

*Eco-Agri Conservation in Africa: Balancing Agricultural Production with Conservation for Food Security and Sustainability*

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**Kariuki Muigua**

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## **Eco-Agri Conservation in Africa: Balancing Agricultural Production and Conservation for Food Security and Sustainability**

**Kariuki Muigua\***

### **Abstract**

*This paper critically examines how the ideal of sustainable agriculture can be achieved in Africa by pursuing eco-agri conservation. The paper examines the current state of agriculture in Africa. It argues that despite its role in fostering food security and supporting livelihoods and economic growth in the continent, agriculture is a major threat to environmental conservation in Africa. The paper discusses some of the environmental impacts of agriculture in Africa. In light of these challenges, the paper posits that pursuing sustainable agricultural practices is key towards balancing food production and environmental conservation. It examines how the ideal of eco-agri conservation can be attained in Africa for enhanced agricultural production and environmental conservation towards food security and sustainability.*

### **1.0 Introduction**

Agriculture plays a key role in fostering food security and human well-being. Agriculture is vital in improving food security by increasing food production and availability<sup>1</sup>. The availability of food crops and livestock which support global food security relies on enhanced agricultural production<sup>2</sup>. Agriculture has been identified as the main source of global food supply<sup>3</sup>. In addition to ensuring global food security, agriculture supports the livelihoods of millions of people especially in developing countries and rural areas<sup>4</sup>.

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\* PhD in Law (Nrb), FCI Arb (Chartered Arbitrator), OGW, LL. B (Hons) Nrb, LL.M (Environmental Law) Nrb; Dip. In Law (KSL); FCPS (K); Dip. in Arbitration (UK); MKIM; Mediator; Consultant: Lead expert EIA/EA NEMA; BSI ISO/IEC 27001:2005 ISMS Lead Auditor/ Implementer; ESG Consultant; Advocate of the High Court of Kenya; Professor of Environmental Law and Conflict Management at the University of Nairobi, Faculty of Law; Member of the Permanent Court of Arbitration (PCA) [July, 2025].

<sup>1</sup> Agriculture and Food Security., Available at <https://idl-bnc-idrc.dspacedirect.org/server/api/core/bitstreams/647bd865-b66d-4f78-bc2b-b8b3fece67d5/content#:~:text=Agricultural%20growth%20is%20critical%20for,calories%20for%20the%20world's%20population.> (Accessed on 19/07/2025)

<sup>2</sup> Ibid

<sup>3</sup> Food Security and the Role of Agriculture., Available at <https://timesagriculture.com/food-security-and-the-role-of-agriculture/> (Accessed on 19/07/2025)

<sup>4</sup> Ibid

Agriculture increases employment and income-generating opportunities thus positively influencing economic growth<sup>5</sup>. It has been argued that agriculture does not just feed people, it is also one of the most powerful tools to end extreme poverty and boost economies<sup>6</sup>. Agriculture produces millions of on-farm jobs and has the potential to generate more jobs across the supply chain<sup>7</sup>. Further, good nutrition derived from agriculture and food production makes people healthier and more productive, empowers entrepreneurs, and represents a critical long-term economic investment<sup>8</sup>.

Agriculture therefore supports food security, human health derived from good nutrition, livelihoods and economic growth. Agriculture is thus an integral component of Sustainable Development<sup>9</sup>. However, global agricultural systems are also fueling major environmental challenges undermining the quest towards sustainability. For example, agriculture is one of the main drivers of land degradation<sup>10</sup>. It has been observed that unsustainable agricultural practices including natural vegetation clearance, nutrient depletion, overgrazing, inappropriate irrigation and excessive use of agrochemicals are fueling land degradation all over the world<sup>11</sup>.

Agriculture is also a major cause of global biodiversity loss. According to the United Nations Environment Programme (UNEP), the biggest driver of biodiversity loss is how people use the land and sea<sup>12</sup>. This includes the conversion of land covers such as forests,

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<sup>5</sup> Agriculture, food security and nutrition., Available at <https://www.fao.org/4/w0078e/w0078e03.htm#:~:text=Agricultural%20practices%20and%20technology%20as,prevention%20and%20proper%20child%20growth>. (Accessed on 19/07/2025)

<sup>6</sup> World Bank Group., 'Agriculture and Food' Available at <https://www.worldbank.org/en/topic/agriculture/overview> (Accessed on 19/07/2025)

<sup>7</sup> Ibid

<sup>8</sup> Ibid

<sup>9</sup> Ibid

<sup>10</sup> Global Environment Facility., 'Land Degradation' Available at <https://www.thegef.org/what-we-do/topics/land-degradation> (Accessed on 19/07/2025)

<sup>11</sup> Ibid

<sup>12</sup> United Nations Environment Programme., 'Five drivers of the nature crisis' Available at <https://www.unep.org/news-and-stories/story/five-drivers-nature-crisis> (Accessed on 19/07/2025)

wetlands and other natural habitats for agricultural use<sup>13</sup>. Agricultural expansion is also the main driver of deforestation, forest degradation and forest biodiversity loss<sup>14</sup>. The global food system has been identified as the primary driver of biodiversity loss, with agriculture alone being the identified threat of more than 85 per cent of species threatened with extinction<sup>15</sup>.

In addition, agriculture is directly responsible for the climate crisis. It has been observed that agriculture activities are responsible for more land-clearing than any other sector, contributing a significant amount of emissions especially in developing countries<sup>16</sup>. Agriculture has been identified as the second-largest contributor to global greenhouse gas emissions after the energy sector (including transport)<sup>17</sup>. It is estimated that the global agrifood system is responsible for nearly one-third of all greenhouse gas emissions<sup>18</sup>. In addition, agriculture is the primary cause of deforestation, threatening vital ecosystems such as the Amazon and the Congo Basin undermining their role as effective carbon sinks<sup>19</sup>.

Despite its role in enhancing food security, human health, livelihoods and economic growth, agriculture can therefore cause environmental threats including land degradation, biodiversity loss and climate change thus threatening sustainability. In light of these concerns, it has become necessary to pursue sustainable agriculture. Sustainable Development Goal (SDG) 2 under the United Nations 2030 *Agenda for Sustainable*

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<sup>13</sup> Ibid

<sup>14</sup> Ibid

<sup>15</sup> United Nations Environment Programme., 'Facts about the Nature Crisis' Available at <https://www.unep.org/facts-about-nature-crisis> (Accessed on 19/07/2025)

<sup>16</sup> Agriculture., Available at <https://www.climatewatchdata.org/sectors/agriculture#drivers-of-emissions> (Accessed on 19/07/2025)

<sup>17</sup> Ibid

<sup>18</sup> World Bank Group., 'Climate-Smart Agriculture' Available at <https://www.worldbank.org/en/topic/climate-smart-agriculture> (Accessed on 19/07/2025)

<sup>19</sup> Ibid

*Development*<sup>20</sup> seeks to promote sustainable agriculture towards ending hunger, achieving food security and improving nutrition<sup>21</sup>.

This paper critically examines how the ideal of sustainable agriculture can be achieved in Africa by pursuing eco-agri conservation. The paper examines the current state of agriculture in Africa. It argues that despite its role in fostering food security and supporting livelihoods and economic growth in the continent, agriculture is a major threat to environmental conservation in Africa. The paper discusses some of the environmental impacts of agriculture in Africa. In light of these challenges, the paper posits that pursuing sustainable agricultural practices is key towards balancing food production and environmental conservation. It examines how the ideal of eco-agri conservation can be attained in Africa for enhanced agricultural production and environmental conservation towards food security and sustainability.

## **2.0 The State of Agriculture in Africa: Promises and Pitfalls**

Agriculture has been identified as the most important economic activity in Africa<sup>22</sup>. It is a vital sector that promotes food security, provides jobs for millions of people in Africa and contributes significantly to the continent's economic growth<sup>23</sup>. It is estimated that Africa is home to nearly 60 per cent of the world's arable land providing immense opportunities for agriculture and food production towards ensuring food security both in Africa and globally<sup>24</sup>. Africa has several favorable factors that support agriculture including vast arable land, abundance of freshwater, plenty of sunshine throughout the

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<sup>20</sup> United Nations General Assembly., 'Transforming Our World: the 2030 Agenda for Sustainable Development.' 21 October 2015, A/RES/70/1., Available at <https://sustainabledevelopment.un.org/content/documents/21252030%20Agenda%20for%20Sustainable%20Development%20web.pdf> (Accessed on 19/07/2025)

<sup>21</sup> Ibid

<sup>22</sup> African Development Bank Group., 'Agriculture and agro-industries' Available at <https://www.afdb.org/en/topics-and-sectors/sectors/agriculture-agro-industries#:~:text=Agriculture%20is%20a%20major%20source,Read%20more> (Accessed on 20/07/2025)

<sup>23</sup> Ibid

<sup>24</sup> Agriculture in Africa 2021: Focus Report., Available at <https://oxfordbusinessgroup.com/reports/agriculture-in-africa-2021-focus-report-crr> (Accessed on 20/07/2025)

year, fertile soils and a huge working population engaged in the agricultural sector<sup>25</sup>. Africa's vast arable land therefore provides immense opportunities for agriculture and food production<sup>26</sup>. Further, it has been observed that the soil across most of Africa, except in arid and semi-arid regions, is rich and fertile and can support agriculture towards fostering food security in the continent<sup>27</sup>.

It is estimated that agriculture is the source of livelihood for almost 70 percent of the African population<sup>28</sup>. Further, it has been observed that agriculture accounts for nearly 35 percent of Africa's Gross Domestic Product (GDP) and employs more Africans than any other sector<sup>29</sup>. Agriculture is therefore an integral part of the African economy and the daily lives of the majority of Africans<sup>30</sup>. Agriculture in Africa encompasses both subsistence farming, where smallholder farmers produce food primarily for their own consumption, and commercial farming, which involves large-scale agricultural enterprises aimed at generating profits<sup>31</sup>. It has been argued that agriculture is at the core of Africa's economic transformation, and the continent has the potential to become a global agricultural powerhouse and a net exporter of food<sup>32</sup>. By harnessing its vast agricultural potential, Africa can improve food security and incomes, reduce poverty and strengthen economic growth<sup>33</sup>.

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<sup>25</sup> African Development Bank Group., 'Feed Africa' Available at [https://www.afdb.org/fileadmin/uploads/afdb/Documents/Generic-Documents/Brochure\\_Feed\\_Africa\\_-En.pdf](https://www.afdb.org/fileadmin/uploads/afdb/Documents/Generic-Documents/Brochure_Feed_Africa_-En.pdf) (Accessed on 20/07/2025)

<sup>26</sup> Ibid

<sup>27</sup> Ibid

<sup>28</sup> African Union., 'Food Security' Available at <https://au.int/en/auc/priorities/food-security> (Accessed on 20/07/2025)

<sup>29</sup> Africa's agricultural revolution: From self-sufficiency to global food powerhouse., Available at <https://www.whitecase.com/insight-our-thinking/africa-focus-summer-2023-africas-agricultural-revolution> (Accessed on 20/07/2025)

<sup>30</sup> African Development Bank Group., 'Feed Africa' Op Cit

<sup>31</sup> Agriculture and its Environmental Impact in Africa., Available at <https://www.lpfdevelopment.org/community-contributions/agriculture-and-its-environmental-impact-in-africa> (Accessed on 21/07/2025)

<sup>32</sup> Africa's agricultural revolution: From self-sufficiency to global food powerhouse., Op Cit

<sup>33</sup> Agriculture., Available at <https://futures.issafrica.org/thematic/04-agriculture/> (Accessed on 20/07/2025)

Despite its benefits for food security, livelihoods and economic growth, agriculture poses several challenges to environmental conservation in Africa. For instance, negative practices such as over-cultivation, deforestation and poor land management practices are fueling land degradation in Africa<sup>34</sup>. It is estimated that nearly 65 per cent of productive land in Africa has been degraded, while desertification affects 45 per cent of Africa's land area<sup>35</sup>. In addition, the expansion of agricultural activities into vital habitats such as forests and savannahs is fueling the loss of biodiversity in Africa<sup>36</sup>. Further, the over-extraction of water for irrigation and poor water management practices in the agricultural sector are fueling water scarcity especially in arid and semi-arid regions of the continent<sup>37</sup>. Poor agricultural practices such as overgrazing, mono-cropping, continuous cropping, frequent rangeland burning, and over-use or clearance of woodlands and forests are prevalent in Africa<sup>38</sup>. These practices have adverse environmental impacts including loss of soil and other natural resources, land degradation, changes in natural habitats and ecosystems, reduced ecosystem services such as water infiltration, loss of agro-biodiversity and wild biodiversity as well as decrease in land productivity leading to poor harvests and food shortages<sup>39</sup>.

It has also been pointed out that the food system in Africa including both crop production and livestock farming contributes to climate change<sup>40</sup>. For example, methane emissions from livestock production, carbon dioxide emissions from soil carbon loss and fossil fuel use, and nitrous oxide emissions from nitrogenous fertilizer application on farms are

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<sup>34</sup> Agriculture and its Environmental Impact in Africa., Op Cit

<sup>35</sup> United Nations., 'New FAO report highlights urgent need to restore Africa's degraded landscape' Available at <https://news.un.org/en/story/2021/09/1101632> (Accessed on 21/07/2025)

<sup>36</sup> Agriculture and its Environmental Impact in Africa., Op Cit

<sup>37</sup> Ibid

<sup>38</sup> Woodfine. A., 'Using Sustainable Land Management Practices to Adapt to and Mitigate Climate Change in Sub-Saharan Africa' Available at [https://www.ipcinfo.org/fileadmin/user\\_upload/terrafrica/docs/SLM\\_SUB-SAHARAN\\_AFRICA.pdf](https://www.ipcinfo.org/fileadmin/user_upload/terrafrica/docs/SLM_SUB-SAHARAN_AFRICA.pdf) (Accessed on 21/07/2025)

<sup>39</sup> Ibid

<sup>40</sup> Omotoso. A. B., & Omotayo. A.O., 'The interplay between agriculture, greenhouse gases, and climate change in Sub-Saharan Africa' *Regional Environmental Change.*, Volume 21, No. 1 (2024)

responsible for the climate crisis in Africa<sup>41</sup>. Further, it has been argued that as Africa's population continues to rise, greenhouse gas emissions from the agricultural sector will increase due to the continent's reliance on agriculture for its food needs<sup>42</sup>. Confronting climate change therefore requires significant changes in the agricultural sector in Africa.

Due to its adverse environmental impacts, it is imperative to embrace sustainable agriculture in order to balance agricultural production with environmental conservation for food security and sustainability in Africa.

### **3.0 Embracing Eco-Agri Conservation in Africa for Food Security and Sustainability**

Eco-agri conservation also referred to as conservation agriculture is a sustainable and resource-saving approach towards agriculture that optimizes and sustains the capacity of soils to produce food<sup>43</sup>. This practice is linked to the ecological preservation and conservation of agricultural landscapes<sup>44</sup>. Eco-agri conservation focuses on balancing agricultural production and conservation through minimal soil disturbance, keeping soils covered and crop diversification<sup>45</sup>. It has been argued that eco-agri conservation is a sustainable agricultural practice that conserves biodiversity, increases agricultural yields and contributes to sustainable land management practices<sup>46</sup>. It has the potential to bolster food security and environmental conservation while supporting livelihoods and economic growth<sup>47</sup>.

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<sup>41</sup> Ibid

<sup>42</sup> Ibid

<sup>43</sup> Conservation Agriculture., Available at [https://www.echocommunity.org/resources/5df58d8f-5e95-4ff2-b4c8-bfca318cbc29#:~:text=Conservation%20agriculture%20\(CA\)%20is%20a,practices%20appropriate%20to%20local%20needs](https://www.echocommunity.org/resources/5df58d8f-5e95-4ff2-b4c8-bfca318cbc29#:~:text=Conservation%20agriculture%20(CA)%20is%20a,practices%20appropriate%20to%20local%20needs). (Accessed on 21/07/2025)

<sup>44</sup> Ibid

<sup>45</sup> Ibid

<sup>46</sup> Conservation Agriculture: eco-sustainable development in Zambezia., Available at <https://www.cosv.org/conservation-agriculture-eco-sustainable-development-in-zambezia/?lang=en> (Accessed on 21/07/2025)

<sup>47</sup> Ibid

According to the Food and Agriculture Organization of the United Nations (FAO), eco-agri conservation aims to foster food security and sustainability by promoting minimum soil disturbance, maintaining a permanent soil cover and diversifying crop species<sup>48</sup>. FAO notes that eco-agric conservation enhances biodiversity and natural biological processes above and below the ground surface, which contribute to increased water and nutrient use efficiency and to improved and sustained crop production for food security<sup>49</sup>. Eco-agri conservation is therefore an effective approach towards balancing agricultural production with environmental conservation. While agriculture enhances food security, economic growth and livelihoods, it is also linked to biodiversity loss, deforestation, land degradation, soil erosion and climate change<sup>50</sup>. Eco-agri conservation can therefore reduce the negative environmental impacts of agriculture while ensuring long-term food production<sup>51</sup>. It has been argued that prioritising eco-agri conservation is important in creating vibrant agricultural systems that are resilient and sustainable now and in the future<sup>52</sup>.

Eco-agri conservation can therefore foster a balance between agricultural production and environmental conservation for food security and sustainability in Africa. It is based on sustainable practices including minimal mechanical soil disturbance, permanent soil cover with living or dead plant material, and crop diversification through rotation or intercropping<sup>53</sup>. By embracing eco-agri conservation, farmers can boost their yields and

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<sup>48</sup> Food and Agriculture Organization of the United Nations., 'Conservation Agriculture' Available at <https://www.fao.org/conservation-agriculture/en/> (Accessed on 21/07/2025)

<sup>49</sup> Ibid

<sup>50</sup> Kodaparthi. A et al., 'Environmental Conservation for Sustainable Agriculture' Available at [https://link.springer.com/chapter/10.1007/978-3-031-53270-2\\_2](https://link.springer.com/chapter/10.1007/978-3-031-53270-2_2) (Accessed on 21/07/2025)

<sup>51</sup> Ibid

<sup>52</sup> Ibid

<sup>53</sup> What is Conservation Agriculture?., Available at <https://www.cimmyt.org/news/what-is-conservation-agriculture/#:~:text=Conservation%20agriculture%20is%20based%20on,agriculture%20different%20from%20sustainable%20intensification?> (Accessed on 21/07/2025)

increase profits while the environment also benefits through tackling land degradation, reversing biodiversity loss and confronting climate change<sup>54</sup>.

Embracing eco-agri conservation is therefore a vital agenda for Africa. It has been argued that since a majority of Africans rely on agriculture for their livelihoods, the sector must be sustainable, not just for present needs but also for future generations<sup>55</sup>. Challenges such as overgrazing, over-cultivation, mono-cropping, unsustainable land use practices and land degradation have led to nutrient depletion, soil erosion, and reduced agricultural productivity while also threatening environmental conservation in Africa<sup>56</sup>. Adopting eco-agri conservation is thus key towards enhancing agricultural production while conserving the environment in Africa.

#### **4.0 Conclusion**

Agriculture is the backbone of African economies supporting food security, human health and well-being, livelihoods and economic growth. However, unsustainable agricultural practices are diminishing productivity while fueling environmental threats including land degradation, climate change, deforestation and biodiversity loss. Eco-agri conservation provides benefits for both agricultural production and environmental conservation in Africa through minimal soil disturbance, permanent soil cover provided by a growing crop and/or a mulch of organic residues, and diversification of crop species through crop rotation and intercropping<sup>57</sup>. Despite its potential, eco-agri conservation is yet to be widely embraced in Africa. It is therefore necessary to enhance the uptake of eco-agri conservation in Africa. In particular, it has been argued that conservation agriculture is knowledge and capital intensive and not all farmers may have access to the

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<sup>54</sup> Ibid

<sup>55</sup> Sustainable Agriculture In Africa : An Overview., Available at <https://africa-agriexpo.com/sustainable-agriculture-in-africa.html> (Accessed on 21/07/2025)

<sup>56</sup> Ibid

<sup>57</sup> Conservation Agriculture: For Smallholder Farmers in Africa?., Available at <https://act-africa.org/341/conservation-agriculture-for-smallholder-farmers-in-africa/> (Accessed on 21/07/2025)

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knowledge, training and finance required on how to practice it<sup>58</sup>. As a result, there is need to support all farmers including small-scale farmers through capacity building and access to finance in order to enhance the widespread adoption of eco-agri conservation in Africa<sup>59</sup>. Eco-agri conservation provides an efficient approach towards balancing agricultural production with ecological conservation. It is imperative to embrace this practice in Africa for food security and sustainability.

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<sup>58</sup> Donovan. M., 'What is conservation agriculture?' Available at <https://www.cimmyt.org/news/what-is-conservation-agriculture/#:~:text=Conservation%20agriculture%20is%20based%20on,agriculture%20different%20from%20sustainable%20intensification?> (Accessed on 21/07/2025)

<sup>59</sup> Ibid

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