



**YSDC 2020**

**BACKGROUND GUIDE: CLIMATE ACTION COMMITTEE**

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## **IMPLEMENTING SUSTAINABLE AGRICULTURAL PRACTICES TO COMBAT CLIMATE CHANGE AND PROTECT WATER RESOURCES**

*“The fate of the climate, forests and agriculture are bound together. If agriculture and land use change continue to produce up to 30 percent of global greenhouse gases, it will mean further disaster and disruption from climate change”.*<sup>1</sup>

### **1. INTRODUCTION**

Climate change, also referred to as global warming, is one of the biggest issues affecting the world today. In fact, it goes to the extent of affecting human existence in the years to come. Climate change is basically a change in the earth’s climate especially through the rise in temperature caused by high levels of carbon dioxide and other gases.<sup>2</sup>

However, to understand climate change, the concepts of “weather” and “climate” must be defined. Weather is the day-to-day atmosphere and its short variations, which can range between minutes to weeks.<sup>3</sup> On the other hand, climate is the weather of a place averaged over a long period of time for about 30-50 years. This means a climate can be determined by the continuous weather patterns for a certain period of time, in a particular place. Therefore, the weather deals with short-term changes in the atmosphere, while the climate of a place is determined by weather patterns on long-term basis. So, a changing climate is as a result of a build-up of short-term weather changes caused by human activities.<sup>4</sup>

According to the United Nations Framework Convention on Climate Change (UNFCCC), climate change refers to a change of weather conditions that is attributed directly or indirectly to human activity that alters the composition of the global atmosphere and that is in addition to natural climate variability observed over comparable time periods”.<sup>5</sup> Climate change is caused by the activities of humans, such as manufacturing of cement, deforestation and release of fossil fuels (petroleum, coal, oil spills, burning of wood), to mention a few. Green House Gases (GHGs) are emissions which when released in a substantial amount, in turn affects the ozone layers, which directly protects the earth from the sun. Carbon dioxide is such a substance, which is needful to humanity, as it is what each person breathes out and is absorbed by plants. It is

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<sup>1</sup> Rachel Kyte, CEO and Special Representative of the UN Secretary General for Sustainable Energy for all, and former Vice President of the World bank at the Global Climate Action Summit in San Francisco, 2018

<sup>2</sup> National Snow & Ice Data Centre “*Climate vs Weather*”.

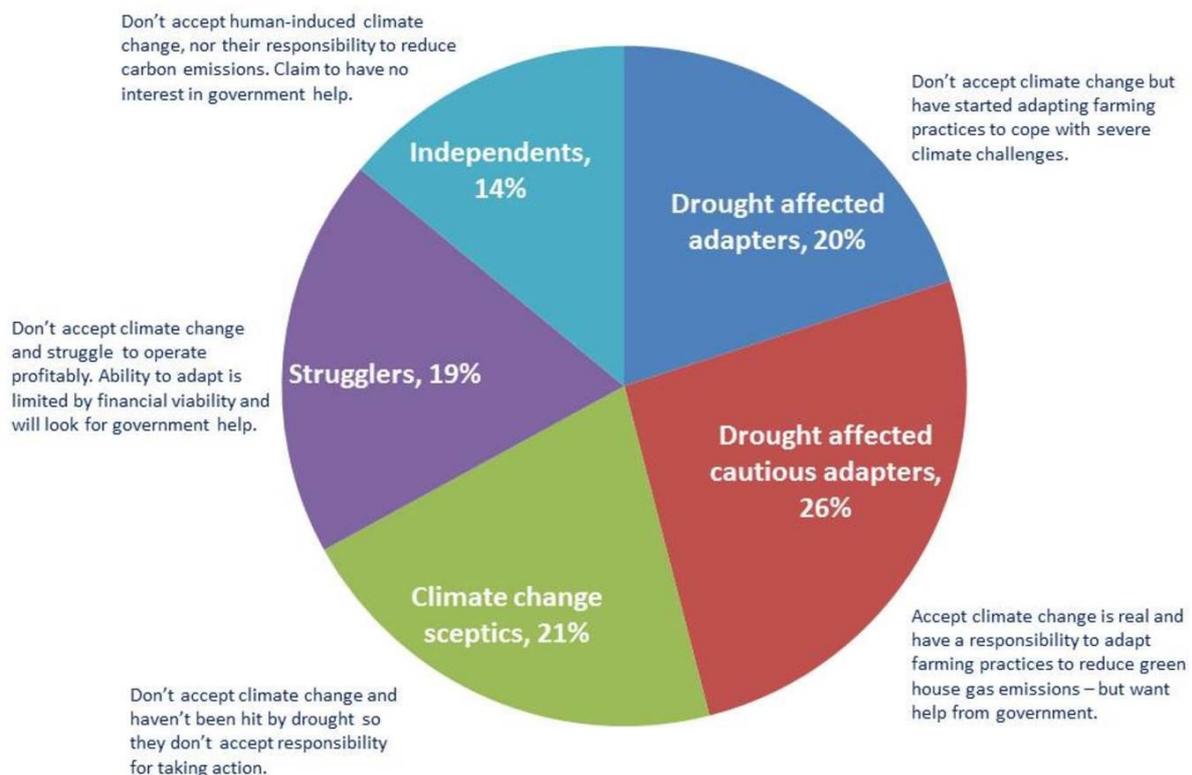
<sup>3</sup> Ibid

<sup>4</sup> Ibid.

<sup>5</sup> United Nations Convention on Climate Change (UNFCCC) “*Fact sheet: Climate change science - the status of climate change science today*”.

gas which is very useful for production in the industrial sector like; for refrigeration, welding systems, and also used in fire extinguishers. However, when this becomes too much in the atmosphere it causes an excess level of warming of the earth, which in turn leads to melting of ice caps (the mass of ice that covers less than 50,000km square of land area) leading to flooding, because ordinarily CO<sub>2</sub> gives warmth to the earth. This release is usually through emissions by factories, energy plants and many more, its weight in the atmosphere becomes too much to be normalized by the earth, through the absorption by trees as this is what it absorbs and unfortunately these are being cut down, as a result of the monetary value derived from its use, which itself is not bad, but the level of trees being cut down is not proportionate to the amount being planted, hence the outcry to limit the amount of trees being cut down and to grow more trees, therefore, mitigating its effects.

### Primary producer segments in relation to climate change



Source: Donnelly et al 2009

The effects of climate change are long-term weather changes (like having hotter days because of global warming) and possible permanent alterations of the earth's ecological systems. The further effect of this is the emergence of large-scale environmental hazards to human health,

extreme weather, loss of biodiversity, shortage in food production, ozone depletion, etc. Climatic changes are estimated to cause over 150,000 deaths annually.<sup>6</sup>

Climate change threatens the survival of humanity and acts as an obstacle to achievement of sustainable development in the world today.<sup>7</sup> Climate change and its associated effects are global threats. Climate change can negatively affect the availability and stability of the food supply, reduce the safety of food and water, and worsen extreme poverty levels that limit access to food.<sup>8</sup> Agriculture is a major source of greenhouse gas (GHG) emissions and contributes to climate change through deforestation, the production of livestock, and the administration of nutrients and fertilizers in the soil.<sup>9</sup> There is a complex link between climate change and sustainable agriculture. Agriculture suffers enormously from climate change; however, it also contributes to climate change by producing GHGs and has a potentially important role in climate change mitigation. This double effect requires Member States to carry out sustainable and climate smart agricultural practices to ensure food security.

Water, on the other hand, is an essential part of human life, yet only 3% of the Earth's water composition is fresh water, and less than 1% of it is fresh surface water accessible to the human population. Water is critical for sustainable development and the eradication of poverty and hunger, and is indispensable for human development, health and well-being.<sup>10</sup> Human activities which cause climate change, affect the availability of water resources. The main climate change consequences related to water resources are increases in temperature, and a likely increase in the frequency of flooding and droughts.

Climate change tends to increase the frequency and intensity of rainfall; there may be an increase in the occurrence of flooding due to heavy rainfall events. Changes in water resource have consequences for several economic sectors. Low water and droughts have severe consequences on most sectors, particularly agriculture, forestry, energy, and drinking water provision. Activities that depend on water abstraction and use, such as irrigated agriculture, hydropower generation and use of cooling water, will be affected by changed flow systems and reduced annual water availability. Moreover, wetlands and aquatic ecosystems will be threatened. This will affect the sectors that depend on the goods and services they provide.

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<sup>6</sup> World Health Organisation, *Climate Change*, 2019.

<sup>7</sup> UN DPI, *Goal 13: Take urgent action to combat climate change and its impacts*, 2018.

<sup>8</sup> FAO, *The State of the Food and Agriculture*, 2016, p. 8.

<sup>9</sup> FAO, *The State of the Food and Agriculture*, 2016, pp. 5-6.

<sup>10</sup> *United Nations Secretary-General's Plan: Water Action Decade 2018-2028*, 2017.

Shifting to sustainable agricultural practices is vital to meet the ecological, societal, and institutional challenges of the future and is a valuable means of climate change mitigation.<sup>11</sup> Effective and inclusive development and poverty reduction cannot be achieved without sustainable agriculture.<sup>12</sup> 750 million people, including almost two-thirds of those in extreme poverty, earn their livelihoods through agriculture.<sup>13</sup> The links between climate change and sustainable development are strong.<sup>14</sup> Supporting small-scale farmers, introducing sustainable agriculture, ending poverty, ensuring human health, and addressing climate change are all aspects of the Sustainable Development Goals (SDGs or 2030 Agenda).<sup>15</sup>

Having given a background to climate change and its impact on agriculture, the need for mitigation and adaptation to climate change through sustainable agricultural practices needs to be discussed. This can be achieved through youth participation and the use technology.

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<sup>11</sup> UN DESA, *TST Issues Briefs*, 2014, pp. 22-23.

<sup>12</sup> UN DESA, *Food security and nutrition and sustainable agriculture*, 2018.

<sup>13</sup> FAO, *2016 - The State of Food and Agriculture*, 2016, p. 4.

<sup>14</sup> UN DESA, *Climate Change*, 2018.

<sup>15</sup> UN DESA, *Food security and nutrition and sustainable agriculture*, 2018.

## 2. INTERNATIONAL AND REGIONAL FRAMEWORK

The underlying principles behind climate action and environmental protection, generally, can be traced back to the United Nations Conference on the Human Environment (Stockholm Conference) (1972).<sup>16</sup> It laid the foundation for the development of multilateral frameworks on the protection of the environment.

In 1987, the Brundtland Commission report, *Our Common Future*, expanded on the role of stakeholders, including young people, to achieve sustainable development for present and future generations.<sup>17</sup> The United Nations in its effort to save our planet established its “Earth Summit”. This led to the United Nations Conference on Environment and Development (UNCED), and the adoption of the United Nations Framework Convention on Climate Change (UNFCCC) in 1992.<sup>18</sup> The UNFCCC was a first step in addressing climate change.<sup>19</sup>

The ultimate aim of the UNFCCC is to prevent ‘dangerous’ human interference with climate system.<sup>20</sup> It also aims at mitigating anthropogenic impacts on the climate system by limiting greenhouse gas emissions.<sup>21</sup> It is an international framework designed to collectively combat climate change and other environmental concerns.<sup>22</sup> It recognises the “common but differentiated responsibilities” in combating climate change. This means that both developing and developed countries are expected to work purposefully to mitigate the adverse effects of climate change, although developed countries are to take the lead to combating this because they contribute the highest percentage of GHGs. *Article 2 of the UNFCCC* aims to reduce greenhouse gas (GHG) concentrations to a stable level that will not impact the climate system. Article 2 also affirms the importance of protecting food production, while Article 4 names agriculture as a crucial sector for action.<sup>23</sup> The Conference of Parties (COP) is the supreme governing body of UNFCCC Secretariat and meets annually to review and make decisions about the implementation of the UNFCCC.<sup>24</sup> COP is the most important platform for

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<sup>16</sup> UN Environment, *Declaration of the United Nations Conference on the Human Environment*, 1972.

<sup>17</sup> UN WCED, *Our Common Future*, 1987, p. 24.

<sup>18</sup> UNFCCC, *History of the Convention*.

<sup>19</sup> United Nations Framework Convention on Climate Change, *The Earth Summit*, 1992.

<sup>20</sup> *United Nations Framework Convention on Climate Change*, 1992, art 4.

<sup>21</sup> *Ibid.*

<sup>22</sup> UNFCCC, *History of the Convention*.

<sup>23</sup> UNCED, *United Nations Framework Convention on Climate Change*, 1992.

<sup>24</sup> UNFCCC, *Conference of the Parties (COP)*, 2018.

discussions on climate change adaptation and mitigation within the UN system.<sup>25</sup> Today, it has a near-universal membership with 197 countries.<sup>26</sup>

The first major agreement to arise out of the COP was the *Kyoto Protocol to the United Nations Framework Convention on Climate Change* (Kyoto Protocol), adopted in 1997 and covering the period from 2008-2012.<sup>27</sup> *Article 2 of the Kyoto Protocol* obliges Annex I parties to promote “sustainable forms of agriculture in light of climate change considerations.”<sup>28</sup> Additionally, Article 10 mentions agriculture as a crucial sector to address when mitigating and adapting to climate change, but it contains no further commitments.<sup>29</sup> The Kyoto Protocol was an important first step but it lacks binding targets and universality.<sup>30</sup> In 2011, COP 17 adopted the *Durban Platform for Enhanced Action*, which agreed to establish a legally binding climate change agreement by 2015.<sup>31</sup>

At COP 21 in 2015, the *Paris Agreement* was adopted with a goal to keep “the increase in the global average temperature to well below 2°C, above pre-industrial levels” and an aim to strengthen the capacity of all countries to mitigate climate change.<sup>32</sup> The agreement contains nationally determined contributions (NDCs) that embody each state’s post-2020 efforts to mitigate and adapt to climate change.<sup>33</sup> An overwhelming majority of intended NDCs, especially those of least developed countries, name agriculture as a priority sector.<sup>34</sup> *Article 2* explicitly states that efforts to mitigate climate change should not threaten food production.<sup>35</sup>

Also, in 2015, climate change was adopted as a cross-cutting theme of the Food and Agricultural (FAO) Strategic Framework, meaning that climate implications and opportunities are being reflected in each Strategic Programme at regional and country level.<sup>36</sup>

In September 2015, the General Assembly adopted the 2030 Agenda, which continues work on poverty eradication, health, education, and food security, but also sets economic, social, and

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<sup>25</sup> UNFCCC, *About the Secretariat*, 2018.

<sup>26</sup> UNFCCC, *First steps to a safer future: Introducing the United Nations Framework Convention on Climate Change*.

<sup>27</sup> UNFCCC, *What is the Kyoto Protocol?* 2018.

<sup>28</sup> COP 3, *Kyoto Protocol to the United Nations Framework Convention on Climate Change*, 1997.

<sup>29</sup> *Ibid.*

<sup>30</sup> *Supra* Note 27.

<sup>31</sup> UNFCCC, *Essential Background – Durban outcomes*, 2018.

<sup>32</sup> COP 21, *Paris Agreement*, 2015.

<sup>33</sup> UNFCCC, *Nationally Determined Contributions (NDCs)*, 2018.

<sup>34</sup> FAO, *The Agriculture Sectors in the Intended Nationally Determined Contributions: Analysis*, 2016, pp. xiv-xvi.

<sup>35</sup> COP 21, *Paris Agreement*, 2015.

<sup>36</sup> FAO, *Evaluation of FAO’s contribution to Climate Change Adaptation and Mitigation*, 2015.

environmental goals.<sup>37</sup> The 2030 Agenda includes 17 Sustainable Development Goals (SDGs) with 169 cross-cutting targets.<sup>38</sup> Sustainable agriculture cuts across all SDGs, but there are some that are particularly relevant.<sup>39</sup> SDG 1 aims to eradicate extreme poverty entirely and halve poverty by 2030, but this cannot be achieved without building agricultural resilience and mitigating climate change.<sup>40</sup> SDG 2 calls for more agricultural investments, with targets including doubling the yields and incomes of small-scale producers and establishing sustainable production systems.<sup>41</sup> SDG 6 addresses the improved management of water resources. It aims to reduce the potential for conflict by ensuring sustainable withdrawals of water and increasing water efficiency, with the objective of reducing the number of people suffering from water scarcity. Climate change is directly addressed in SDG 13, which calls for urgent action, while SDGs 14 and 15 focus on sustainably using and conserving ecosystems.<sup>42</sup>

In March 2015, the *Sendai Framework for Disaster Risk Reduction* (Sendai Framework) was introduced as a 15-year (2015-2030) voluntary and non-binding agreement to counter the risks of climate change.<sup>43</sup> The Sendai Framework includes seven targets and four priorities for action to reduce the occurrence and impact of disasters resulting from natural hazards.<sup>44</sup> It prioritizes risk awareness, capacity for risk governance, investment in risk reduction strategies, and capacity for disaster preparedness.<sup>45</sup> Among those priorities, the Framework calls for the strengthening and implementation of global mechanisms on hydrometeorological issues in order to raise awareness and improve understanding of water-related disaster risks and their impact on society, and advance strategies for risk reduction.<sup>46</sup>

Climate change has contributed to the increment of severe weather disasters and extreme conditions to which agriculture is particularly vulnerable.<sup>47</sup> The 2030 Agenda, the *Paris Agreement*, and the *Sendai Framework* represent an opportunity to harmonize approaches to climate change, sustainable agricultural development, and disaster risk reduction in a way that

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<sup>37</sup> UN General Assembly, *Transforming our world: the 2030 Agenda for Sustainable Development (A/RES/70/1)*, 2015.

<sup>38</sup> *Ibid.*

<sup>39</sup> FAO, *Strategic work of FAO for sustainable food and agriculture*, 2017, p. 28.

<sup>40</sup> *Supra* Note 37

<sup>41</sup> *Supra* Note 37.

<sup>42</sup> *Supra* Note 37.

<sup>43</sup> UN General Assembly, *Sendai Declaration and Framework for Disaster Reduction 2015-2030 (A/RES/68/283)*, 2015; UNISDR, *Sendai Framework for Disaster Risk Reduction*, 2018.

<sup>44</sup> UNDRR, *Sendai Framework for Disaster Risk Reduction 2015-2030*, United Nations Conference 2015.

<sup>45</sup> UN General Assembly, *Sendai Declaration and Framework for Disaster Reduction 2015-2030 (A/RES/68/283)*, 2015; UNISDR, *Sendai Framework for Disaster Risk Reduction*, 2018.

<sup>46</sup> UNDRR, *Sendai Framework for Disaster Risk Reduction 2015-2030*, United Nations Conference 2015.

<sup>47</sup> FAO, *The future of food and agriculture: Trends and challenges*, 2017, p. 137.

will enhance efficiency, and enable coordination so that the common aims of these frameworks can be fully realized.<sup>48</sup>

The Intergovernmental Panel on Climate Change (IPCC) (1988) is the United Nation's body for assessing the science related to climate change. It was created to provide scientific analysis and data, potential risks, provision of adaption and advantageous techniques<sup>49</sup>. It usually releases a comprehensive report on issues, scientific data, possible solutions regarding climate change, and sometimes, it releases special reports on specific issues relating to climate change. Recently in 2018; it released a special report of global warming hitting 1.5°C, which has been critically warned against prior to that point in time.

### **3. STATISTICAL ANALYSIS OF THE TOPIC**

Climate change is already affecting agriculture, with effects unevenly distributed across the world. Future climate change will likely negatively affect crop production. Also, with the existing climate change scenario, by 2030, water scarcity in some arid and semi-arid places will displace between 24 million and 700 million people.<sup>50</sup>

The Intergovernmental Panel on Climate Change (IPCC) has produced several reports that have assessed the scientific literature on climate change. The IPCC Third Assessment Report, published in 2001, concluded that the poorest countries would be hardest hit, with reductions in crop yields in most tropical and sub-tropical regions due to decreased water availability, and new or changed insect pest incidence. In Africa and Latin America many rain fed crops are near their maximum temperature tolerance, so that yields are likely to fall sharply for even small climate changes; falls in agricultural productivity of up to 30% over the 21st century are projected. Marine life and the fishing industry will also be severely affected.

In the report published in 2014, the Intergovernmental Panel on Climate Change said that the world may reach “a threshold of global warming beyond which current agricultural practices can no longer support large human civilizations” by the middle of the 21st century. In 2019, it published reports in which it says that millions already suffer from food insecurity due to

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<sup>48</sup> UNFCCC, *Opportunities and options for integrating climate change adaptation with the Sustainable Development Goals and the Sendai Framework for Disaster Risk Reduction 2015-2030*, 2017, pp. 9-10.

<sup>49</sup> Intergovernmental Panel on Climate Change “*About the IPCC*”

<sup>50</sup> UN-Water, *Climate Change Adaptation: The Pivotal Role of Water*, 2010

climate change and predicted decline in global crop production of 2% - 6% by decade.<sup>51</sup> A 2008 study published in science suggested that, due to climate change, “Southern Africa could lose more than 30% of its main crop, maize, by 2030. In South Asia, losses of many regional staples, such as rice, millet and maize could top 10%”.<sup>52</sup>

A 2010 study by the Asian Development Bank, the World Bank, and the Japan International Co-operation Agency looked at the effects of climate change on three of Asia’s megacities.<sup>53</sup> The study estimated that 26% of the population in Ho Chi Minh City is currently affected by extreme storm events. By 2050, this number could climb to more than 60%.<sup>54</sup> It is also projected that by 2050, between 350 million and 600 million people would experience increased water stress due to climate change.<sup>55</sup> Urban population is also projected to triple, increasing by 800 million people, complicating urban poverty and access to basic services.<sup>56</sup>

Climate change induced by increasing greenhouse gases is likely to affect crops differently from region to region. For example, average crop yield is expected to drop down to 50% in Pakistan according to the Met Office scenario whereas corn production in Europe is expected to grow up to 25% in optimum hydrologic conditions. More favourable effects on yield tend to depend to a large extent on realization of the potentially beneficial effects of carbon dioxide on crop growth and increase of efficiency in water use. Decrease in potential yields is likely to be caused by shortening of the growing period, decrease in water availability and poor vernalization.

In the long run, the climatic change could affect agriculture in several ways:

- productivity, in terms of quantity and quality of crops;
- agricultural practices, through changes of water use (irrigation) and agricultural inputs such as herbicides, insecticides and fertilizers;
- environmental effects, in relation of frequency and intensity of soil drainage (leading to nitrogen leaching), soil erosion, reduction of crop diversity;

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<sup>51</sup> Human health: impacts, adaptation, and co-benefits. In: *Climate Change 2014: Impacts, Adaptation, and Vulnerability. Part A: Global and Sectorial Aspects. Contribution of Working Group II to the Fifth Assessment Report of the Intergovernmental Panel on Climate Change* (2014); Amanda Little, “Climate Change Is Likely to Devastate the Global Food Supply. But There’s Still Reason to Be Hopeful” (2019).

<sup>52</sup> BBC, “Climate ‘could devastate crops’”, 31 January 2008.

<sup>53</sup> Hijioka, *IPCC, Climate Change 2014: impacts, Adaptation and Vulnerability*, 2014

<sup>54</sup> IPCC, *Summary for Policymakers: Mitigation of Climate Change*. Contribution of Working Group III to the Fifth Assessment Report of the Intergovernmental Panel on Climate Change, 2014

<sup>55</sup> Zhou XN, *Potential impact of climate change on schistosomiasis transmission in China*, 2008

- rural space, through the loss and gain of cultivated lands, land speculation, land renunciation, and hydraulic facilities;
- Adaptation, organisms may become competitive, as well as humans may develop urgency to develop more competitive organisms, such as flood resistant or salt resistant varieties of rice.

They are large uncertainties to uncover, particularly because there is lack of information on many specific local regions, and include the uncertainties on magnitude of climate change, the effects of technological changes on productivity, global food demands, and the numerous possibilities of adaptation.

Most agronomists believe that agricultural production will be mostly affected by the severity and pace of climate change, not so much by gradual trends in climate. If change is gradual, there may be enough time for biota adjustment. Rapid climate change, however, could harm agriculture in many countries, especially those that are already suffering from rather poor soil and climate conditions, because there is less time for optimum natural selection and adaptation.

But much remains unknown about how climate change may affect farming and food security, in part because the role of farmer behaviour is poorly captured by crop-climate models. For instance, research has conducted a number of studies that show that the socio-economic context of farming may play a huge role in determining whether a drought has a major, or an insignificant impact on crop production.<sup>57</sup> In some cases, it seems that even minor droughts have big impacts on food security (such as what happened in Ethiopia in the early 1980s where a minor drought triggered a massive famine), versus cases where even relatively large weather-related problems were adapted to without much hardship.<sup>58</sup> The research combines socio-economic models along with climatic models to identify “vulnerability hotspots”.<sup>59</sup> One such study has identified US maize (corn) production as particularly vulnerable to climate change because it is expected to be exposed to worse droughts, but it does not have the socio-economic

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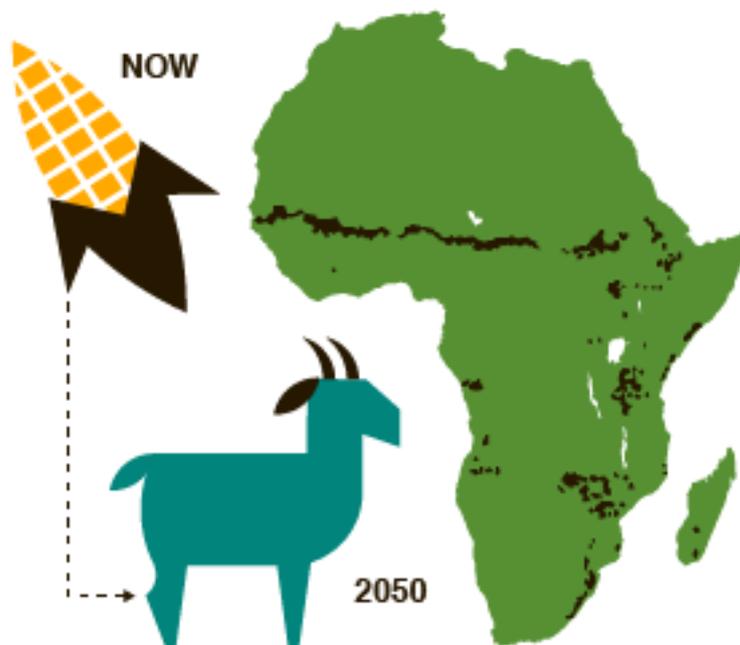
<sup>57</sup> E. Fraser “Travelling in antique lands: Studying past famines to understand present vulnerabilities to climate change” 2007; E. Simelton, E. Fraser, M. Termansen, “Typologies of crop-drought vulnerability: an empirical analysis of the socio-economic factors that influence the sensitivity and resilience to drought of three major food crops in China (1961–2001)” *Environmental Science & Policy* 12(4), 438–452 (2009).

<sup>58</sup> E.D. Fraser, M. Termansen, N. Sun, D. Guan, E. Simelton, P. Dodds, K. Feng, Yu Y “Quantifying socio-economic characteristics of drought sensitive regions: evidence from Chinese provincial agricultural data” *Comptes Rendus Geoscience* 340 (9–10) 679–688 (2008).

<sup>59</sup> E. Simelton, E. Fraser, M. Termansen, “Typologies of crop-drought vulnerability: an empirical analysis of the socio-economic factors that influence the sensitivity and resilience to drought of three major food crops in China (1961–2001)” *Environmental Science & Policy* 12(4), 438–452 (2009).

conditions that suggest farmers will adapt to these changing conditions.<sup>60</sup> Other studies rely instead on projections of key agro-meteorological or agro-climate indices, such as growing season length, plant heat stress, or start of field operations, identified by land management stakeholders and that provide useful information on mechanisms driving climate change impact on agriculture.<sup>61</sup>

By 2050, **3% OF AFRICA'S LAND** will no longer be able to grow maize and will transition from mixed crop and livestock systems to livestock-only farming systems.



Source: Lobell et al., 2011 || Jones and Thornton 2009

**Big Facts**  
ccafs.cgiar.org/bigfacts



RESEARCH PROGRAM ON  
Climate Change,  
Agriculture and  
Food Security



<sup>60</sup> E.D. Fraser, E. Simelton, M. Termansen, S.N. Gosling, A. South, “‘Vulnerability hotspots’: integrating socio-economic and hydrological models to identify where cereal production may decline due to climate change induced drought” *Agricultural and Forest Meteorology* 170: 195–205(2013).

<sup>61</sup> E.D. Fraser, E. Simelton, M. Termansen, S.N. Gosling, A. South, “‘Vulnerability hotspots’: integrating socio-economic and hydrological models to identify where cereal production may decline due to climate change induced drought” *Agricultural and Forest Meteorology* 170: 195–205(2013).

Nigeria is also affected by climate change. About 25 years ago, in the Northern Region, the southern part of Lake Chad dried up.<sup>62</sup> This was a source of livelihood to about 30 million people. This lake covered an area of over 40,000 square kilometres about 40 years ago, but as at 2016, it merely covered an expanse of 1,300 square kilometres<sup>63</sup> thus, remotely causing desertification as temperature got warmer, leading to rapid expansion of the Sahara Desert. In addition, due to the search for natural resources, large expanses of land have been degraded by oil pollution. It has been estimated by the Nigerian government that more than 7,000 spills have occurred between 1970 and 2000,<sup>64</sup> and many more have continued to occur since then. The extraction of such natural resources, such as fossil fuels, are major causes of climate change.

#### **4. SUB TOPICS**

##### **CLIMATE CHANGE CAUSED BY AGRICULTURAL ACTIVITIES**

Agriculture contributes to climate change both by anthropogenic emissions of greenhouse gasses and by conversion of non-agricultural lands such as forests into agricultural land. Man-made emissions could be caused as a result of the production of food items for animals, for example 95% of soy produced in the world is consumed by farm animals, mostly cattle and the production of a kilo of this cattle meat is equivalent 200 kilo of CO<sub>2</sub> emissions and further in the production of soy, it destroys several biodiversity needed to reduce CO<sub>2</sub> emissions.<sup>65</sup> Deforestation for the sole purpose of agriculture, is another major activity that causes climate change, as such trees would not be able to absorb emissions when released, as it would have been cut down.<sup>66</sup>

The activities of farming affect climate change as it releases significant amounts of methane, carbon dioxide and nitrous oxide, three powerful greenhouse gasses into the atmosphere, which are now responsible for 19% of total greenhouse gas emission, including gases from land clearing for agricultural purposes and livestock.<sup>67</sup> Methane is produced by livestock during digestion due to enteric chemical breakdown and is released via belches. It can also escape

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<sup>62</sup> Jumoke Beyioku “*Climate Change in Nigeria: A brief review of causes, effects and solution*”.

<sup>63</sup> Ibid”.

<sup>64</sup> John Vidal “*Nigeria’s agony dwarfs the gulf oil spills. The US and Europe ignore it*”.

<sup>65</sup> Life Gate “*How Agriculture and Climate Change are related: Cause and Effect*”.

<sup>66</sup> Ibid”.

<sup>67</sup> One Earth “*Regenerative Agriculture and Food Systems*”.

from stored manure and organic and mineral nitrogen fertilizers. Agriculture accounted for up to 10% of EU's total greenhouse-gas emissions from agriculture between 1990 and 2012.<sup>68</sup>

Also, genetically modified seeds need expensive pesticides and herbicides, which damage the soil and make farming more difficult.<sup>69</sup> Some local farmers depend on seed banks to get their crops, as a result of the declining availability of seeds, (a cause of this is climate change) and these seeds are usually expensive to obtain. Also, due to a lot of seeds being genetically modified, they would require expensive chemicals to grow them, which such local farmers may not be able to afford. Both issues have led many farmers to commit suicide in India and many have died from acute pesticide poisoning, mostly occurring in developing countries.<sup>70</sup>

Also, food waste affects the amount of emission of climate gases into the atmosphere, as about 40% of the food produced end up wasted.<sup>71</sup> The production of pollutants is not actually caused by the food themselves, but it is caused by the energy used on the farms to produce or process these foods being wasted, the energy used in transporting these foods that would be wasted, the emission that comes from the decay in landfills and other such instances,<sup>72</sup> that bring about the emission. It has even been stated that if food waste were a country, it would be the third largest producer of climate gases, after China and America.<sup>73</sup>

Furthermore, between 2001 and 2011, global emissions from crop and livestock grew by 14%. The increase occurred mainly in developing countries due to a rise in total agricultural output. This was driven by increased global food demand and changes in food consumption patterns due to rising incomes in some developing countries. Emissions from enteric chemical breakdown increased by 11% in this period and accounted for 39% of the sector's total greenhouse-gas outputs in 2011.<sup>74</sup>

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<sup>68</sup> Supra Note 65 ”.

<sup>69</sup> Supra Note 67 ”.

<sup>70</sup> Supra Note 67 ”.

<sup>71</sup> One Earth “*Regenerative Agriculture and Food Systems*”.

<sup>72</sup> World Resource Institute “*What's Food Loss and Waste got to do with Climate Change? A Lot Actually*”.

<sup>73</sup> Ibid ”.

<sup>74</sup> Sector 4.2: Agriculture's Current Contribution to Current Greenhouse Gas emission in HLPE 2012, pp.67-69.

## **BARRIERS TO SUSTAINABLE AGRICULTURE AND ACCESS TO WATER RESOURCES**

The depletion of land, water, and bio-diverse resources caused by climate change presents crucial challenges to agricultural productivity and food security.<sup>75</sup> Providing more food with fewer resources, while reducing poverty and preserving the livelihoods of people dependent on agriculture, is one of the most pressing challenges facing the world.<sup>76</sup> Even if a global average temperature increase is limited to 2°C, the potential effects on agriculture in many regions, especially sub-tropical and tropical areas, would be catastrophic.<sup>77</sup> Taking into consideration all current Nationally Determined Contributions (NDCs) and mitigation strategies, the average global temperature increase will significantly exceed the 2°C goal.<sup>78</sup>

### ***Agricultural Challenges***

As regards agriculture, there are two major challenges: environmental and socioeconomic challenges.

### ***Environmental Challenges***

Agriculture will be negatively affected by climate change, but it also has the capacity to effectively adapt since land resources can act either as a source of emissions or as a carbon sink.<sup>79</sup> Climate change will have different effects on different regions, but the impacts remain almost entirely negative, especially in the period after 2030.<sup>80</sup> Agricultural production will be affected by factors including rising and variable temperatures; sea level changes, shifts in precipitation and freshwater availability, more frequent droughts and severe weather events, and the shrinking availability of suitable land for farming.<sup>81</sup> Crop yields have increased in previous decades due to intensive agricultural systems that relied on high input levels to dramatically increase productivity.<sup>82</sup> These systems have had severe consequences, including soil depletion, massive GHG emissions, and increases in water scarcity.<sup>83</sup> Unsustainable management practices, such as the overuse of mineral fertilizers, the burning of forests to create grazing lands, and exhaustion of water resources, deplete the quality, fertility, and productivity

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<sup>75</sup> FAO, *2017 - The State of Food and Agriculture*, 2017, p. 2.

<sup>76</sup> UN DESA, *Food security and nutrition and sustainable agriculture*, 2018.

<sup>77</sup> FAO, *2016 - The State of Food and Agriculture*, 2016, p. 11.

<sup>78</sup> UNFCCC, *UN Climate Change Annual Report 2017*, 2018, 21.

<sup>79</sup> UNFCCC, *Introduction to Land Use*, 2018.

<sup>80</sup> FAO, *The future of food and agriculture: Trends and challenges*, 2017, p. 137.

<sup>81</sup> World Bank, *Turn Down the Heat: Why a 4°C Warmer World Must be Avoided*, 2012, p. 44.

<sup>82</sup> FAO, *The future of food and agriculture: Trends and challenges*, 2017, pp. 135-36.

<sup>83</sup> *Ibid.*

of the soil.<sup>84</sup> Intensive food production systems cannot guarantee food security in perpetuity if they compromise the natural resources necessary to grow food.<sup>85</sup> Modern food system transformations in least developed countries must take place in the context of climate change and natural-resource scarcities.<sup>86</sup> This is reflected in the intended NDCs submitted as part of the *Paris Agreement*, where most countries cite vulnerabilities in their agricultural sectors and many countries remain economically dependent on agriculture and lack the resources to adapt.<sup>87</sup>

### ***Socioeconomic Challenges***

Small-scale family-based or subsistence farmers form a large proportion of the poor and hungry, with extreme poverty and hunger being a predominantly rural phenomenon.<sup>88</sup> These farmers are more vulnerable to climate change's effects than large-scale producers, as they have limited capacity to manage risks.<sup>89</sup> Eradicating hunger and poverty is linked to increasing food production and the earnings of the rural population through sustainable development.<sup>90</sup> As food systems transform and urbanization takes hold, labour exits agriculture even as productivity increases, automation takes over.<sup>91</sup> Rural populations are forced to migrate to cities in search of work when their land becomes too difficult and uneconomical to farm.<sup>92</sup> There are 500 million smallholder farmers in the world and in some areas, particularly sub-Saharan Africa and South Asia, these farmers can produce up to 80% of the region's food supply.<sup>93</sup> Unless economic growth becomes more inclusive by including all segments of the population, the goals of ending poverty and achieving zero hunger by 2030 will not succeed.<sup>94</sup> It is impossible to address poverty, food security, and climate change without including and protecting the hundreds of millions of small-scale farmers.<sup>95</sup> COP has recognized the importance of an inclusive response to climate change by emphasizing the role of women,

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<sup>84</sup> FAO, 2016 - *The State of Food and Agriculture*, 2016, p. 52.

<sup>85</sup> FAO, 2017 - *The State of Food and Agriculture*, 2017, p. 73.

<sup>86</sup> *Ibid*, pp. 72-73.

<sup>87</sup> FAO, *The Agriculture Sectors in the Intended Nationally Determined Contributions: Analysis*, 2016, pp. 19-23.

<sup>88</sup> UN DESA, *Food security and nutrition and sustainable agriculture*, 2018.

<sup>89</sup> FAO, 2016 - *The State of Food and Agriculture*, 2016, p. 48.

<sup>90</sup> UN DESA, *Food security and nutrition and sustainable agriculture*, 2018.

<sup>91</sup> FAO, *The future of food and agriculture: Trends and challenges*, 2017, pp. 14-15.

<sup>92</sup> UN DPI, *Goal 2: Zero Hunger*, 2018.

<sup>93</sup> FAO, 2017 - *The State of Food and Agriculture*, 2017, p. xi.

<sup>94</sup> *Ibid*, p. vii.

<sup>95</sup> FAO, 2016 - *The State of Food and Agriculture*, 2016, p. xii.

youth, and indigenous groups in facilitating a transition to a low-emission global economy, particularly in agriculture.<sup>96</sup>

### ***Water Resources Challenges***

Water, on the other hand, has been stated earlier to be critical to sustainable development and the eradication of poverty and hunger, and is indispensable for human development, health and well-being.<sup>97</sup> Water-related challenges, including limited access to safe water and sanitation, increasing pressure on water resources and ecosystems, disasters and a negative risk of droughts and floods, have received increasing attention in the global development arena.<sup>98</sup> In recent decades the percentage increase in water use on a global scale has exceeded twice that of population growth.<sup>99</sup> This has led to more, and larger, regions in the world being subject to water stress where the current restricted rates of water use and consumption, let alone the desired rates, are unsustainable.<sup>100</sup>

Despite water shortages, misuse of water is widespread. Small communities and large cities, farmers and industries, developing countries and industrialized economies are all mismanaging water resources. Surface water quality is deteriorating in key basins from urban and industrial wastes.<sup>101</sup> Also, groundwater is polluted from surface sources and irreversibly damaged by the intrusion of saltwater.<sup>102</sup> Overexploited aquifers are losing their capacity to hold water and lands are subsiding. Cities are unable to provide adequate drinking-water and sanitation facilities.<sup>103</sup> Waterlogging and soil salinity are diminishing the productivity of irrigated lands.<sup>104</sup> Decreasing water flows are reducing hydroelectric power generation, pollution assimilation and fish and wildlife habitats.<sup>105</sup> Moreover, stagnant water and poor irrigation drainage escalate the incidence of water-related diseases, resulting in human suffering and increased health costs.<sup>106</sup>

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<sup>96</sup> UNFCCC, *Climate Change Annual Report 2017*, 2018, pp. 17-18.

<sup>97</sup> *United Nations Secretary- General's Plan: Water Action Decade 2018-2028*, 2017.

<sup>98</sup> FAO, *The Future of Food and Agriculture: Trends and Challenges*, 2017, p.4.

<sup>99</sup> Mays, L. *Water Resources Sustainability*; McGraw-Hill Professional: New York, NY, USA, 2006.

<sup>100</sup> Ibid.

<sup>101</sup> UNESCO, *International Decade for Action, "Water for Life"*, 2012.

<sup>102</sup> FAO, *An International Action Programme on Water and Sustainable Agricultural Development*, Rome, 1990.

<sup>103</sup> Ibid.

<sup>104</sup> Ibid.

<sup>105</sup> Ibid.

<sup>106</sup> UNEP, *Fresh water pollution*, 1991.

Today, agriculture is often unable to compete economically for clean water.<sup>107</sup> Cities and industries can afford to pay more for water and earn a higher economic rate of return from a unit of water than does agriculture. Irrigators in some areas are now asked to pay for the water they receive, including the full cost of water delivery.<sup>108</sup> In other areas, new regulations require farmers to pay for polluting streams, lakes and aquifers.<sup>109</sup>

In addition to threatening the human food supply, water shortages severely reduce biodiversity in both aquatic and terrestrial ecosystems, while water pollution facilitates the spread of serious human diseases and diminishes water quality.<sup>110</sup>

Water for sustainable agriculture is at the heart of the recent milestone agreements such as the 2030 Agenda for Sustainable Development, the Sendai Framework for Disaster Risk Reduction 2015-2030, and the 2015 Paris Agreement.<sup>111</sup> The World Economic Forum ranks water crisis in the top 3 global risks for the third consecutive year.<sup>112</sup> Failing to respond effectively to these challenges will have devastating global effects.<sup>113</sup>

### ***Farming Activities being affected by Climate Change in Nigeria***

*United Nations Convention to Combat Desertification* (UNCCD) defines desertification as land degradation in arid, semi-arid, and humid areas resulting from various factors, including climate variations and human activities.<sup>114</sup> Desertification has affected the Northern region in Nigeria, the effect of which is making herdsmen migrate from their lands into the lands of farmers, thereby causing occupational conflicts. However, drought largely affects farmers especially when there is little or no rainfall. This would lead to desertification if it persists.

A comparative analysis is appropriate here, examining countries such as Saudi Arabia, that are covered with a vast area of sand and learning how they have been able to adapt and grow in such circumstances. Nigeria shares boundaries with the Sahara Desert, towards the Northern half and would be prone to its effects, especially with the increase of climate change, which would inevitably affect all the persons in the region, as is currently happening, with the issues of the herdsmen. And with about 63.83% of the country's land being threatened by

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<sup>107</sup> FAO, *The Future of Food and Agriculture: Trends and Challenges*, 2017.

<sup>108</sup> UNESCO, *Water and the Three Dimensions of Sustainable Development*, 2017.

<sup>109</sup> *Ibid.*

<sup>110</sup> *United Nations World Water Assessment Programme*, 2009.

<sup>111</sup> *United Nations Secretary-General's Plan: Water Action Decade 2018-2028*, 2017.

<sup>112</sup> *Ibid.*

<sup>113</sup> *Ibid.*

<sup>114</sup> Temidayo Olagunju "Drought, Desertification and the Nigerian Environment: A Review".

desertification,<sup>115</sup> there is a need to act, as this resulted to herdsman crises in the Northern part of Nigeria.

Firstly, using nuclear technology, the soil and water conservation of a desert could be strengthened.<sup>116</sup> The International Atomic Energy Agency (IAEA) currently applies nuclear technology, especially the Isotopic Technique, through its Technical Cooperation (TC) Program, assisting member states party to it, to solve their problems of soil degradation.<sup>117</sup> The technique works through with gathering of data, which leads to analysis of the various elements in the soil, water and plants, and this information can be used to create strategies for the adaptation on crops in such environment, through efficient use of water and soil.<sup>118</sup> This in effect would enable such farmer to develop a sustainable means of agriculture. Nigeria as a party to the IAEA, could likewise adopt this technology in gathering the efficiency of a soil before planting, enabling the country to strategize effectively. And if such technology could be employed in the state, there would be a reduction in the amount of land unable to yield anything.

Furthermore, the Central Pivot Irrigation system, works such that a certain area of land is constantly watered, by attaching sprinklers to the arm, which are attached to wheels, to rotate the arm with a pivot at the center.<sup>119</sup> This patch of land could be used to grow grass that could be used as a fodder (food, especially dried hay or straw, for cattle and other livestock), for feeding livestock. This technology if adopted could solve a major problem in the Nigerian economy, as the crises of Fulani Herdsmen would no longer be in existence, as each herdsman would have a field for pasture. Aside from this, it would drastically reduce the influx of migrants from one state to another, displacing the original farmers in such locality or state.<sup>120</sup>

Though this technology may seem to be the solution, but it is quite high to maintain and not cost effective for agricultural purposes. As the water used is gotten from deep ground water table, which is not sustainable and cannot be replenished. The water could also be gotten from private desalination plants or sometimes could be provided by government through pipes at subsidized rates (this is also not sustainable).<sup>121</sup> So, it is suggested that there should be a public and private partnership in this regard, civil societies and international communities working in

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<sup>115</sup> Ibid.

<sup>116</sup> International Atomic Energy Agency “*World Day to Combat Desertification*”.

<sup>117</sup> International Atomic Energy Agency “*Combating Desertification*”.

<sup>118</sup> Ibid.

<sup>119</sup> Quora “*What can Technology do to reduce Desertification*”.

<sup>120</sup> Ibid.

<sup>121</sup> Ibid.

line with this could assist with funding, which could be for a period of time, pending the moment they would be able to resettle.<sup>122</sup>

### ***IMPROVING SOCIOECONOMIC DEVELOPMENT THROUGH WATER SECURITY***

Water security is defined in the UN-Water 2013 analytical brief entitled “Water Security & the Global Water Agenda” as, “the capacity of a population to safeguard sustainable access to adequate quality water for sustainable livelihoods, human well-being, and socioeconomic development, for ensuring protection against water-borne pollution and water-related disasters, and for preserving ecosystems in a climate of peace and political stability”.<sup>123</sup>

While there are many obstacles to achieving water security, including natural and man-made disasters, trans-boundary water management, and achieving human security, there are a few success stories that emphasize how water security can improve development.<sup>124</sup> For example, the Nile Basin, which provides large populations access to water in Eastern Africa, faces many environmental stressors that threaten its productivity, but with regional cooperation, there are collaborative efforts being made to create water security.<sup>125</sup>

Following the 2010 United Nations General Assembly resolution 64/292 on “The human right to water and sanitation,” the Task Force on Water Security was established by UN-Water to advocate for the importance of ensuring water security.<sup>126</sup>

It is essential that water security be incorporated as a major target in the post-2030 development agenda to ensure that socioeconomic development meets an adequate level of food and human security through practices including water governance.<sup>127</sup> To that end, good water governance leads to increased water security, especially in regions where water resources are scarce.<sup>128</sup> Water governance involves a multitude of structures and actors working towards building a successful institution that will ultimately ensure a high-level of water security.<sup>129</sup> Good water governance requires a strong legislative base, financial resources, technical expertise, and

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<sup>122</sup> Ibid.

<sup>123</sup> UN-Water, *Water Security & the Global Water Agenda: A UN-Water Analytical Brief*, 2013.

<sup>124</sup> Ibid.

<sup>125</sup> Supra Note 123.

<sup>126</sup> UN-Water, *Task Force on Water Security*, 2014.

<sup>127</sup> Supra Note 123.

<sup>128</sup> Ibid.

<sup>129</sup> Ibid.

cooperative and collaborative practices to ensure capacity-building and socioeconomic development.<sup>130</sup>

To better promote good water governance practices, the United Nations Development Programme's Water Governance Facility (WGF) at the Stockholm International Water Institute (SIWI) was created in 2005 to promote reform and implementation in a wide range of issues.<sup>131</sup> The WGF provides a variety of services to Member States in order to ensure water governance by supplying policy support, information sharing, promoting development, and endorsing the achievement of the SDGs at the international, regional, national, and local levels.<sup>132</sup> Through the "Water Integrity Programme," the WGF works to fight corrupt water governance practices by advocating for improved water policy, capacity-building, and risk assessment.<sup>133</sup> The "Water Integrity Programme" works in regional divisions in Latin America, the Middle East and North Africa, and Sub-Saharan Africa by hosting training workshops for those involved in the water governance sector.<sup>134</sup> In addition to the WGF, the United Nations Development Program has a Water Governance Program (WGP) in over 150 countries to finance projects related to integrated water resource management (IWRM), water supply and sanitation, and international and regional cooperation.<sup>135</sup> The WGP assists in placing many of the UNDP's projects, such as Cap-Net, in Member States that may not have had the capacity to utilize these types of capacity-building projects to facilitate socioeconomic development.<sup>136</sup>

## ***BUILDING CAPACITY AND SUSTAINABLE AGRICULTURAL PRACTICES FOR FARMERS***

Since 2012, COP has maintained a capacity-building web portal to collect and spread relevant knowledge specific to countries and continents.<sup>137</sup> The capacity of States parties to the *Paris Agreement* to enact adaptation and mitigation measures varies enormously, with many states, especially developing and least developed countries, lacking financial resources.<sup>138</sup> The *Paris*

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<sup>130</sup> Ibid.

<sup>131</sup> United Nations Development Programme, *The UNDP Water Governance Facility at SIWI*, 2014.

<sup>132</sup> Ibid.

<sup>133</sup> Water Governance Facility, *Water Integrity Programme*, 2014.

<sup>134</sup> Water Governance Facility, *Water Integrity Programme Capacity Building Programme in MENA*, 2014.

<sup>135</sup> United Nations Development Programme, *Fast Facts: Adaptive Water Governance*, 2010.

<sup>136</sup> Ibid.

<sup>137</sup> UNFCCC, *Capacity-building portal*, 2018.

<sup>138</sup> UNFCCC, *Introduction to Climate Finance*, 2018.

*Agreement* requests that developed countries increase support for capacity-building measures in least developed countries and provide financing.<sup>139</sup> Climate funds like the Global Environment Facility (GEF) and Green Climate Fund (GCF) are crucial sources of funding and are mentioned in many NDCs, but are imperfect mechanisms.<sup>140</sup> Countries face six major challenges to access climate finance: low awareness that funding is available; difficulty in meeting the standards of the funds; low capacity to monitor progress; limited information and expertise; lack of legal and regulatory frameworks; and a lack of clear priorities.<sup>141</sup>

At their sessions in December 2018, COP adopted a decision about the institutional arrangements for capacity-building under the *Paris Agreement*.<sup>142</sup> Submitted NDCs under the *Paris Agreement* related to sustainable agriculture include identified needs for sufficient financial resources, access to adaptation technology, increased institutional and human capacities, further scientific research, and education and awareness campaigns.<sup>143</sup> The *Paris Agreement* established the Paris Committee on Capacity-Building (PCCB), which reports to COP to address inadequacies in capacity-building and to focus on enhancing the abilities of least developed countries by providing analysis and recommendations.<sup>144</sup> From 2017-2019, the PCCB is focusing on ensuring the readiness of countries to implement NDCs under the *Paris Agreement*.<sup>145</sup>

Food and Agriculture Organization of the United Nations (FAO) has outlined several key principles for sustainable development in agriculture, including the efficient use and conservation of resources, the protection of rural economies, enhancing the resilience of people and ecosystems, and responsible governance.<sup>146</sup> Inclusive rural transformation will facilitate these aims, but requires supportive policies and investment, development of agroindustry and infrastructure to connect rural areas with urban markets, and a territorial focus, where networks of small towns, cities, and rural areas are considered together in any rural development strategy.<sup>147</sup>

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<sup>139</sup> UNFCCC, *Building Capacity in the UNFCCC Process*, 2018.

<sup>140</sup> FAO, 2016 - *The State of Food and Agriculture*, 2016, p. 112.

<sup>141</sup> Ibid.

<sup>142</sup> UNFCCC, *Capacity-building in the negotiations*, 2018.

<sup>143</sup> UNFCCC, *Aggregate effect of the intended nationally determined contributions: an update (FCCC/CP/2016/2)*, p. 72.

<sup>144</sup> UNFCCC, *Paris Committee on Capacity Building (PCCB)*, 2018.

<sup>145</sup> UNFCCC, *Paris Committee on Capacity Building (PCCB)*, 2018.

<sup>146</sup> FAO, *Strategic work of FAO for sustainable food and agriculture*, 2017, p. 8.

<sup>147</sup> FAO, 2017 - *The State of Food and Agriculture*, 2017, pp. 116-119.

## ***THE ROLE OF TECHNOLOGY IN SUSTAINABLE AGRICULTURE AND WATER SECURITY***

The *Paris Agreement* places emphasis on voluntary contributions and reporting from Member States on actions and efforts to mitigate global warming.<sup>148</sup> Prepared through a collaborative, bottom-up approach, the agreement created a global goal on climate change adaptation, finance, technology and capacity building.<sup>149</sup>

Sustainable agriculture embraces the environmental, economic and social conditions that challenge food security.<sup>150</sup> Taking into consideration, agriculture, when done sustainably, has the potential to relieve hunger and create lasting change.<sup>151</sup> Sustainable agriculture can be achieved when the farmers are supplied with adequate, appropriate, accurate and timely information.<sup>152</sup> Agricultural information has the key role in facilitating the participation of people relating to sustainable development.<sup>153</sup> Globally, the emerging concept of e-agriculture incorporates the sophisticated use of innovative information and communication technologies (ICT). ICTs have the potential to revolutionize the agricultural sector due to their affordability, accessibility, and adaptability.<sup>154</sup>

ICTs can implement mitigation and adaptation strategies.<sup>155</sup> ICTs in Latin America have enabled collaborations between private and public organizations to collect, analyse, and disseminate information to farmers about trends in seasonal climate conditions and what resources are required.<sup>156</sup> A similar collaboration in Uganda allows farmers access to advisories, market information, weather data, and guidance on harvesting techniques and disaster coping mechanisms.<sup>157</sup> The discussions within the *Koronivia Joint Work on Agriculture* within the COP and its subsidiary bodies will allow adaptation and mitigation strategies to be assessed and distributed in coming years.<sup>158</sup> A shortage of local technical experts, especially in least developed countries and developing countries, has been reported as

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<sup>148</sup> Climate Focus, *The Paris Agreement*, 2015, pp. 1-6.

<sup>149</sup> Ibid.

<sup>150</sup> Qudsia Kiran, *ICTs for Sustainable Agriculture: An Answer to Food Security*, 2015.

<sup>151</sup> United Nations Sustainable Development Goal 2: End hunger, to achieve food security and improved nutrition, and promote sustainable agriculture.

<sup>152</sup> FAO, *ICT in Sustainable agriculture*, 2015.

<sup>153</sup> Ibid.

<sup>154</sup> Ibid.

<sup>155</sup> UNFCCC, *Information and Communications Technology Solutions*, 2018.

<sup>156</sup> UNFCCC, *ICTs for Small-Scale Farmers: A Game Changing Approach to Climate Smart Agriculture in Latin America*, 2018.

<sup>157</sup> UNFCCC, *Enabling Farmers to Adapt to Climate Change*, 2018.

<sup>158</sup> UNFCCC, *Issues related to agriculture*, 2018.

hindering both the collection of data and the implementation of technology-based adaptation projects.<sup>159</sup>

Private businesses and academic institutions also contribute to capacity-building in developing countries.<sup>160</sup> The COP hosts regular forums with climate technology businesses, designed to empower these private organizations in the development of climate technology solutions.<sup>161</sup> Public-private partnerships are also instrumental in the development of climate mitigation and adaptation technology and infrastructure with, for example, the COP frequently facilitates forums with global energy sector leaders designed to incorporate their expertise into capacity-building activities.<sup>162</sup>

Moreover, water-smart agricultural technologies integrate traditional and innovative practices, technologies and services that are relevant for a particular location to adopt climate change and variability.<sup>163</sup> Location-specific water-smart technologies, either individually or in combination, have substantial potential to reduce climate change impacts on water resources with proper planning and implementation.<sup>164</sup>

Similarly, water-smart technologies, namely, micro-irrigation, furrow-irrigated raised bed, rainwater, cover-crop method, partial root dry (PRD), deficit irrigation, greenhouse, laser land levelling and drainage management can also help farmers to reduce the impact of climate change and variability.<sup>165</sup>

Also, National Initiative on Climate Resilient Agriculture has suggested several interventions such as adoption of scientific water conservation methods, precise estimation of crop water requirement, irrigation scheduling, groundwater recharge techniques, use of drought tolerant varieties, adjusting the planting dates, modifying the fertilizer and irrigation schedules and adopting zero-tillage which may help farmers to achieve satisfactory crop yields even in deficit rainfall and warmer years.<sup>166</sup> This has led to a successful implementation of smart water technologies for climate- smart sustainable agriculture.<sup>167</sup>

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<sup>159</sup> UNFCCC, *Implementation of the framework for capacity-building in developing countries (FCCC/SBI/2017/3)*, 2017, p. 11.

<sup>160</sup> UNFCCC, *Climate: Get the Big Picture*.

<sup>161</sup> UNFCCC, *Boosting climate technology innovation through entrepreneurship*, 2018.

<sup>162</sup> Global Sustainable Electricity Partnership, *Global Electricity Leaders at COP 22*.

<sup>163</sup> Climate Innovative Agriculture Technology, *Water-smart agricultural technologies*, 2014.

<sup>164</sup> *Ibid.*

<sup>165</sup> Altieri & Nicholls, *Water- smart technologies in sustainable agriculture*, 2017.

<sup>166</sup> National Initiative on Climate Resilient Agriculture, 2016.

<sup>167</sup> *Ibid.*

## ***INCLUSION OF YOUTH FOR BEST PRACTICES***

The definition of ‘Youth’ varies from country to country according to the influences of socio-cultural, institutional, economic and political factors.<sup>168</sup> The United Nations defines ‘youth’ as those persons between the ages of 15 and 24 years, which overlaps with the definition of children by the United Nations Convention on the Rights of the Child (CRC) as persons up to the age of 18.<sup>169</sup> However, there is no universal agreement, and some definitions consider individuals less than 30 years of age to be youth.<sup>170</sup>

The United Nations system recognizes the key role that youth play in tackling climate change and works closely with youths-led and youth-focused organisations around the world through the United Nations Joint Framework Initiative on Children, Youth and Climate Change.<sup>171</sup> Through the United Nations Alliance of Climate Change, the UNFCCC Secretariat collaborates with other UN agencies like UNESCO, UNICEF, the Food and Agriculture Organization of the United Nations (FAO), and UN Environment, to promote climate change education, public awareness, and training for young people. The Joint Framework Initiative has been coordinating efforts by 16 intergovernmental entities and many youth organizations to empower youth to take adaptation and mitigation actions and enhance effective participation of youth in climate change policy decision-making processes.<sup>172</sup>

Since 1998, young people have actively participated in the climate change negotiation process, and continue to engage with the processes, programs, and initiatives related to combating climate change throughout the UN system.<sup>173</sup> Youth NGO (YOUNGO), the youth constituency of the UNFCCC process, provides a global platform for young people to network, debate, and organize themselves within UN climate negotiation.<sup>174</sup> Young people create public awareness, educate, train, mobilize and engage stakeholders to take positive action on climate change through such bodies as the International Youth Climate Movement and the Action for Climate Empowerment (ACE).<sup>175</sup>

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<sup>168</sup> United Nations, Secretary-General’s Report to the General Assembly, (UNGA A/36/215), at para 8 of annex.

<sup>169</sup> United Nations, *International Youth Year: Participation, Development, Peace*, General Assembly Resolution A/RES/36/28, 1981.

<sup>170</sup> Convention on the Rights of the Child, 1990, Article 1.

<sup>171</sup> COP, *United Nations Joint Framework Initiative on Children, Youth and Climate Change*, 2008.

<sup>172</sup> UNFCCC, *United Nations Alliance of Climate Change, Education, Training and Public Awareness*

<sup>173</sup> UNFCCC, *Youth Participation in the UNFCCC Negotiation Process*, 2010, p.17.

<sup>174</sup> International Youth Climate Movement, *Youth Climate*.

<sup>175</sup> International Youth Climate Movement, *Youth Climate; Action for Climate Empowerment Youth Forum, About the ACE Youth Forum*, 1998.

Across the globe, young people have demonstrated innovative practices to adapt, mitigate, and cope with the realities of global climate change, with a multitude of projects existing at both the international, regional and national levels.<sup>176</sup> In Ethiopia, for example, 50,000 school children engaged in the Millennium Tree Planting Campaign for Ethiopia's forest reclamation to combat climate change.<sup>177</sup> This led to a drastic reduction in forest loss coverage from 40% to less than 2% currently. Also, the innovative Climate Change and Environmental Education (CCEE) program trained 2,812 teachers on climate change and sustainable practices in seven regions in Ethiopia, with the program also developing into Somalia.<sup>178</sup> Similarly, tree planting and child-to-child rainforest preservation education were implemented in Central Guyana to adapt and mitigate the impacts of climate change.<sup>179</sup>

At the UN Climate Change Conference in Marrakech (COP22), young people have been vocally pushing for climate ambition and for a stronger role of youth in helping the Paris Climate Change Agreement and the new Sustainable Development Goals.<sup>180</sup> The United Nations recognizes the need to involve young people in the UN climate talks, given that their futures are threatened by the impacts of climate change such as greater incidences of drought and flooding, and that young people profit the most from the transition to low carbon and resilience.<sup>181</sup> The United Nations General Assembly resolution 72/215 of 2017 urges the development and spread of sustainable agricultural technologies to developing countries, while recognizing the importance of smallholder farming and gender and youth-focused projects.<sup>182</sup>

In a nutshell, the role of youth in climate resilience formed the agenda of the 2018 National Youth Workshop on the Youth Agenda in the Implementation of SDGs and Paris Agreement in Kenya.<sup>183</sup> The forum brought together youth from across the country to engage in an interactive consultative workshop that addresses the role of the youth in addressing climate change.<sup>184</sup> The youth raised a myriad of issues spanning from technical capacity, access to finance, policy implementation, monitoring and evaluation, access to information, public

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<sup>176</sup> UN JFI, *The Youth in Action on Climate Change: Inspirations from Around World*, 2013, p.27

<sup>177</sup> UNFCCC, *Building Cross-Cutting Skills and Effective Youth Participation: Tree Planting- Ethiopia*.

<sup>178</sup> Ibid.

<sup>179</sup> UNFCCC, *Rainforest Protection and Disaster Risk Reduction – Guyana*.

<sup>180</sup> UN Climate Change Conference, *The role of youth in the Paris Agreement*, 2015.

<sup>181</sup> Ibid.

<sup>182</sup> UN General Assembly, *Agriculture development, food security and nutrition (A/RES/72/238)*, 2017.

<sup>183</sup> Kenya Climate Change Action Plan, *The role of Youth in promoting climate justice and sustainable development*, 2018.

<sup>184</sup> Ibid.

participation and corruption as some of the challenges that exist while undertaking projects addressing climate change.<sup>185</sup>

Also, in 2019, UN held the first ever, UN Youth Climate Summit. The UN Youth Climate Summit was a platform for young climate action leaders to showcase their solutions at the United Nations and to meaningfully engage with decision-makers on the defining issue of our time.<sup>186</sup> The summit initiated new ideas in the fight for climate change.<sup>187</sup>

## **5. Relating the Topic to the Conference Theme: Youth at the Centre of the Achievement and Implementation of the SDGs.**

### ***IMPLEMENTING SUSTAINABLE AGRICULTURAL PRACTICES TO COMBAT CLIMATE CHANGE AND PROTECT WATER RESOURCES AND THE SDGS***

The theme of the Conference is Youth at the Centre of the Achievement and Implementation of the SDGs. It is in line with the current position of the international community, which seeks the integration of youth in the achievement of the SDGs. The topic for this committee covers several global issues towards achieving climate action in accordance with Goal 13 of the SDGs. Issues such as sustainable agriculture, water security, youth participation and the use of technology.

Generally, the aim of the Conference is to engage youths. It provides an avenue and a different perspective to solving both global and national issues. One of the most important sectors in the world is agriculture, because it has to do with food security and utilization of water resources. Without these two, no human being can survive. However, food and water security are threatened by climate change, but this can be solved through sustainable agricultural practices, such as the use of technology and the participation of youths.

In Nigeria of today, youths are referred to as being lackadaisical, not forward thinking and even lazy, which may or may not be true depending on the angle one views it from; notwithstanding which side one takes their perspective, if there is a problem in a certain place, it is left to one to find a solution towards it, not waiting for another. Therefore, it is, that addressing pressing issues in Nigeria should be top priority in the minds of the youths, to make their society a

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<sup>185</sup> Ibid.

<sup>186</sup> UNESCO, *UN Youth Climate Summit*, 2019.

<sup>187</sup> Ibid.

convenient, comfortable, safe and developed place, not only for the present age, but also for posterity sake.

Though with all said, the role of the NGOs, private sectors, government and international community cannot be over-stated, as such, institutions are instrumental to the achievement of such aims, as without their full participation then such innovations would not be worth anything.

## 6. CONCLUSION

Climate change is real and combating it requires a holistic approach, concerted effort, and global collaboration among all stakeholders.<sup>188</sup> It is projected to have increasingly negative impacts on agriculture.<sup>189</sup> Progress toward sustainable agriculture is slow and increased investment is necessary to catalyse development, mitigation and adaptation strategies, and enhance agricultural productivity.<sup>190</sup> Governments, NGOs, and individuals must work together to craft policies that properly address the deficiencies in current approaches and ensure that agriculture becomes sustainable.<sup>191</sup> This can be done through the engagement of youths and the use of technology. Active engagement of young people on climate change is important as, in their position as both stakeholders and future leaders, they must be empowered to champion a new climate change regime.<sup>192</sup> Climate change education has shown to be a vital strategy in engaging young people and influencing them to adopt sustainable practices.<sup>193</sup> Young people are positive change agents, and with the right support system, education, and training, they can contribute immensely to the achievement of the *Paris Agreement* and the SDGs.<sup>194</sup>

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<sup>188</sup> UNPY, *Fact Sheet: Youth and Climate Change*, 2010, p. 3.

<sup>189</sup> IPCC, *Climate Change 2014 Synthesis Report*, 2014, p. 53.

<sup>190</sup> UN General Assembly, *Agriculture development, food security, and nutrition: Report of the Secretary-General (A/72/303)*, 2017, p. 3.

<sup>191</sup> UNFCCC, *UN Climate Change Annual Report 2017*, 2018, p. 45.

<sup>192</sup> UNPY, *Fact Sheet: Youth and Climate Change*, 2010, p. 3.

<sup>193</sup> *Ibid.*

<sup>194</sup> UN DESA, *Youth Participation*, 2013, p. 1.

## ***FURTHER RESEARCH***

This guide is not a conclusive and final exposition to what delegates will do during the Conference, more research on this topic is expected to be done by delegates. In carrying out further research, delegates could ask themselves: How can the linkages between sustainable development, disaster risk reduction, and climate change be formalized? How can risk be shifted away from subsistence farmers that lack resources and is there enough focus on smallholders within the COP? What other technological innovation could be adopted in minimizing and coping with the effects of climate change to agriculture? How would such technology be funded and by who? Would it be controlled by citizens or by government? How can countries integrate young people in climate action, especially in relation to sustainable agriculture? What effective strategies can be adopted for climate change education to reach rural youths in less developed and developing countries?

These questions should be considered before the conference, for discussion by delegates during the conference.

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