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Embracing Climate Technologies in Climate Change Mitigation and Adaptation for Sustainable Development

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Abstract

Embracing technology is significant in curbing climate change, both in mitigation and adaptation efforts. Digital Technology helps to be more prepared for the effects of climate change. Advanced weather forecasting systems, for instance, offers early warning of extreme weather occurrences. Traditional approaches towards climate change mitigation and adaptation such as the enactment of laws and policies have not been effective. This has resulted in the continued threat of climate change that hinders attainment of Sustainable Development.

The paper postulates that there is need to embrace climate technologies for climate change mitigation and adaptation in order to foster Sustainable Development. The adverse effects of climate change are being felt across the globe and adaptation to these effects is significant as the minimizing of the emissions of greenhouses gases. This paper makes a case for the challenges and opportunities for climate technologies in climate change mitigation and adaptation towards Sustainable Development. It provides actionable insights that address climate change issues.

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1.0 Introduction

Climate change is the most pressing global concern of the 21st Century. Climate change has been defined as the change of climate 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[1]. Climate change has been associated with effects such drought, crop failure resulting in food insecurity, water scarcity, rising sea levels, displacement of people, health hazard and unemployment[2]. Climate change hinders the attainment of Sustainable Development[3].

In addition, most part of the world encounter disproportionately severe consequences from climate change, the most hit are tourism, health and agriculture and overall livelihood is put into a halt. Effects of climate slows sustainable development as the effects supplements and complements each other advancing their effects.

Sustainable Development has been defined as the development that meets the needs of the present without compromising the ability of future generations to meet their own needs[4]. The concept of Sustainable Development has been adopted as the global blueprint for development as envisaged by the United Nations Agenda for

[1] United Nations Framework Convention on Climate Change (United Nations, 1992), Article 1 (2)., Available at *https://unfccc.int/resource/docs/convkp/conveng.pdf* (Accessed on 15/06/2023)
[2] Muigua. K., 'Nurturing Our Environment for Sustainable Development.' Glenwood Publishers Limited, 2016
[3] Ibid
[4] *Our Common Future*, Report of the World Commission on Environment and Development, 1987 (Brundtland Report)

Sustainable Development[5]. The Sustainable Development Goals are universal call to action to end poverty, protect the planet, and ensure that by 2030 all people enjoy peace and prosperity[6]. However, attainment of the Sustainable Development agenda is faced by several challenges key among them being the threat of climate change[7]. Consequently, one of the priority concerns under the Sustainable Development agenda is combating climate change[8].

Various techniques and approaches have been adopted towards climate change mitigation and adaptation in the quest towards Sustainable Development. Such measures include the enactment of laws and policies on climate change at the global and national levels[9]. However, despite these measures, the threat of climate change still persists. Thus, to promote Sustainable Development, it is important that climate change be embraced, which impedes climate change mitigation and adaptation.

The paper aims to shed light on the explicit needs and issues for climate technologies in mitigation and adaptation to climate change for Sustainable Development. It further posits that technological

[5] United Nations., 'Transforming Our World: The 2030 Agenda for Sustainable Development.' Available at *https://sustainabledevelopment.un.org/content/documents/21252030%20Agenda%20for%20Sustainable%20Development%20web.pdf* (Accessed on 15/06/2023)

[6] Ibid

[7] Ibid

[8] Sustainable Development Goal 13., 'Available at *https://www.undp.org/sustainable-development-goals/climate-action?gclid=Cj0KCQjw7aqkBhDPARIsAKGa0oJBBwTdYd3P8F1StpqlCbJdXLuiKKDP6CeT6vrkjvGQ9QF5ktjg9WwaAgPuEALw_wcB* (Accessed on 15/06/2023)

[9] See for example the Paris Agreement and the Climate Change Act of Kenya

innovation is crucial for an effective and efficient long term global response to climate change and enhancing Sustainable Development[10]. The agenda of this paper is to contribute to ways of achieving climate resilience which promote the readiness and capacity to respond to the adverse effects of climate change through digital technologies.

2.0 The Role of Climate Technologies in Climate Change Mitigation and Adaptation: Opportunities and Challenges

Climate technologies refer to technology approaches adopted to combat climate change by mitigating global greenhouse gas emissions[11].These are technologies used to address the global threat of climate change[12]. Climate technologies aim to combat climate change by removing greenhouse gases in the atmosphere and reducing future emissions[13]. Climate technologies are able to achieve environmentally and socially sound, cost effective and efficient approaches towards climate change mitigation and adaptation[14].

[10] Lee. W. J & Mwebaza. R., 'The Role of the Climate Technology Centre and Network as a Climate Technology and Innovation Matchmaker for Developing Countries.' Available at *https://www.ctc-n.org/sites/www.ctc-n.org/files/resources/sustainability-12-07956.pdf* (Accessed on 15/06/2023)
[11] Hetler. A., 'Climate tech vs clean tech: What's the difference.' Available at *https://www.techtarget.com/whatis/feature/Climate-tech-vs-clean-tech-Whats-the-difference* (Accessed on 15/06/2023)
[12] United Nations Climate Change., 'What is Technology Development and Transfer.' Available at *https://unfccc.int/topics/what-is-technology-development-and-transfer* (Accessed on 15/06/2023)
[13] Ibid
[14] Lee. W. J & Mwebaza. R., 'The Role of the Climate Technology Centre and Network as a Climate Technology and Innovation Matchmaker for Developing Countries.' Op Cit

The *United Nations Framework Convention on Climate Change* [15] recognizes the role of technology in climate change mitigation and adaptation. It calls upon member states to control greenhouse gas emissions through the use of appropriate technologies[16]. It further advocates for the transfer of suitable technologies to developing countries to aid in their efforts towards climate change mitigation and adaptation[17]. The *Paris Agreement* also recognizes the importance of technology development and transfer in order to improve resilience to climate change and to reduce greenhouse gas emissions[18]. It calls for the adoption of technology in order to implement the mitigation and adaptation strategies set out under the Agreement [19]. The *Sustainable Development Goals* also envisage the role of technology in limiting global greenhouse gas emissions and rise in temperatures[20]. The United Nations further asserts that technology is integral in the climate change agenda and argues a case for transfer of technologies to developing countries in order to promote meaningful adaptation and mitigation actions towards attaining the sustainable development goals and objectives[21]. In Kenya, the *Climate Change Act* enshrines the importance of technology and technological innovations relevant to climate change in formulating the National Climate Change Action Plan[22].

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[15] United Nations Framework Convention on Climate Change., Op Cit
[16] Ibid
[17] Ibid, Article 4 (1) (c)
[18] Paris Agreement., 'United Nations, 2015.' Article 10., Available at *https://unfccc.int/sites/default/files/english_paris_agreement.pdf* (Accessed on 15/06/2023)
[19] Ibid
[20] Sustainable Development Goal 13., Op Cit
[21] United Nations., 'Acting on Climate Change: The UN Delivering as One.' (United Nations, New York, November 2008), p 32
[22] Climate Change Act, No. 11 of 2016, S 13 (5) (b)

Climate technologies therefore have an important role to play in climate change mitigation towards Sustainable Development. Climate technologies include Agri-tech initiatives such as the use of drought-resistant crops, using less pesticides, use of manure and improving crop growing processes; afforestation to aid in carbon capture; use of carbon capture technologies and use of geoengineering to alter the climate system in order to reduce the effects of climate change[23]. These technologies also include renewable energy sources such as solar energy, wind energy and hydropower and technologies geared towards adapting to adverse effects of climate change such as early warning systems and sea walls[24].

Climate technologies present several advantages in climate change mitigation and adaptation. Technology ensures that countries are better equipped to achieve their economic and social development goals in a more climate resilient manner [25] . Further, climate technologies can be more robust and cost-effective in climate change mitigation and adaptation especially when combined with other approaches such as nature-based solutions[26]. Climate technologies are thus viable in climate change mitigation and adaptation.

However, despite the important role of climate technologies in climate change mitigation and adaptation, several challenges have

[23] Hetler. A., 'Climate tech vs clean tech: What's the difference.' Op Cit
[24] United Nations Climate Change., 'What is Technology Development and Transfer.' Op Cit
[25] De Coninck , H & Sagar. A., 'Making Sense of Policy for Climate Technology Development and Transfer.' Climate Policy, Volume 15, No.1
[26] United Nations Framework Convention on Climate Change., 'How Technology Can Help Fight Climate Change.' Available at *https://unfccc.int/news/how-technology-can-help-fight-climate-change* (Accessed on 15/06/2023)

hindered effective adoption of technology as a tool of managing climate change. Financial and economic hurdles may prevent certain countries especially those in developing regions of the world from accessing suitable technology necessary for climate change mitigation and adaptation[27]. Further, legal and regulatory challenges such insufficient legal framework and bureaucracy may hinder effective transfer and adoption of technology for climate change mitigation and adaptation[28]. In addition, institutional and capacity challenges such as absence or limited institutions dealing with climate technologies and lack of technical knowhow may hinder effective adoption of climate technologies[29]. Finally, adoption of climate technologies may be hindered by environmental factors and physical conditions in a particular country such as the condition of infrastructure[30].

Climate technologies offer huge potential in climate change mitigation and adaptation towards Sustainable Development. However, the challenges highlighted above hinder effective adoption and transfer of technology as a tool of climate change mitigation. There is need to address these challenges in order to enhance the role of climate change technologies in climate change mitigation and adaptation and foster Sustainable Development.

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[27] United Nations Environment Programme., *'Overcoming Barriers to the Transfer and Diffusion of Climate Technologies.'* Available at *https://www.researchgate.net/profile/Ivan-Nygaard-2/publication/318109356_Overcoming_Barriers_to_the_Transfer_and_Diffusion_of_Climate_Technologies_Second_edition/links/595a13cc0f7e9ba95e147f67/Overcoming-Barriers-to-the-Transfer-and-Diffusion-of-Climate-Technologies-Second-edition.pdf* (Accessed on 15/06/2023)

[28] Ibid

[29] Traerup. S., 'The Role of Climate Technologies in Green Transition Pathways.' *The Journal of Field Actions,* No. 24 of 2022

[30] Ibid

3.0 Way Forward

In order to enhance the role of technology in climate change mitigation and adaptation, there is need for countries to strengthen technological innovation so that it can deliver environmentally and socially sound, cost effective, and better-performing climate technologies at a larger and more widespread scale[31]. Governments and the private sector can spearhead this endeavor through funding, enactment of governing laws and regulations, political goodwill, training among other measures. There is also need for increased cooperation among public actors, private actors and international actors to enhance national and global partnerships towards adoption of climate technologies[32]. Adaptation policies at all levels should better reflect social vulnerability to climate change and vulnerable groups should be involved in the design of fair adaptation policies and socially just adaptation in cities[33].

There is also need for developing countries to support climate change responses of developing countries through technology transfer, setting up of innovative technologies and enhancing the national systems of innovation in developing countries[34]. Both the *United Nations Framework Convention on Climate Change* and the *Paris Agreement* acknowledge the role of technology transfer in climate

[31] Lee. W. J & Mwebaza. R., 'The Role of the Climate Technology Centre and Network as a Climate Technology and Innovation Matchmaker for Developing Countries.' Op Cit

[32] Traerup. S., 'The Role of Climate Technologies in Green Transition Pathways.' Op Cit

[33] Mariya Gancheva, Sarah O'Brien, Tugce Tugran and Camille Borrett (Milieu Consulting SRL) Commission for the Environment, Climate Change and energy
https://cor.europa.eu/en/engage/studies/Documents/Climate%20Change_adaptation.pdf

[34] Ibid

change mitigation and adaptation[35]. There is need to promote the vision of these instruments and enhance effective technology transfer for climate change mitigation and adaptation. Technology transfer is essential in promoting the diffusion and uptake of environmentally friendly and climate friendly technologies and practices towards achieving objectives of mitigation and adaptation at the country levels[36]. For there to be effective technology transfer, there is need for local anchoring of climate technologies with local production, skills upgrading and strengthening of local markets in order to ensure that climate technologies suit to the needs and circumstances of specific countries[37]. Through these measures, climate technologies will be widely adopted for climate change mitigation and adaptation towards Sustainable Development.

4.0 Conclusion

Climate technologies offer huge potential in climate change mitigation and adaptation. Such technologies can be more viable than traditional approaches such as the use of laws and policies in combating climate change. There is need to embrace climate technologies in climate change mitigation and adaptation in order to foster Sustainable Development. A collaborative approach to the digital technologies aids climate adaptation by managing risks through use of remote sensors like satellites and weather radars, supporting monitoring, and promoting sustainability through responsible use. By leveraging digital innovation and big data,

[35] United Nations Framework Convention on Climate Change., Article 4 (1) (c); Paris Agreement., Article 10
[36] United Nations., 'Acting on Climate Change: The UN Delivering as One.' Op Cit
[37] Traerup. S., 'The Role of Climate Technologies in Green Transition Pathways.' Op Cit

advanced levels of interventions for achieving sustainable development can be unveiled. Collaboration between organizations, businesses, and people is essential for successful climate action and a future that is more sustainable for future generations. There is a dire need for resilient infrastructure that can stand climate change adverse effects such floods and promote climate change adaptation.

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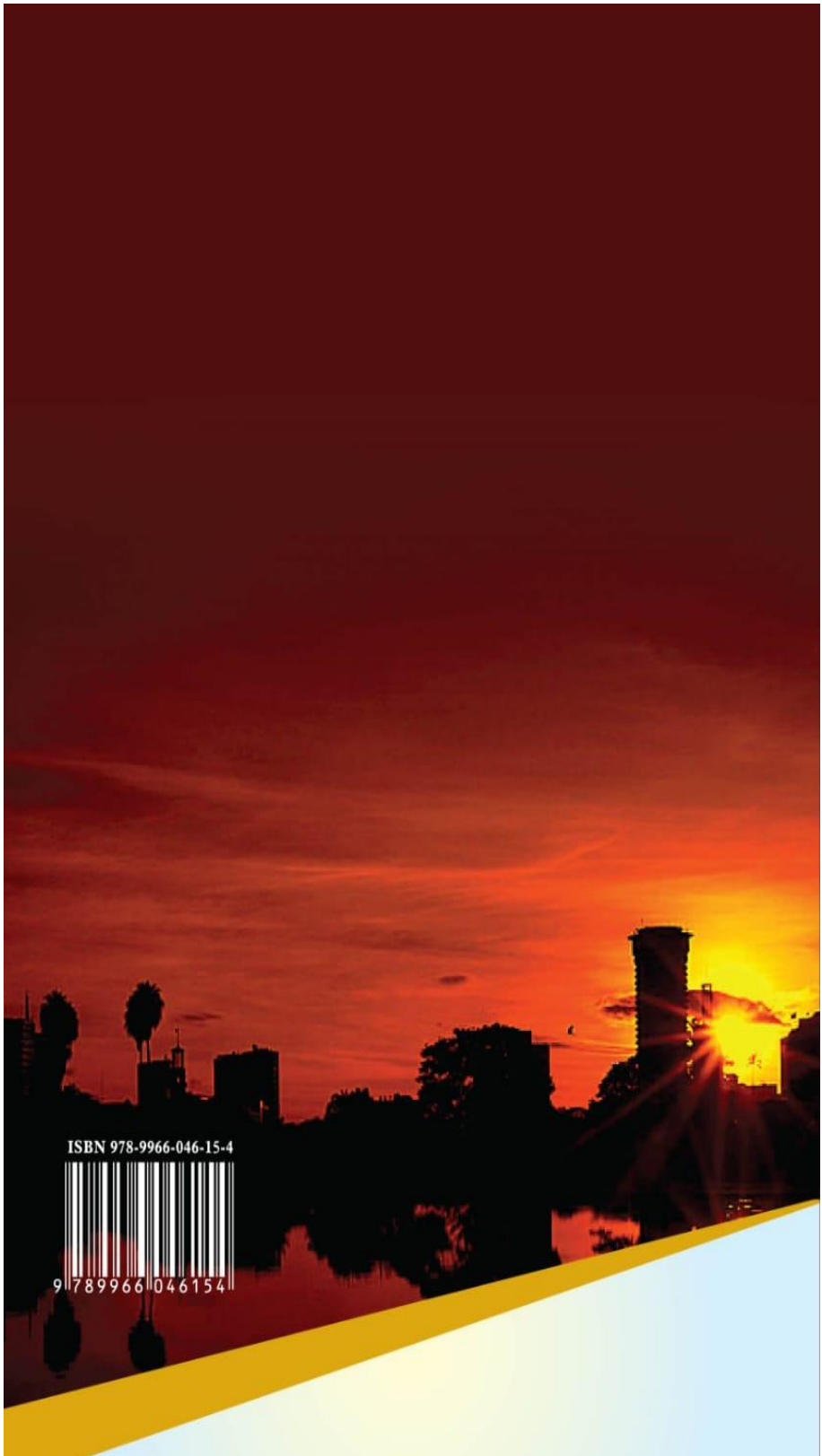

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