

# **Protecting Pollinators vital for Biodiversity Conservation**

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## Protecting Pollinators vital for Biodiversity Conservation

Kariuki Muigua\*

### Abstract

This paper critically examines the role of pollinators in biodiversity conservation. The paper posits that pollinators play a fundamental role in conserving biodiversity. It discusses ways through which pollinators enhance the conservation of biodiversity. Due to their key role in biodiversity conservation, the paper argues that it is vital to protect pollinators for sustainability. The paper explores some of the key challenges in protecting pollinators and their impacts on biodiversity conservation. In addition, the paper suggests interventions towards protecting pollinators vital for biodiversity conservation.

### 1.0 Introduction

The *Convention on Biological Diversity*<sup>1</sup> defines biological diversity/biodiversity as the variability among living organisms from all sources including, inter alia, terrestrial, marine and other aquatic ecosystems and the ecological complexes of which they are part; including diversity within species, between species and of ecosystems<sup>2</sup>. Further, the United Nations Environment Programme (UNEP) defines biodiversity as the variety of life on Earth and the natural patterns it forms<sup>3</sup>. Biodiversity includes not only the planet's species with their unique evolutionary histories, but also genetic variability within and

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<sup>1</sup> The Convention on Biological Diversity, 5 June 1992 (1760 U.N.T.S. 69)

<sup>2</sup> Ibid, article 2

<sup>3</sup> United Nations Environment Programme., 'UNEP and Biodiversity' Available at <https://www.unep.org/unep-and-biodiversity#:~:text=Biological%20diversity%20is%20the%20variety,of%20human%20influence%20as%20well.> (Accessed on 04/08/2024)

among populations of species and the distribution of species across local habitats, ecosystems, landscapes, and whole continents or oceans<sup>4</sup>.

Biodiversity is crucial for survival of life on the planet<sup>5</sup>. It forms the web of life, of which humans are integral and upon which people and the planet so fully depend<sup>6</sup>. Biodiversity underpins all life on Earth<sup>7</sup>. The air we breathe, the water we drink, the food we eat, and human health and wellbeing depend on biodiversity<sup>8</sup>. Healthy ecosystems provide clean air, fresh water, medicines and food which are key for human health and wellbeing<sup>9</sup>. Biodiversity is also a key indicator of the health of an ecosystem<sup>10</sup>. Areas which have high levels of biodiversity are considered biodiversity hot spots and provide habitat to numerous endemic species<sup>11</sup>. Biodiversity therefore remains a primary indicator of our planet's health and underpins every facet of our society – from our foods and medicines to our cultures to our ability to withstand extreme weather<sup>12</sup>.

Despite the key role biodiversity plays in sustaining life on the planet, it has been noted that species are now disappearing hundreds, or even thousands, of times faster than the natural background rate of extinction<sup>13</sup>. This loss of biodiversity threatens every life on

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<sup>4</sup> National Library of Medicine., 'What is Biodiversity?' Available at <https://www.ncbi.nlm.nih.gov/books/NBK224405/> (Accessed on 04/08/2024)

<sup>5</sup> United Nations Environment Programme., 'UNEP and Biodiversity' Op Cit

<sup>6</sup> Ibid

<sup>7</sup> Hoffman. L., Salleh. A. F., & Adam. N., 'Fostering Action for Biodiversity' Available at <https://stories.flores.unu.edu/fostering-action-for-biodiversity/> (Accessed on 04/08/2024)

<sup>8</sup> Ibid

<sup>9</sup> World Health Organization., 'Biodiversity and Health' Available at <https://www.who.int/newsroom/fact-sheets/detail/biodiversity-andhealth#:~:text=Biodiversity%20loss%20can%20have%20significant,cause%20or%20exacerbate%20politics%20conflict> (Accessed on 04/08/2024)

<sup>10</sup> How do we Define and Measure Biodiversity –and Just why is it so Important?., Available at <https://www.nrdc.org/stories/biodiversity-101> (Accessed on 04/08/2024)

<sup>11</sup> Ibid

<sup>12</sup> Ibid

<sup>13</sup> United Nations Environment Programme., 'UNEP and Biodiversity' Op Cit

Earth, not just those species which are close to extinction<sup>14</sup>. Biodiversity loss impacts ecosystem services including food, clean water, and medicine therefore threatening the survival of life on the planet<sup>15</sup>. Loss of biodiversity affects ecosystem functioning and significant disruptions of ecosystems can result in loss of life sustaining ecosystem goods and services<sup>16</sup>. These challenges have heightened the need to conserve biodiversity.

This paper critically examines the role of pollinators in biodiversity conservation. The paper posits that pollinators play a fundamental role in conserving biodiversity. It discusses ways through which pollinators enhance the conservation of biodiversity. Due to their key role in biodiversity conservation, the paper argues that it is vital to protect pollinators for sustainability. The paper explores some of the key challenges in protecting pollinators and their impacts on biodiversity conservation. In addition, the paper suggests interventions towards protecting pollinators vital for biodiversity conservation.

## **2.0 Role of Pollinators in Biodiversity Conservation**

Pollinators are vital in ensuring pollination. The process of pollination occurs when pollen is moved within flowers or carried from flower to flower by pollinating animals such as birds, bees, bats, butterflies, moths, beetles, or other animals<sup>17</sup>. The transfer of pollen in and between flowers of the same species leads to fertilization, and successful production of seed and fruit for plants<sup>18</sup>. In addition, pollination ensures that a plant will produce full-bodied fruit and a full set of viable seeds<sup>19</sup>. Pollinators include birds, bats, butterflies, moths, flies, beetles, wasps, small mammals, and most importantly, bees<sup>20</sup>.

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<sup>14</sup> United Nations., 'What is Biodiversity' Available at <https://www.un.org/sustainabledevelopment/blog/2023/08/explainer-what-is-biodiversity/> (Accessed on 04/08/2024)

<sup>15</sup> United Nations Climate Change., 'What is the Triple Planetary Crisis?' Available at <https://unfccc.int/news/what-is-the-triple-planetarycrisis#:~:text=The%20triple%20planetary%20crisis%20refers,change%2C%20pollution%20and%20biodiversity%20loss> (Accessed on 04/08/2024)

<sup>16</sup> World Health Organization., 'Biodiversity and Health' Op Cit

<sup>17</sup> Pollination., Available at <https://www.pollinator.org/pollination> (Accessed on 04/08/2024)

<sup>18</sup> Ibid

<sup>19</sup> Ibid

<sup>20</sup> Ibid

Pollination is a process that is critical for food production and human livelihoods, and directly links wild ecosystems with agricultural production systems<sup>21</sup>. It is estimated that nearly 90 per cent of all wild flowering plants depend at least to some extent on animal pollination<sup>22</sup>. In addition to food crops, pollinators also contribute to the survival of crops that provide biofuels<sup>23</sup>.

Pollinators are therefore crucial for the environment by supporting the production of flowering plants and crop species. They are important for the provision of ecosystem services<sup>24</sup>. The process of pollination is key to ecosystems and to human societies and the health and wellbeing of pollinating insects is considered as crucial to life, be it in sustaining natural habitats or contributing to the development of local, regional and global economies<sup>25</sup>. It has been noted that despite significant enhancements in technology and innovation in recent years, humanity is still completely dependent on healthy ecosystems for water, food, medicines, clothing, fuel, shelter, energy and livelihoods among other vital ecosystem services<sup>26</sup>. The role of pollinators such as bees and butterflies in pollination is essential for ecosystems to thrive, and conservation of these ecosystems

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<sup>21</sup> United Nations Environment Programme., 'Pollinators Under Threat - So What?' Available at <https://www.unep.org/news-and-stories/story/pollinators-under-threat-so-what#:~:text=Nearly%2090%20per%20cent%20of,%2C%20music%2C%20religion%20and%20technology>. (Accessed on 04/08/2024)

<sup>22</sup> Ibid

<sup>23</sup> Ibid

<sup>24</sup> Muigua. K., 'The Neglected Link: Safeguarding Pollinators for Sustainable Development in Kenya' Available at <http://kmco.co.ke/wp-content/uploads/2018/08/Safeguarding-the-Pollinators-for-Sustainable-Development-Draft-of-23rd-January-2018-DRAFT-FOUR.pdf> (Accessed on 04/08/2024)

<sup>25</sup> Kluser, S., Neumann, P., Chauzat, M.P., Pettis, J.S., Peduzzi, P., Witt, R., Fernandez, N. and Theuri, M., Global honey bee colony disorders and other threats to insect pollinators, (United Nations Environmental Programme, 2010), p.1. Available at [https://www.researchgate.net/profile/Peter\\_Neumann5/publication/305160493\\_Disorders\\_of\\_bee\\_colonies\\_around\\_the\\_world\\_and\\_other\\_threats\\_to\\_insect\\_pollinators/links/5783b17208ae37d3af6c005c/Disorders\\_of\\_bee\\_colonies\\_around\\_the\\_world\\_and\\_other\\_threats\\_to\\_insect\\_pollinators.pdf](https://www.researchgate.net/profile/Peter_Neumann5/publication/305160493_Disorders_of_bee_colonies_around_the_world_and_other_threats_to_insect_pollinators/links/5783b17208ae37d3af6c005c/Disorders_of_bee_colonies_around_the_world_and_other_threats_to_insect_pollinators.pdf) (Accessed on 04/08/2024)

<sup>26</sup> United Nations Development Programme., 'Protecting Bees to Enhance Biodiversity Conservation' Available at <https://www.undp.org/uganda/blog/protecting-bees-enhance-biodiversity-conservation> (Accessed on 04/08/2024)

is central to maintaining biodiversity<sup>27</sup>. For example, bees are essential pollinators since they move from flower to flower in search of nectar, inadvertently transferring pollen between different plant species<sup>28</sup>. This cross-pollination promotes genetic diversity which is crucial for the survival and evolution of many plant species<sup>29</sup>. As a result, bees can contribute to biodiversity conservation by supporting habitats and ecosystems<sup>30</sup>.

Pollination is therefore one of the most important mechanisms in the maintenance and promotion of biodiversity and life on Earth<sup>31</sup>. Pollinators and pollination are critical for food production and human livelihoods by directly linking wild ecosystems with agricultural production systems<sup>32</sup>. Pollinators are key in fostering food security<sup>33</sup>. The Food and Agriculture Organization (FAO) of the United Nations estimates that one third of the global food production depends on bees<sup>34</sup>. Pollinators are therefore essential for our existence, sustaining agriculture and biodiversity worldwide<sup>35</sup>. By facilitating the reproduction of plants, pollinators contribute to the maintenance of biodiversity in both natural ecosystems and a sustainable food chain<sup>36</sup>.

In addition to their crucial role in food security, pollinators, especially bees, have also played a key role throughout human history as inspirations for art, music, religion and

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<sup>27</sup> Ibid

<sup>28</sup> Ibid

<sup>29</sup> Ibid

<sup>30</sup> Ibid

<sup>31</sup> Convention on Biological Diversity Secretariat., 'Pollinators and Biodiversity' Available at <https://www.cbd.int/cop/cop-14/media/briefs/en/cop14-press-brief-pollinators.pdf> (Accessed on 04/08/2024)

<sup>32</sup> Ibid

<sup>33</sup> United Nations Environment Programme., 'Why Bees are Essential to People and Planet' Available at <https://www.unep.org/news-and-stories/story/why-bees-are-essential-people-and-planet> (Accessed on 04/08/2024)

<sup>34</sup> Food and Agriculture Organization of the United Nations., 'World Bee Day' Available at <https://www.fao.org/world-bee-day/en/> (Accessed on 04/08/2024)

<sup>35</sup> Ibid

<sup>36</sup> The Vital Role of Bees in Biodiversity Conservation and a Sustainable Food Chain., Available at <https://hivehero.ca/blogs/straight-from-the-hive/the-vital-role-of-bees-in-biodiversity-conservation-and-a-sustainable-food-chain> (Accessed on 04/08/2024)

technology<sup>37</sup>. Bees are also symbols of identity and heritage in some major world religions and traditions<sup>38</sup>. Beekeeping also provides an important source of income for many rural livelihoods<sup>39</sup>.

Protecting pollinators is therefore key in biodiversity conservation<sup>40</sup>. Protecting pollinators has been identified as a critical initiative aimed at safeguarding the diverse array of species, including bees, butterflies, and birds, that play a pivotal role in fertilising plants by transferring pollen<sup>41</sup>. This process is not only essential for biodiversity but also underpins global food security<sup>42</sup>. It is therefore necessary to protect pollinators.

### **3.0 Protecting Pollinators vital for Biodiversity Conservation: Progress and Setbacks**

The *Convention on Biological Diversity*<sup>43</sup> is geared towards conservation of biological diversity, sustainable use of its components and the fair and equitable sharing of benefits arising from the use of genetic resources<sup>44</sup>. It has been pointed that there is a complex relationship of interdependence between pollinators such as bees and ecosystems<sup>45</sup>. Without bees, the diversity of plant species and diversity within a species may not be as high<sup>46</sup>. In contrast, the loss of biodiversity and the diversity of flowering plants is also threat to bees<sup>47</sup>. The Convention on Biological Diversity seeks to address these problems. At the fifth meeting of the Conference of the Parties to the Convention on Biological Diversity, countries established an *International Initiative for the Conservation and*

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<sup>37</sup> United Nations Environment Programme., 'Pollinators Under Threat – So What?' Op Cit

<sup>38</sup> Ibid

<sup>39</sup> Ibid

<sup>40</sup> Pollinator Conservation., Available at <https://www.vaia.com/en-us/explanations/environmental-science/ecological-conservation/pollinator-conservation/> (Accessed on 04/08/2024)

<sup>41</sup> Ibid

<sup>42</sup> Ibid

<sup>43</sup> The Convention on Biological Diversity, 5 June 1992 (1760 U.N.T.S. 69)

<sup>44</sup> Ibid, article 1

<sup>45</sup> The Convention on Biological Diversity (CBD) and Bees., Available at <https://www.health.belgium.be/en/convention-biological-diversity-cbd-and-bees> (Accessed on 04/08/2024)

<sup>46</sup> Ibid

<sup>47</sup> Ibid



*Sustainable Use of Pollinators*<sup>48</sup>. The Initiative aims to monitor pollinator decline, its causes and its impact on pollination services<sup>49</sup>; address the lack of taxonomic information on pollinators<sup>50</sup>; assess the economic value of pollination and the economic impact of the decline of pollination services<sup>51</sup>; and promote the conservation, restoration and sustainable use of pollinator diversity in agriculture and related ecosystems<sup>52</sup>.

Further, at the fourteenth meeting of the Conference of the Parties to the Convention on Biological Diversity, countries adopted a *Plan of Action 2018-2030 for the International Initiative for the Conservation and Sustainable Use of Pollinators*<sup>53</sup>. The Plan of Action aims promote coordinated action worldwide to safeguard wild and managed pollinators and promote the sustainable use of pollination functions and services, which is a recognized vital ecosystem service for agriculture and for the functioning and health of ecosystems<sup>54</sup>. It further aims to support the implementation of coherent and comprehensive policies for the conservation and sustainable use of pollinators at the local, subnational, national, regional and global levels, and to promote their integration into sectoral and cross-sectoral plans, programmes and strategies<sup>55</sup>. The Plan of Action identifies key strategies towards protecting pollinators including protecting and conserving the threatened pollinator species as well as their natural environment; implementing effective pesticide regulation; protecting and promoting indigenous and traditional knowledge; controlling the trade and movement of managed pollinators, and other trade-related impacts; promoting connectivity, conservation, management and restoration of pollinator

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<sup>48</sup> Convention on Biological Diversity Secretariat., 'Pollinators - Introduction' Available at <https://www.cbd.int/agro/pollinator.shtml> (Accessed on 04/08/2024)

<sup>49</sup> Ibid

<sup>50</sup> Ibid

<sup>51</sup> Ibid

<sup>52</sup> Ibid

<sup>53</sup> Convention on Biological Diversity., Conference of the Parties to the Convention on Biological Diversity ., Fourteenth meeting Sharm El-Sheikh, Egypt, 17-29 November 2018., 'Conservation and Sustainable use of Pollinators' CBD/COP/DEC/14/6 30 November 2018

<sup>54</sup> Ibid

<sup>55</sup> Ibid

habitats; and promoting sustainable beekeeping and bee health<sup>56</sup>. Implementing this Plan of Action is therefore vital in protecting pollinators.

The *Cancun Declaration on Mainstreaming the Conservation and Sustainable use of Biodiversity for Well-Being*<sup>57</sup> also sets out the need to protect pollinators vital for biodiversity conservation. The Cancun Declaration affirms that the well-being of all life depends on the conservation and sustainable use of biodiversity, and the ecosystem services it underpins<sup>58</sup>. It further notes that biodiversity offers solutions to the pressing development and societal challenges that the world community is currently facing<sup>59</sup>. The Declaration also points out that the conservation of biodiversity is threatened by degradation and fragmentation of ecosystems, unsustainable land use changes, overexploitation of natural resources, illegal harvesting and trade of species, introduction of invasive alien species, pollution of air, soil, inland waters and oceans, climate change and desertification among other factors<sup>60</sup>. In addition, the Declaration notes that pollination is crucial in biodiversity conservation efforts since it benefits crop production and is therefore critical in sustaining food security, nutrition and human well-being<sup>61</sup>. The Cancun Declaration urges all countries to embrace effective management and conservation of pollinators<sup>62</sup>.

The *Kunming-Montreal Global Biodiversity Framework*<sup>63</sup> also sets out targets towards protecting pollinators vital for biodiversity conservation. The Framework notes that biodiversity is fundamental to human well-being, a healthy planet, and economic

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<sup>56</sup> Ibid

<sup>57</sup> Cancun Declaration on Mainstreaming the Conservation and Sustainable use of Biodiversity for Well-Being., Available at <https://www.cbd.int/cop/cop-13/hls/cancun%20declaration-en.pdf> (Accessed on 05/08/2024)

<sup>58</sup> Ibid

<sup>59</sup> Ibid

<sup>60</sup> Ibid

<sup>61</sup> Ibid

<sup>62</sup> Ibid

<sup>63</sup> Kunming-Montreal Global Biodiversity Framework., CBD/COP/DEC/15/4 19., December 2022

prosperity for all people, including for living well in balance and in harmony with nature<sup>64</sup>. In addition, it notes that humanity depends on biodiversity for food, medicine, energy, clean air and water, security from natural disasters as well as recreation and cultural inspiration, and it supports all systems of life on the planet<sup>65</sup>. It further notes the crucial role that pollinators play in biodiversity conservation efforts<sup>66</sup>. Target 11 of the Framework urges all countries to restore, maintain and enhance nature's contributions to people, including ecosystem functions and services, such as the regulation of air, water and climate, soil health, *pollination* and reduction of disease risk, as well as protection from natural hazards and disasters, through nature-based solutions and/or ecosystem-based approaches for the benefit of all people and nature<sup>67</sup>.(Emphasis added) The Framework also urges countries to reduce pollution risks and the negative impacts of pollution from all sources by reducing the overall risk from pesticides and highly hazardous chemicals by at least half, including through integrated pest management, based on science, taking into account food security and livelihoods<sup>68</sup>. Excessive use of agrochemicals such as pesticides is a major threat to pollinators<sup>69</sup>. Therefore, reducing the use of pesticides as envisaged under the Kunming-Montreal Global Biodiversity Framework is a major strategy in protecting pollinators vital for biodiversity conservation.

Protecting pollinators vital for biodiversity conservation is also a key agenda for Africa. It has been noted that in Africa, there is a high demand for pollination for many crops in order to foster food security for the continent which is heavily reliant on agriculture<sup>70</sup>. However, pollinators in Africa are exposed to environmental pressures including habitat

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<sup>64</sup> Ibid

<sup>65</sup> Ibid

<sup>66</sup> Ibid

<sup>67</sup> Ibid, target 11

<sup>68</sup> Ibid, target 7

<sup>69</sup> United Nations Environment Programme., 'Why Bees are Essential to People and Planet' Op Cit

<sup>70</sup> Impacts of Pesticides on Pollinators and Pollination in Africa., Available at <https://www.ipbes.net/policy-support/case-studies/impacts-pesticides-pollinators-pollination-africa> (Accessed on 05/08/2024)

transformation and fragmentation, loss of diversity and abundance of floral resources, inappropriate use of pesticides, spread of pests and diseases, and climate change<sup>71</sup>. It has been noted that pesticide use is increasing in sub-Saharan Africa threatening the survival of pollinators<sup>72</sup>. Further, the growing impacts of climate change and land use changes in Africa increasingly affect the life cycle as well as spatial and temporal distribution patterns of pollinators (such as honeybee, stingless bees), their pests, and the flowering plants upon which they depend for food and shelter<sup>73</sup>. Habitat changes and climatic shifts have a trickle-down effect on pollination efficiency and are therefore a threat to food security in Africa<sup>74</sup>. Protecting pollinators is therefore critical for biodiversity conservation and food security in Africa.

Protecting pollinators vital for biodiversity conservation is therefore a key agenda both globally and in Africa. However, pollinators continue to face threats due to human activities. These threats include habitat loss, intensive farming practices, changes in weather patterns, and the excessive use of agrochemicals such as pesticides<sup>75</sup>. Air pollution also affects bees, interfering with their ability to forage efficiently<sup>76</sup>. It has been noted that due to pollution, air pollutants interact with scent molecules released by plants which bees need to locate food<sup>77</sup>. The mixed signals interfere with the bees' ability to forage efficiently, making them slower and less effective at pollination<sup>78</sup>. UNEP further notes that the populations of pollinators including bees have been declining globally due to human activities<sup>79</sup>. This in turn poses a threat to a variety of plants critical to human well-being and livelihoods<sup>80</sup>. It is therefore imperative to address these challenges in order to protect pollinators vital for biodiversity conservation.

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<sup>71</sup> Ibid

<sup>72</sup> Ekesi. S., Lattorff. M., & Dubois. T., 'Research Finds Protecting Pollinators is Critical For Food Security in Africa' Available at <https://agrilinks.org/post/research-finds-protecting-pollinators-critical-food-security-africa> (Accessed on 05/08/2024)

<sup>73</sup> Ibid

<sup>74</sup> Ibid

<sup>75</sup> United Nations Development Programme., 'Protecting Bees to Enhance Biodiversity Conservation' Op Cit

<sup>76</sup> Ibid

<sup>77</sup> United Nations Environment Programme., 'Why Bees are Essential to People and Planet' Op Cit

<sup>78</sup> Ibid

<sup>79</sup> Ibid

<sup>80</sup> Ibid

#### 4.0 Towards Effective Protection of Pollinators vital for Biodiversity Conservation

In order to effectively protect pollinators vital for biodiversity conservation, it is imperative to reduce the use of pesticides<sup>81</sup>. The use of pesticides is a significant threat to the health of pollinators<sup>82</sup>. Pesticides affect the ability of pollinators to forage, reproduce, and navigate<sup>83</sup>. Reducing the use of pesticides is thus crucial in protecting pollinators and enhancing biodiversity conservation efforts. In order to reduce the use of pesticides and their impact on pollinators, the *Kunming-Montreal Global Biodiversity Framework* urges countries to adopt Integrated Pest Management (IPM), based on science, taking into account food security and livelihoods<sup>84</sup>. IPM techniques offer a viable solution in protecting pollinators by combining biological, cultural, and mechanical methods to control pests with minimal impact on non-target species including pollinators<sup>85</sup>. In addition, encouraging organic farming and promoting pollinator-friendly pest control methods can also mitigate the risks associated with the use of pesticides<sup>86</sup>.

In addition, it is also necessary to restore and preserve habitats that are essential for the survival of pollinators<sup>87</sup>. Pollination is one of the critical ecosystem services that is threatened by habitat loss<sup>88</sup>. It has been noted that pollinators require diverse and abundant sources of food and shelter<sup>89</sup>. Therefore, habitat loss is a major concern in the protection of pollinators. For example, it has been noted that habitat deterioration including loss of natural forests, reforestation and afforestation with exotic tree species,

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<sup>81</sup> Brears. R., 'Strategies for Biodiversity Conservation and Sustainable Agriculture' Available at <https://medium.com/global-climate-solutions/protecting-pollinators-effective-strategies-for-biodiversity-conservation-and-sustainable-dfab7b2aadf3> (Accessed on 05/08/2024)

<sup>82</sup> Ibid

<sup>83</sup> Ibid

<sup>84</sup> Kunming-Montreal Global Biodiversity Framework., Op Cit

<sup>85</sup> Brears. R., 'Strategies for Biodiversity Conservation and Sustainable Agriculture' Op Cit

<sup>86</sup> Ibid

<sup>87</sup> United Nations., 'Bee Engaged with Youth to Safeguard Bees and Other Pollinators' Available at <https://www.un.org/en/%E2%80%9Cbee-engaged-youth%E2%80%9D-safeguard-bees-and-other-pollinators> (Accessed on 05/08/2024)

<sup>88</sup> Scott. E., 'The Importance of Habitat Restoration and how Pollinator Programs Support It' Available at <https://bestbees.com/2023/02/28/habitat-restoration/> (Accessed on 05/08/2024)

<sup>89</sup> Brears. R., 'Strategies for Biodiversity Conservation and Sustainable Agriculture' Op Cit

negatively impacts species richness and diversity of pollinators including stingless bees in Sub-Saharan Africa<sup>90</sup>. Restoring natural habitats, such as meadows, wetlands, and forests, can provide the essential resources needed for the survival of pollinators while also strengthening biodiversity conservation efforts<sup>91</sup>. UNEP urges countries to target habitat conservation, management and restoration as key strategies towards protecting pollinators<sup>92</sup>.

Further, there is need to combat air pollution<sup>93</sup>. It has been noted that the reproduction of pollinators is dependent on the ability to locate and identify mating partners, processes that are based on chemical signaling<sup>94</sup>. Air pollution therefore might degrade these chemicals and/or reduce insects' perception thereby impeding communication and limiting mating opportunities thus impeding the reproduction of pollinators<sup>95</sup>. Further, the interaction of air pollutants with scent molecules released by plants which bees need to locate food interfere with the ability of bees to forage efficiently, making them slower and less effective at pollination<sup>96</sup>. It is therefore necessary to tackle air pollution in order to effectively protect pollinators vital for biodiversity conservation.

Finally, there it is vital to confront climate change in order to effectively protect pollinators<sup>97</sup>. Climate change is a major threat to pollinators. The impacts of climate change including rising temperatures and increasing frequency and intensity of extreme weather events affect food sources and habitats which are essential conditions on which pollinators depend for survival<sup>98</sup>. In addition, climate change also affects the timing and

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<sup>90</sup> Ekesi. S., Lattorff. M., & Dubois. T., 'Research Finds Protecting Pollinators is Critical For Food Security in Africa' Op Cit

<sup>91</sup> Brears. R., 'Strategies for Biodiversity Conservation and Sustainable Agriculture' Op Cit

<sup>92</sup> United Nations Environment Programme., 'Why Bees are Essential to People and Planet' Op Cit

<sup>93</sup> Ibid

<sup>94</sup> Duque. L., & Steffan-Dewenter. I., 'Air Pollution: a Threat to Insect Pollination' Available at <https://doi.org/10.1002/fee.2701> (Accessed on 05/08/2024)

<sup>95</sup> Ibid

<sup>96</sup> United Nations Environment Programme., 'Why Bees are Essential to People and Planet' Op Cit

<sup>97</sup> United Nations., 'Bee Engaged with Youth to Safeguard Bees and Other Pollinators' Op Cit

<sup>98</sup> How Does Climate Change Affect Pollinators and Put Our Food Supply at Risk?., Available at <https://earth.org/climate-change->

availability of flowering plants, leading to mismatches between pollinators and their food sources therefore affecting the pollination process<sup>99</sup>. Climate change could lead to a decline in the quality of nectar, which is the main food source for many pollinators<sup>100</sup>. As a result of the impacts of climate change, the population of pollinators including bees is declining globally<sup>101</sup>. It is therefore imperative for all countries to take urgent action and combat climate change in order to effectively protect pollinators vital for biodiversity conservation.

## **5.0 Conclusion**

Pollination is a key process in the maintenance and promotion of biodiversity and life on Earth<sup>102</sup>. Pollinators are essential for our existence, sustaining agriculture and biodiversity worldwide<sup>103</sup>. Protecting pollinators is therefore essential for biodiversity conservation and global food security<sup>104</sup>. Despite their key role in biodiversity conservation and food security, pollinators are facing a number of threats including habitat loss, intensive farming practices, climate change, air pollution, and the excessive use of agrochemicals such as pesticides<sup>105</sup>. Due to these challenges, the population of pollinators including bees have been declining globally posing a threat to food security and biodiversity conservation efforts<sup>106</sup>. It is therefore vital to protect pollinators vital for biodiversity conservation. In order to achieve this goal, there is need to: reduce the use of pesticides<sup>107</sup>; restore and preserve habitats that are essential for the survival of pollinators<sup>108</sup>; combat air pollution<sup>109</sup>; and confront climate change<sup>110</sup>. Protecting

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[pollinators/#:~:text=Rapidly%20Disappearing%3A%20How%20Does%20Climate,particular%20face%20a%20steep%20decline](#). (Accessed on 05/08/2024)

<sup>99</sup> Ibid

<sup>100</sup> Ibid

<sup>101</sup> United Nations Environment Programme., 'Why Bees are Essential to People and Planet' Op Cit

<sup>102</sup> Convention on Biological Diversity Secretariat., 'Pollinators and Biodiversity' Op Cit

<sup>103</sup> Food and Agriculture Organization of the United Nations., 'World Bee Day' Op Cit

<sup>104</sup> Pollinator Conservation., Op Cit

<sup>105</sup> United Nations Development Programme., 'Protecting Bees to Enhance Biodiversity Conservation' Op Cit

<sup>106</sup> United Nations Environment Programme., 'Why Bees are Essential to People and Planet' Op Cit

<sup>107</sup> Brears. R., 'Strategies for Biodiversity Conservation and Sustainable Agriculture' Op Cit

<sup>108</sup> United Nations., 'Bee Engaged with Youth to Safeguard Bees and Other Pollinators' Op Cit

<sup>109</sup> United Nations Environment Programme., 'Why Bees are Essential to People and Planet' Op Cit

<sup>110</sup> United Nations., 'Bee Engaged with Youth to Safeguard Bees and Other Pollinators' Op Cit

pollinators vital for biodiversity conservation is a key endeavour for survival of life on the planet. It is imperative for all countries to pursue and realize this goal.



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