport sector makes up the biggest share of petroleum consumption in Kenya; as such about 67% of Kenya's energy-related CO₂ emissions and 11.3% of Kenya's total GHG emissions in 2015 came from transport-related activities (GHG inventory report, 2019).¹⁰⁵ Kenya thus seeks to implement low carbon and efficient transportation systems in its December 2020 updated NDC. These are: Upscaling the construction of roads to systematically harvest water and reduce flooding; Enhancing institutional capacities on climate proofing vulnerable road infrastructure through vulnerability assessments; and Promoting use of appropriate designs and building materials to enhance resilience of at least 4500 km of roads to climate risks.¹⁰⁶ Key actions for the transport sector include: Developing an affordable, safe and efficient public transport system,

¹⁰¹ Ibid.

¹⁰² Ibid.

¹⁰³ Le Quéré C and others, 'Temporary Reduction in Daily Global CO₂ Emissions during the COVID-19 Forced Confinement' (2020) 10 Nature Climate Change 647.

¹⁰⁴ Quéré CL and others, 'Coronavirus Is a "sliding Doors" Moment. What We Do Now Could Change Earth's Trajectory' (*The Conversation*).

¹⁰⁵ 'NDC Update Kenya: Enhanced Reduction Target' (*Changing Transport*, 13 January 2021)

<<https://www.changing-transport.org/ndc-update-kenya-enhanced-reduction-target/>> accessed 21 January 2021.

¹⁰⁶ Ibid.

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including a Bus Rapid Transit System in Nairobi and non-motorised transport facilities; Reducing fuel consumption and fuel overhead costs, including electrification of the Standard Gauge Railway; Encouraging low-carbon technologies in the aviation and maritime sectors; Climate proofing transport infrastructure; Encouraging technologies such as development of electric modes of transport and research on renewable energy for powering different modes of transport; Creating awareness on issues such as fuel economy and electric mobility options; Putting enabling policies and regulations in place to facilitate implementation of the mitigation and adaptation actions.¹⁰⁷

There is also a need for the country to continually invest in renewable sources of energy such as solar, wind power, biogas, among others.¹⁰⁸

The reduction of GHG emissions can also be done through, inter alia, involving the communities in nature-based solutions to reduce the emissions gap such as improved land use and management which may include low-emissions agriculture, agro-forestry, and ecosystem conservation and restoration all of which could achieve this task if properly implemented.¹⁰⁹

Nature-based solutions combine climate change mitigation, adaptation, disaster risk reduction, biodiversity conservation, and sustainable resource management.¹¹⁰

Reducing Emissions from Deforestation and Forest Degradation (REDD) is a mechanism that has been under negotiation by the United Nations Framework Convention on Climate Change (UNFCCC) since 2005, with the objective of mitigating climate change through reducing net emissions of greenhouse gases through enhanced forest management, mostly in the developing countries.¹¹¹ Forests play an important role in reducing GHG emissions. The Constitution of Kenya 2010 obligates the State to ensure that the country achieves a land surface tree cover of at

¹⁰⁷ Ibid.

¹⁰⁸ Muigua, K., Exploring Alternative Sources of Energy in Kenya, *Journal of Conflict Management and Sustainable Development*, Volume 5, No 2, (October, 2020); Muigua, K., Towards Energy Justice in Kenya, February 2020, available at <http://kmco.co.ke/wp-content/uploads/2020/01/Towards-Energy-Justice-in-Kenya.pdf>; Muigua, K., Access to Energy as a Constitutional Right in Kenya, available at <http://www.kmco.co.ke/attachments/article/118/Access%20to%20Energy%20as%20a%20Constitutional%20Right%20in%20Kenya-%20NOVEMBER%202013.pdf>.

¹⁰⁹ 'Nature-Based Solutions for Better Climate Resilience: The Need to Scale up Ambition and Action | NDC Partnership' <<https://ndcpartnership.org/nature-based-solutions-better-climate-resilience-need-scale-ambition-and-action>> accessed 21 January 2021.

¹¹⁰ Ibid.

¹¹¹ Kimaro, Didas N., Alfred N. Gichu, Hezron Mogaka, Brian E. Isabirye, and Kifle Woldearegay. "Climate Change Mitigation and Adaptation in ECA/SADC/COMESA region: Opportunities and Challenges," 4.

least 10 per cent.¹¹² It has been observed that past attempts to increase forest cover and address the problem of deforestation and forest degradation in the country have not been very successful due to a number of reasons: increasing demand for land for agriculture, settlement and other developments, high energy demand and inadequate funding to support investments in the forestry sector.¹¹³ In order to overcome these challenges, Kenya's participation in REDD+ is premised on the conviction that the process holds great potential in supporting: realization of vision 2030 objectives of increasing forest cover to a minimum of 10%; access to international climate finance to support investments in the forestry sector; Government efforts in designing policies and measures to protect and improve its remaining forest resources in ways that improve local livelihoods and conserve biodiversity; realization of the National Climate Change Response Strategy (NCCRS) goals; and contribution to global climate change mitigation and adaptation efforts.¹¹⁴

These efforts coupled with lifestyle changes and investments in cleaner technologies can potentially reduce greenhouse gases emission in Kenya thus enabling the country to meet and even exceed its global country targets.

6.3. Inclusion of Communities in Climate Change Impact Reduction and Early Warning Systems

The United Nations describes early warning system as an adaptive measure for climate change, using integrated communication systems to help communities prepare for hazardous climate-related events.¹¹⁵

Such systems are meant to save lives and jobs, land and infrastructures and support long-term sustainability, as well as assist public officials and administrators in their planning, saving money in the long run and protecting economies.¹¹⁶

The United Nations, working in diverse partnerships, has been putting in place a number of innovative early warning systems initiatives in vulnerable areas around the world, such as the Strengthening Climate Information and Early Warning Systems (SCIEWS) project, which is a

¹¹² Article 69 (1), Constitution of Kenya 2010.

¹¹³ Kimaro, Didas N., Alfred N. Gichu, Hezron Mogaka, Brian E. Isabirye, and Kifle Woldearegay. "Climate Change Mitigation and Adaptation in ECA/SADC/COMESA region: Opportunities and Challenges," 16.

¹¹⁴ Ibid.

¹¹⁵ United Nations, 'Early Warning Systems' (*United Nations*) <<https://www.un.org/en/climatechange/climate-solutions/early-warning-systems>> accessed 20 January 2021.

¹¹⁶ Ibid.

comprehensive programme operating across Africa, Asia and the Pacific, meant to ensure preparedness and rapid response to natural disasters, using a model that integrates the components of risk knowledge, monitoring and predicting, dissemination of information and response to warnings.¹¹⁷

Such systems should actively and meaningfully involve local communities, because as it has been observed, indigenous people are good observers of changes in weather and climate and acclimatize through several adaptive and mitigation strategies.¹¹⁸

6.4. Environmental Education and Creating Awareness on Climate Change Mitigation and Resilience

It has been argued that it is critically important to be aware of the geologic context of climate change processes if we are to understand the anthropogenic (human-caused) climate change because, firstly, this awareness increases the understanding of how and why our activities are causing present-day climate change, and secondly, it allows us to distinguish between natural and anthropogenic processes in the climate record in the past.¹¹⁹

Resilience has been defined as the ability to deal with shocks and stress without crossing tipping points and applies to human and environmental systems, from individual households to financial systems, ecosystems, and the biosphere as a whole. Resilience also includes the capacity to adapt to the change, that is, to deal with change without crossing a threshold, and the ability to transform in situations of crises – essentially, the capacity to rebuild livelihoods or functioning ecosystems after crossing a tipping point.¹²⁰

For mitigation planning, the primary goal is to reduce current and future direct and indirect GHG emissions, particularly from energy production, land use, waste, industry, the built environment infrastructure, and transportation.¹²¹ The primary goal of adaptation is to adjust the built, social,

¹¹⁷ Ibid.

¹¹⁸ Rinku Singh and GS Singh, 'Traditional Agriculture: A Climate-Smart Approach for Sustainable Food Production' (2017) 2 Energy, Ecology and Environment 296.

¹¹⁹ '15.1: Global Climate Change' (*Geosciences LibreTexts*, 26 December 2019) <[https://geo.libretexts.org/Bookshelves/Geology/Book%3A_An_Introduction_to_Geology_\(Johnson_Affolter_Inkenbrandt_and_Mosher\)/15%3A_Global_Climate_Change/15.01%3A_Global_Climate_Change](https://geo.libretexts.org/Bookshelves/Geology/Book%3A_An_Introduction_to_Geology_(Johnson_Affolter_Inkenbrandt_and_Mosher)/15%3A_Global_Climate_Change/15.01%3A_Global_Climate_Change)> accessed 17 January 2021.

¹²⁰ 'Nature-Based Solutions for Better Climate Resilience: The Need to Scale up Ambition and Action | NDC Partnership' <<https://ndcpartnership.org/nature-based-solutions-better-climate-resilience-need-scale-ambition-and-action>> accessed 21 January 2021.

¹²¹ Grafakos, S., Pacteau, C., Delgado, M., Landauer, M., Lucon, O., and Driscoll, P. (2018). Integrating mitigation and adaptation: Opportunities and challenges. In Rosenzweig, C., W. Solecki, P. Romero-Lankao, S. Mehrotra, S.

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and eco-logical environment to minimize the negative impacts of both slow-onset and extreme events caused by climate change, such as sea-level rise, floods, droughts, storms, and heat waves.¹²²

Arguably, conservation, restoration, and the management of ecosystems play a crucial role in climate change mitigation (for instance, through land use forms that maintain carbon stocks, carbon sequestration and the reduction of greenhouse gas emissions), which practices can be important for climate change adaptation, buffering societies from the impacts of climate change and reducing disaster risk.¹²³

There is a need for government bodies in charge of various but relevant sectors to work closely with communities as a way of creating awareness on how their day to day activities are likely to affect the environment and the climatic conditions in general. Dissemination of environmental knowledge as well as creating opportunities for collaborative approaches to combating climate change can go a long way in not only mitigation and adaptation measures but also creating resilient economies and livelihoods. Arguably, in many decision-making processes, perceptions matter more than facts because how we feel about a risk (subjective perceptions of risk) influences what we pay attention to in complicated situations and how we approach and solve problems. Failure to acknowledge this may create and widen the gap between what experts perceive as risk and what the public perceives as risk.¹²⁴

Climate change knowledge should also be incorporated into the primary, secondary and all tertiary level curricula in order to inculcate a sense of environmental ethics in all people from an early age and to ensure that the knowledge acquired will go a long way in combating climate change.

These efforts should be guided by, inter alia, Article 6 of UNFCCC which states that: in carrying out their commitments under Article 4, paragraph 1 (i), the Parties shall: Promote and facilitate at

Dhakal, and S. Ali Ibrahim (eds.), *Climate Change and Cities: Second Assessment Report of the Urban Climate Change Research Network*. Cambridge University Press. New York. 101–138, 103 <https://uccrn.ei.columbia.edu/sites/default/files/content/pubs/ARC3.2-PDF-Chapter-4-Mitigation-and-Adaptation-wecompress.com_.pdf> accessed 17 January 2021.

¹²² Ibid.

¹²³ ‘Nature-Based Solutions for Better Climate Resilience: The Need to Scale up Ambition and Action | NDC Partnership’ <<https://ndcpartnership.org/nature-based-solutions-better-climate-resilience-need-scale-ambition-and-action>> accessed 21 January 2021.

¹²⁴ Grafakos, S., Pacteau, C., Delgado, M., Landauer, M., Lucon, O., and Driscoll, P. (2018). Integrating mitigation and adaptation: Opportunities and challenges. In Rosenzweig, C., W. Solecki, P. Romero-Lankao, S. Mehrotra, S. Dhakal, and S. Ali Ibrahim (eds.), *Climate Change and Cities: Second Assessment Report of the Urban Climate Change Research Network*. Cambridge University Press. New York. 101–138, 133.

the national and, as appropriate, subregional and regional levels, and in accordance with national laws and regulations, and within their respective capacities: (i) the development and implementation of educational and public awareness programmes on climate change and its effects; (ii) public access to information on climate change and its effects; (iii) public participation in addressing climate change and its effects and developing adequate responses; and (iv) training of scientific, technical and managerial personnel; Cooperate in and promote, at the international level, and, where appropriate, using existing bodies: (i) the development and exchange of educational and public awareness material on climate change and its effects; and (ii) the development and implementation of education and training programmes, including the strengthening of national institutions and the exchange or secondment of personnel to train experts in this field, in particular for developing countries.¹²⁵

6.5. Integrating Traditional Knowledge with Mainstream Scientific Knowledge for Climate Mitigation and Adaptation

The Organisation for Economic Co-operation and Development (OECD), countries can use technological change to address climate change without compromising economic growth through ensuring that their climate and innovation policies provide the right incentives for the development and diffusion of “climate-friendly” technologies.¹²⁶ OECD recommends that this can be achieved through, inter alia: providing predictable and long-term policy signals in order to give potential innovators and adopters of climate-friendly technologies the confidence to undertake the necessary investments; using flexible policy measures to give potential innovators incentives to identify the best way to meet climate objectives, and to avoid locking-in technologies that may become inefficient in future; putting a price on Green House Gas (GHG) emissions, for example through taxes or tradable permits, in order to provide incentives across all stages of the innovation cycle; providing an appropriate mix and sequencing of complementary policy measures in order to overcome barriers to development and diffusion of breakthrough technologies; balancing the benefits of technology-neutral policies with the need to direct technological change toward climate-saving trajectories, by diversifying the portfolio of technologies for which support is provided and identifying general

¹²⁵ UN General Assembly, *United Nations Framework Convention on Climate Change*, Article 6.

¹²⁶ OECD, ‘Promoting Technological Innovation to Address Climate Change,’ (November 2011), 1 <<http://www.oecd.org/env/cc/49076220.pdf>> accessed 17 January 2021.

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purpose technologies with environmental benefits; since the sources of innovation are widely-dispersed, supporting research and development in a broad portfolio of complementary fields, and not just energy, “climate-friendly” or 'environmental' Research and development (R&D); ensuring that international policy efforts maximise the potential for sharing of knowledge and technologies of mutual benefit, for example through international research-sharing agreements; and supporting international technology-oriented agreements as an important complement to other international efforts (e.g. emissions-based agreements).¹²⁷

Kenya should review and align her science and technological innovation policies to the above recommendations from the OECD in order to ensure their maximum effectiveness in promoting innovation as a tool for combating climate change in the country. Indeed, the starting point should be the Constitution of Kenya. The Constitution of Kenya 2010 obligates the State to, *inter alia*: promote science and recognise the role of science and indigenous technologies in the development of the nation; and promote the intellectual property rights of the people of Kenya.¹²⁸

The *Environmental Management and Co-ordination Act, 1999*¹²⁹ calls for integration of traditional knowledge for the conservation of biological diversity with mainstream scientific knowledge in conservation of biological resources *in situ*.¹³⁰ Investments in incentivized mitigation programmes, especially in agriculture and forestry, can offer mitigation benefits, increased productivity, improved livelihoods, biodiversity conservation and increased resilience to climate change.¹³¹

The *Science, Technology and Innovation Act, 2013*¹³² was enacted to facilitate the promotion, co-ordination and regulation of the progress of science, technology and innovation of the country; to assign priority to the development of science, technology and innovation; to entrench science, technology and innovation into the national production system and for connected purposes.¹³³ The Act acknowledges that reference to “innovation” under the Act includes ‘indigenous or traditional knowledge by community of beneficial properties of land, natural resources, including

¹²⁷ Ibid, 1.

¹²⁸ Article 11(2), Constitution of Kenya, 2010.

¹²⁹ Environmental Management and Co-ordination Act, No. 8 of 1999, Laws of Kenya.

¹³⁰ Ibid, sec. 51(f).

¹³¹ Kimaro, Didas N., Alfred N. Gichu, Hezron Mogaka, Brian E. Isabirye, and Kifle Woldearegay. "Climate Change Mitigation and Adaptation in ECA/SADC/COMESA region: Opportunities and Challenges," 4.

¹³² Science, Technology and Innovation Act, No. 28 of 2013, Laws of Kenya.

¹³³ Ibid, Preamble.

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plant and animal resources and the environment’, where “traditional knowledge” means the wisdom developed over generations of holistic traditional scientific utilization of the lands, natural resources, and environment.¹³⁴

The Act establishes the National Commission for Science, Technology and Innovation (NACOSTI)¹³⁵ whose objective is to regulate and assure quality in the science, technology and innovation sector and advise the Government in matters related thereto.¹³⁶ The Government, through NACOSTI should work closely with all learning institutions as well as stakeholders in the informal sector to not only tap into the innovations but to also identify the challenges that are affecting the growth and development of this sector. Science and technological innovation should be encouraged through adequate funding as well as fiscal incentives and ensuring that there is a ready market for the same. If the Government can work with the locals, they will not only promote the development of science but will also create an opportunity to utilize the local innovations and ideas especially in environmental areas to combat climate change. NACOSTI should also closely work with the Kenya Institute for Public Policy Research and Analysis whose main functions include: identifying and undertaking independent and objective programmes of research and analysis, including macroeconomic, inter-disciplinary and sectoral studies on topics

¹³⁴ Ibid, sec. 2; see also *Protection of Traditional Knowledge and Cultural Expressions Act*, No. 33 of 2016, Laws of Kenya.

¹³⁵ Ibid, sec. 3.

¹³⁶ Ibid. sec. 4. The functions of the Commission as set out under section 6 thereof are to: develop, in consultation with stakeholders, the priorities in scientific, technological and innovation activities in Kenya in relation to the economic and social policies of the Government, and the country’s international commitments; lead inter-agency efforts to implement sound policies and budgets, working in collaboration with the county governments, and organisations involved in science and technology and innovation within Kenya and outside Kenya; advise the national and county governments on the science, technology and innovation policy, including general planning and assessment of the necessary financial resources; liaise with the National Innovation Agency and the National Research Fund to ensure funding and implementation of prioritized research programmes; ensure co-ordination and co-operation between the various agencies involved in science, technology and innovation; accredit research institutes and approve all Scientific research in Kenya; assure relevance and quality of science, technology and innovation programmes in research institutes; advise on science education and innovation at both basic and advanced levels; in consultation with the National Research Fund Trustees, sponsor national scientific and academic conferences it considers appropriate; advise the Government on policies and any issue relating to scientific research systems; promote increased awareness, knowledge and information of research system; co-ordinate, monitor and evaluate, as appropriate, activities relating to scientific research and technology development; promote and encourage private sector involvement in scientific research and innovation and development; annually, review the progress in scientific research systems and submit a report of its findings and recommendations to the Cabinet Secretary; promote the adoption and application of scientific and technological knowledge and information necessary in attaining national development goals; develop and enforce codes, guidelines and regulations in accordance with the policy determined under this Act for the governance, management and maintenance of standards and quality in research systems; and undertake, or cause to be undertaken, regular inspections, monitoring and evaluation of research institutions to ensure compliance with set standards and guidelines.

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affecting public policy in areas such as human resource development, social welfare, environment and natural resources, agriculture and rural development, trade and industry, public finance, money and finance, macroeconomic and microeconomic modelling.¹³⁷ While coming up with approaches for reducing the country's climate risk and exposure to the main types of climate hazard, their design, implementation and management may and should indeed draw on local and traditional, as well as expert knowledge. Arguably, nature-based solutions – locally appropriate actions that address societal challenges, such as climate change, and provide human well-being and biodiversity benefits by protecting, sustainably managing and restoring natural or modified ecosystems – must become a priority when the government is coming up with solutions to the climate change challenges, with youth, women, indigenous peoples and local communities being key stakeholders.¹³⁸ It has rightly been pointed out that traditional knowledge is holistic in nature due to its multitude applications in diverse fields such as agriculture, climate, soils, hydrology, plants, animals, forests and human health.¹³⁹

The above listed recommendations by the OECD should provide cue when it comes to creating a conducive policy and legal environment for science and innovation.

6.6. Diversification of Economic Activities for Poverty Eradication and Climate Change Mitigation and Adaptation

The World Bank observed in December 2020 that, considering that “the pandemic and global recession may cause over 1.4% of the world's population to fall into extreme poverty, in order to reverse this serious setback to development progress and poverty reduction, countries will need to prepare for a different economy post-COVID, by allowing capital, labour, skills, and innovation to move into new businesses and sectors.”¹⁴⁰

A chief scientist at the U.N. Food and Agriculture Organization (FAO) was recorded in 2020 affirming that farmers and poor urban residents have so far borne the brunt of the COVID-19

¹³⁷ Kenya Institute for Public Policy Research and Analysis Act, No. 15 of 2006, Laws of Kenya, sec. 6(b).

¹³⁸ UN Environment, ‘Adaptation Gap Report 2020’ (*UNEP - UN Environment Programme*, 9 January 2021) <<http://www.unenvironment.org/resources/adaptation-gap-report-2020>> accessed 20 January 2021.

¹³⁹ Rinku Singh and GS Singh, ‘Traditional Agriculture: A Climate-Smart Approach for Sustainable Food Production’ (2017) 2 *Energy, Ecology and Environment* 296.

¹⁴⁰ ‘COVID-19 to Add as Many as 150 Million Extreme Poor by 2021’ (*World Bank*) <<https://www.worldbank.org/en/news/press-release/2020/10/07/covid-19-to-add-as-many-as-150-million-extreme-poor-by-2021>> accessed 17 January 2021.

pandemic, meaning inequality between and within countries could deepen further in 2021.¹⁴¹ This was mainly attributed to the fact that cut off from markets and with a plunge in customer demand, farmers struggled to sell their produce while informal workers in urban areas, living hand to mouth, found themselves jobless as lockdowns were imposed.¹⁴² While the United Nations Sustainable Development Goals set to end hunger by 2030, the World Bank has observed that the COVID-19 pandemic is estimated to have pushed an additional 88 million to 115 million people into extreme poverty in the year 2020, with the total rising to as many as 150 million by 2021, depending on the severity of the economic contraction.¹⁴³

There is a need for countries, including Kenya, to create a conducive environment that will allow their citizens to invest and explore new and emerging sectors such as information technology, science and technology, among others. This should target both urban and rural dwellers. This is because the World Bank has estimated that with the effects of COVID-19 expected to continue, increasing numbers of urban dwellers are expected to fall into extreme poverty, which has traditionally affected people in rural areas.¹⁴⁴

6.7. Embracing Climate Resilient Agricultural Production Methods for Climate Change Mitigation and Poverty Reduction

It has rightly been pointed out that sustainable food production poses one of the major challenges of the twenty-first century in the era of global environmental problems such as climate change, increasing population and natural resource degradation including soil degradation and biodiversity loss, with climate change being among the greatest threats to agricultural systems.¹⁴⁵ The adverse effect of agriculture on the environment and climate change (contributors of global warming through a share of about 10–12% increase in total anthropogenic GHG emission) has largely been attributed to the Green Revolution which though multiplied agricultural production several folds jeopardized the ecological integrity of agro ecosystems by intensive use of fossil

¹⁴¹ ‘COVID-19 Caused Food Insecurity to Soar, But Climate Change Will Be Much Worse – Homeland Security Today’ <<https://www.hstoday.us/subject-matter-areas/emergency-preparedness/covid-19-caused-food-insecurity-to-soar-but-climate-change-will-be-much-worse/>> accessed 17 January 2021.

¹⁴² Ibid .

¹⁴³ ‘COVID-19 to Add as Many as 150 Million Extreme Poor by 2021’ (*World Bank*) <<https://www.worldbank.org/en/news/press-release/2020/10/07/covid-19-to-add-as-many-as-150-million-extreme-poor-by-2021>> accessed 17 January 2021.

¹⁴⁴ Ibid.

¹⁴⁵ Rinku Singh and GS Singh, ‘Traditional Agriculture: A Climate-Smart Approach for Sustainable Food Production’ (2017) 2 *Energy, Ecology and Environment* 296.

fuels, natural resources, agrochemicals and machinery and subsequently threatened the age-old traditional agricultural practices.¹⁴⁶

Arguably, achieving the goals of eradicating hunger and poverty by 2030 while addressing the climate change impacts need a climate-smart approach in agriculture, an approach based on the objectives of sustainably enhancing food production, climate adaptation and resilience and reduction in GHGs emission.¹⁴⁷

Arguably, the negative impacts of climate change on production, incomes and well-being can be avoided or ameliorated through adaptation, which includes changes in agricultural practices as well as broader measures such as improved weather and early warning systems and risk management approaches.¹⁴⁸ Climate smart agriculture is described as an approach that provides a conceptual basis for assessing the effectiveness of agricultural practice change to support food security under climate change, with particular attention to sustainable land management.¹⁴⁹

It has also been suggested that traditional practices like agro forestry, intercropping, crop rotation, cover cropping, traditional organic composting and integrated crop-animal farming all have potentials for enhancing crop productivity and mitigating climate change considering that indigenous farmers and local people perceive climate change in their own ways and prepare for it through various adaptation practices.¹⁵⁰

The Government and other stakeholders should work closely with farmers to identify and explore the available opportunities for farmers to engage in sustainable farming practices, informed by both science and indigenous knowledge.

7. Conclusion

It has been observed that responding to climate change, reducing rural poverty and achieving global food and nutrition security are three urgent and interlinked problems facing the global community today.¹⁵¹ The biggest threat to the 2030 Agenda is climate change, where the

¹⁴⁶ Ibid.

¹⁴⁷ Ibid.

¹⁴⁸ McCarthy, N., Brubaker, J. 2014, *Climate-Smart Agriculture and resource tenure in Sub-Saharan Africa: a conceptual framework*, Rome, FAO, 6.

¹⁴⁹ Ibid, 6.

¹⁵⁰ Rinku Singh and GS Singh, 'Traditional Agriculture: A Climate-Smart Approach for Sustainable Food Production' (2017) 2 *Energy, Ecology and Environment* 296.

¹⁵¹ McCarthy, N., Brubaker, J. 2014, *Climate-Smart Agriculture and resource tenure in Sub-*

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Sustainable Development Goals, from poverty eradication and ending hunger to conserving biodiversity and peace, will be unattainable if climate change is not urgently addressed.¹⁵² Before the outbreak of Corona Virus pandemic, SDG Goal 13 aimed to mobilize US\$100 billion annually by 2020 to address the needs of developing countries to both adapt to climate change and invest in low-carbon development.¹⁵³ However, as things stand currently, countries also have to contend with the Covid-19 pandemic, further complicating the situation.

This paper has put across the argument is that for the country to combat climate change, there is a need for an integrated approach that meaningfully involves all the stakeholders. While it has been acknowledged that efforts to mitigate climate change require political action¹⁵⁴, Governments alone cannot possibly achieve this task. Climate change mitigation is an important step towards achieving sustainability in the country, without which the realisation of both the country's Vision 2030 and the United Nation's 2030 Agenda for Sustainable Development will remain a mirage. There is a need to adopt mitigation and adaptation approaches to address climate change. While mitigation and adaptation policies have different goals and opportunities for implementation, many drivers of mitigation and adaptation are common, and solutions can be interrelated.¹⁵⁵

According to the *IPCC Fifth Assessment Report*:¹⁵⁶

“[T]he more human activities disrupt the climate, the greater the risks of severe, pervasive and irreversible impacts for people and ecosystems... [W]e have the means to limit climate change and its risks, with many solutions that allow for continued economic and human development. However, stabilizing temperature increase to below 2°C

Saharan Africa: a conceptual framework, Rome, FAO, 6
<https://www.researchgate.net/publication/279912013_Climate_Smart_Agriculture_and_Resource_Tenure_in_sub-Saharan_Africa_A_Conceptual_Framework>accessed 17 January 2021.

¹⁵² ‘Aligning SDG and Climate Action’ (*Sustainable Goals*, 18 June 2019)

<<https://www.sustainablegoals.org.uk/aligning-sdg-and-climate-action/>> accessed 21 January 2021.

¹⁵³ ‘Goal 13: Climate Action’ (*UNDP*) <<https://www.undp.org/content/undp/en/home/sustainable-development-goals/goal-13-climate-action.html>> accessed 21 January 2021.

¹⁵⁴ ‘15.5: Anthropogenic Causes of Climate Change’ (*Geosciences LibreTexts*, 4 November 2019)
<[https://geo.libretexts.org/Bookshelves/Geology/Book%3A_An_Introduction_to_Geology_\(Johnson_Affolter_Inkenbrandt_and_Mosher\)/15%3A_Global_Climate_Change/15.05%3A_Anthropogenic_Causes_of_Climate_Change](https://geo.libretexts.org/Bookshelves/Geology/Book%3A_An_Introduction_to_Geology_(Johnson_Affolter_Inkenbrandt_and_Mosher)/15%3A_Global_Climate_Change/15.05%3A_Anthropogenic_Causes_of_Climate_Change)>
accessed 17 January 2021.

¹⁵⁵Grafakos, S., Pacteau, C., Delgado, M., Landauer, M., Lucon, O., and Driscoll, P. (2018). Integrating mitigation and adaptation: Opportunities and challenges. In Rosenzweig, C., W. Solecki, P. Romero-Lankao, S. Mehrotra, S. Dhakal, and S. Ali Ibrahim (eds.), *Climate Change and Cities: Second Assessment Report of the Urban Climate Change Research Network*. Cambridge University Press. New York. 101–138, 102 <https://uccrn.ei.columbia.edu/sites/default/files/content/pubs/ARC3.2-PDF-Chapter-4-Mitigation-and-Adaptation-wecompress.com_.pdf> accessed 17 January 2021.

¹⁵⁶ ‘The Intergovernmental Panel on Climate Change’ (*MIT Climate Portal*)
<<https://climate.mit.edu/explainers/intergovernmental-panel-climate-change>> accessed 21 January 2021.

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relative to pre-industrial levels will require an urgent and fundamental departure from business as usual.”

Combating climate for Sustainable Development in Kenya is indeed a goal that is achievable.

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