

Knowledge Gaps in Sustainable Development Goals (SDGs) Impacts on Biodiversity Conservation in Nairobi, Kenya

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Abstract

Sustainable Development Goals (SDGs) aim to ensure environmental sustainability is enhanced focusing on the future generation. Knowledge of the SDGs becomes pivotal in biodiversity conservation thus, a gap impacts such efforts on protecting and preserving biodiversity habits difficult. Nairobi City was chosen because of her unique ecosystem that habits wildlife and urban life with great prospects of being East Africa's business hub. With an estimated double city population by 2030, knowledge of SDGs would be useful in enhancing biodiversity conservation in unique cities like Nairobi. Thus, a gap in the knowledge of SDGs threatens the future of biodiversity unless it is mitigated. The study employed a cross-sectional design that caters to qualitative and quantitative data. Data was collected using semi-structured questionnaires and key informant interviews. Data Envelopment Analysis (DEA) model was adopted to evaluate how determinants of human perceptions, decisions, and activities related to implementing sustainable development goals impact biodiversity conservation. Results indicate that respondents' knowledge ($30.5\% \pm 2.01\%$), attitudes ($30.4\% \pm 1.56\%$), and practice ($26.3\% \pm 0.08\%$) on implementation of SDGs was significantly low. Further, a majority believed that lack of awareness of SDGs 87% impacts biodiversity conservation, coupled with 12% and 1%, respectively, who opined that limited SDGs knowledge sharing and corruption were barriers to biodiversity conservation. The majority of respondents believed that increased awareness of SDGs ($78.2\% \pm 2.61\%$), and strengthened institutional capacity ($58.7\% \pm 3.01\%$) underscores SDGs' importance in biodiversity conservation. Knowledge of SDGs is pivotal in the enhancement of biodiversity conservation.

Keywords

Biodiversity conservation, Knowledge, Nairobi, Sustainable Development Goals

1. Introduction

Sustainable Development is a concept coined by the Brundtland Commission that includes the interdependent aspects of human life in social, economic, and political spheres (Brundtland, 1987; Eisenmenger et al., 2020). Political and economic development are fundamental in social transformation contributing positively or negatively to the environment (Ankit et al., 2021). Moreover, economic growth contributes to material gain for the people, but development is much about enrichment of the lives of all the people in the society as envisaged in Sustainable Development Goals (Fried et al., 2020; GoK, 2019).

Taking on sustainable development as a strategy and catalyst for transformation, changes are evidenced through interdependence and participatory practices in people, communities, and societies (Bowen et al., 2017). Sustainable Development Goals (SDGs) are globally accepted practices that are intertwined and interrelated to transform humanity and societies through equitable solutions focusing on restoring the earth for future generations (Kathambi & M'Ikiugu, 2018a; Menton et al., 2020). SDGs have a primary aim to ensure the quality of life and end poverty, fight hunger, inequality, and injustice, tackle climate change and the environment, improve access to universal health and education as well as build strong institutions and partnerships in various forms (Kathambi & M'Ikiugu, 2018a; Obura, 2020). Implementation of the 17 goals with 169 puts focus on world governments' efforts in cascading the global agenda into their national development plans for economic benefits, social inclusion, and environmental friendliness in the long run (GoK, 2020; Obura, 2020).

Worth noting, SDGs have quickly been gaining ground because of the unchanging times and growing desire to improve the quality of life for all people in all countries globally (Alcamo et al., 2020; Bengtsson et al., 2018). The foundations for SDGs are the capacity building through technology transfer and solidarity by developed countries providing financial assistance to developing countries all geared to enhancing environmental sustainability ultimately (Kroll et al., 2019).

Fundamentally, the full implementation of SDGs will significantly aid in the protection of the planet and environment from pollution, accumulation, and distribution of toxic wastes, destruction of forests and soil, and greenhouse emissions (Díaz et al., 2020; Kroll et al., 2019). As a result, climate and environmental change emanating from pollution, and disasters manifest in situations where poverty is enhanced and raises concerns if not addressed (Alcamo et al., 2020; Fried et al., 2020). In the wake of climate change and its adverse effects, the fundamental right to a clean healthy environment is threatened and future posterity is altered from attainment (Bryan et al., 2018; Kathambi & M'Ikiugu, 2018a). Notable efforts are being taken to address the adversarial effects of climate change and the environment from human activities that have violated and exploited the planet without protection and more so destroying biodiversity

hubs (Chapman et al., 2022; Kathambi & Ogutu, 2021).

Biodiversity plays a pivotal role in the restoration of the earth through nature-based solutions however human activities continue to undermine its potential through the destruction of its habitat for socio-economic gains (Dasgupta, 2021; Kathambi & Ogutu, 2021). In the recent past, overexploitation of biodiversity and destruction of habitats has necessitated the urgency in addressing this issue to protect and conserve the remaining biospheres (Chapman et al., 2022; Díaz et al., 2020; IPBES, 2019). Numerous reasons have been brought forth excusing the continued destruction and degradation of biodiversity hubs with many arguments for socioeconomic empowerment than conservation and protection (Hoffmann, 2022; Ogutu et al., 2018).

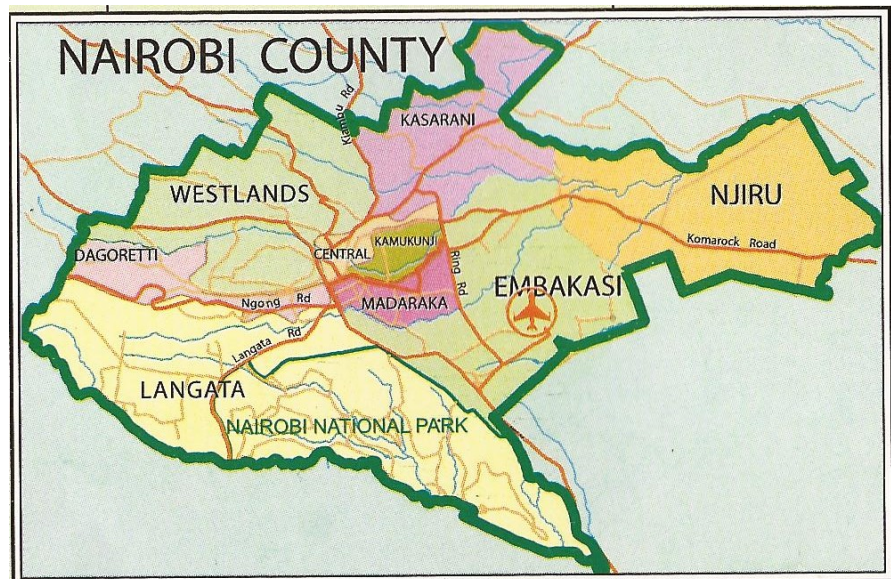
Biodiversity conservation in city setups becomes increasingly difficult due to the dynamics of growing populations, expanding businesses and industries, and an unquenchable thirst for infrastructural development (Bottero et al., 2019; Cartwright, 2015). Nairobi City is a unique global city that hosts a national park that has a rich biodiversity in flora and fauna (Kathambi & M'Ikiugu, 2018b; Myers, 2015). With a projected double city population by 2050, biodiversity within Nairobi City will be under threat if sustainable measures are not in place to tackle rapid urbanization (Hoffmann, 2022; Kathambi & Ogutu, 2021).

Addressing the fundamental role of biodiversity within global cities, SDGs contribute immensely to the knowledge required to have actionable targeted measures for protection, preservation, and conservation (Kathambi & M'Ikiugu, 2018b; O'Connell et al., 2019; Pototsky & Cresswell, 2021). The knowledge of SDGs by city residents accelerates the adoption of conservation measures toward biodiversity hubs and better environmental stewardship of natural resources (Frank & Schäffler, 2019; Kariuki et al., 2023). A deficit in the knowledge base of the importance of SDGs in biodiversity conservation results in the destruction of key habitats where the consequences are irreversible and negative on the environment (Bhola et al., 2021; Obrecht, et al., 2021). A short fall in recognizing the importance of SDGs in ensuring environmental sustainability has had economic and infrastructural development being prioritized over habitat conservation (KIPPRA, 2020). Destruction of forests for road and railway, green parks for business hubs and hotels are some examples of biodiversity habitats destruction evidenced. This explicates the knowledge gaps on SDGs 11 and 15 which look at the sustainable global cities and life on land (GoK, 2020; KNBS, 2020).

In this regard, this paper sought to underpin the knowledge gaps on SDGs and their impacts on biodiversity conservation in Nairobi City. It sheds light on the importance of SDGs in enhancing environmental sustainability which is also crucial in upscaling biodiversity conservation measures in a climate-changing era.

2. Materials and Methods

The study adopted a cross-sectional research design which allows for both qualitative and quantitative data. Further, the study area in **Figure 1**, was selected



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Figure 1. Nairobi County Map (maps of world, 2016).

because of its uniqueness in that it is a city with a national park and various biodiversity hubs (Creswell & Creswell, 2018; Kathambi & M'ikiugu, 2018b). A sample size of 97 was calculated using a sampling formula and the sample population was distributed based on social strata of upper class, middle class, and low class in the study area (Dekker, 2020; Mugenda & Mugenda, 2008). When the population is more than 10,000 individuals, 384 of them are recommended as the desired sample size (Creswell & Creswell, 2018; Mugenda & Mugenda, 2008). However, since the target population to the study is less than 10,000, the final sample size estimate could be adjusted as recommended by Mugenda & Mugenda (2008).

Mugenda and Mugenda recommend the formula;

$$nf = \frac{n}{1 + n/N}$$

where:

nf = is the sample size when population is less than 10,000

n = the sample size when the population is above 10,000

N = the population of the target sub-population

The study used sub-counties as it is applicable if a population from which a sample is to be drawn does not constitute a homogeneous group (Mugenda & Mugenda, 2008).

Data collection was done through the use of semi-structured questionnaires and Key Informant Interviews with the focus being on the SDGs' knowledge and biodiversity (Creswell & Creswell, 2018; Palinkas et al., 2015). *Data Envelopment Analysis (DEA) method* was used to evaluate the determinants of implementation of SDGs as affected by respondents' perceptions, knowledge, attitudes, and

practices in biodiversity conservation (Kuosmanen & Kortelainen, 2004; Leal Paço & Cepeda Pérez, 2013). The data was treated for normalcy tests and reliability to minimize statistical (social desirability bias and leniency bias) and is presented in tables, charts, and graphs (Apuke, 2017; Creswell & Creswell, 2018).

3. Results

The results presented below focus on the respondent's perceptions on SDGs knowledge and biodiversity conservation in Nairobi County. Data collected looked at the respondent's capacity to highlight the SDGs they know and how they relate to biodiversity conservation. Majority of the respondents had very limited knowledge on SDGs and minimal awareness of their importance to biodiversity conservation.

The results in **Table 1** indicate the low knowledge level in SDGs for biodiversity conservation with only 30.5% of the respondents having biodiversity conservation knowledge. Also, the levels of awareness of SDGs were significantly low with a majority of 69.6% having limited awareness of SDGs knowledge. This result is in support of the previous finding of low levels of SDG knowledge. Additionally, respondents had a low practice of SDGs in biodiversity conservation at 83.7% compared to 26.3% who were incorporating SDGs. The results from the data indicate a significant impact of knowledge gaps on biodiversity conservation with a significant number of respondents having little or limited knowledge of SDGs.

In the results in **Table 2**, the majority of the respondents 78.2% agreed that increasing the awareness of SDGs would have a positive impact on environmental management, unlike 21.8% who were opposed to the increased awareness. Also, 58.7% of the respondents were in support that strengthened institutional capacity on SDGs would have positive environmental impacts. The results indicate that the knowledge gaps in SDGs would be decreased by increasing awareness and strengthening institutions on SDGs in biodiversity conservation.

In **Figure 2**, the results illustrate that the barriers to SDG knowledge were majorly 87% due to lack of awareness/ignorance compared to 12% on limited

Table 1. Respondents' knowledge, attitudes, and practices on the sustainable development goals (SDGs) that enhance biodiversity conservation in Nairobi county.

Parameter	Yes (positive) (%)	No (negative) (%)
Knowledge of SDGs in Biodiversity Conservation	30.5 ± 2.01 ^a	69.5 ± 2.19 ^b
Awareness of the existence of SDGs	30.4 ± 1.56 ^a	69.6 ± 1.14 ^b
Practice of SDGs in Biodiversity Conservation	26.3 ± 0.08 ^a	83.7 ± 0.82 ^b

^{a,b}Different letters in the same row differ statistically by Chi-square, $P < 0.005$ Positive: respondents perceive the parameter could enhance knowledge, attitude, and practice of SDGs in biodiversity conservation; Negative: respondents of the contrary views of the positive responses.

Table 2. Respondent’s perceptions on use of sustainable development goals (SDGs) in Environmental Management.

Parameter	agree (positive) (%)	disagree (negative) (%)
Increased awareness of SDGs	78.2 ± 2.61 ^a	21.8 ± 2.43 ^b
Strengthened institutional capacity on SDGs	58.7 ± 3.01 ^a	41.3 ± 2.74 ^b

^{a,b}Different letters in the same row differ statistically by Chi-square, P < 0.005; Positive: respondents perceive the parameter could enhance the use of SDGs in biodiversity conservation; Negative: respondents of the contrary views of the positive responses.

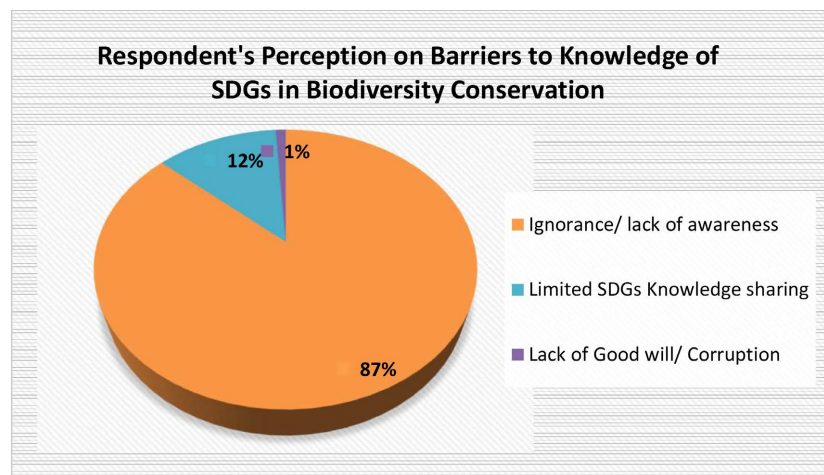


Figure 2. Respondent’s perception of barriers to knowledge of SDGs in biodiversity Conservation in Nairobi county

SDG knowledge sharing. A minority of the respondents 1% perceived that lack of goodwill/corruption were possible barriers to knowledge gaps in SDGs in biodiversity conservation. The results are supported by those in **Table 2** where a majority of the respondents were in agreement that increased awareness would enhance better environmental management which in turn could aid biodiversity conservation.

Results in **Figure 3** illustrate respondents’ perception of the uses of SDGs in biodiversity conservation where the majority 67% agreed that it enhances biodiversity conservation resulting in a clean, healthy environment as illustrated by the blue curve. Further, the respondents also agreed that proper legal structures and policies can enhance biodiversity conservation supported by SDGs averagely (red curve) when compared to those who supported SDGs can healthily impact their lifestyle (green curve). The results indicate that utilization of SDGs in biodiversity conservation has multiple uses that are not only limited to the environment but also, the wellness of humanity.

Perceptions on Benefits of SDGs Knowledge Gap on Protection of Biodiversity Spots

The respondents perceived in **Figure 4** that an increase in their SDGs knowledge would help improve the environment 89% for the biodiversity spots while others

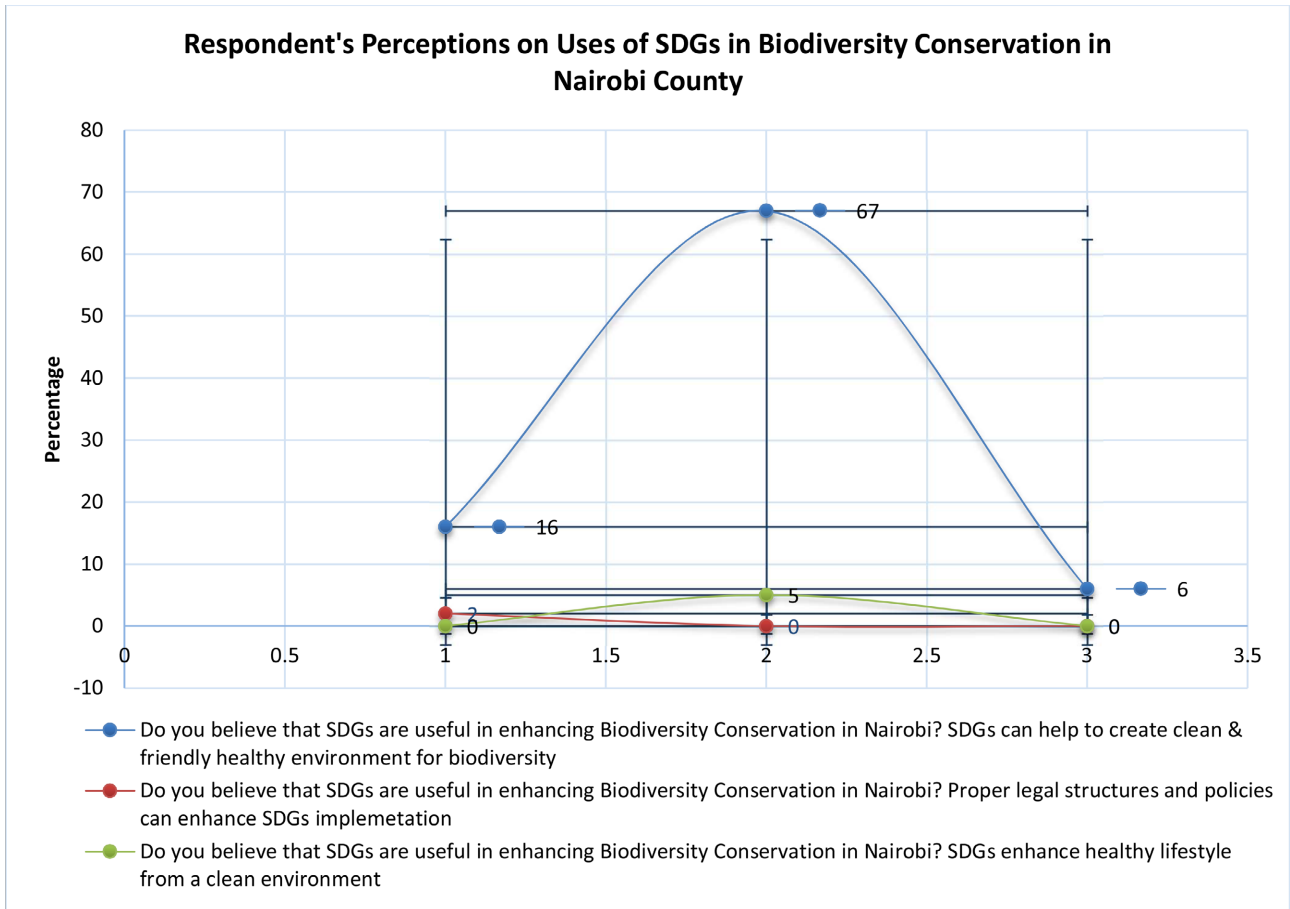


Figure 3. Respondent's perceptions on uses of SDGs in biodiversity conservation in Nairobi county.

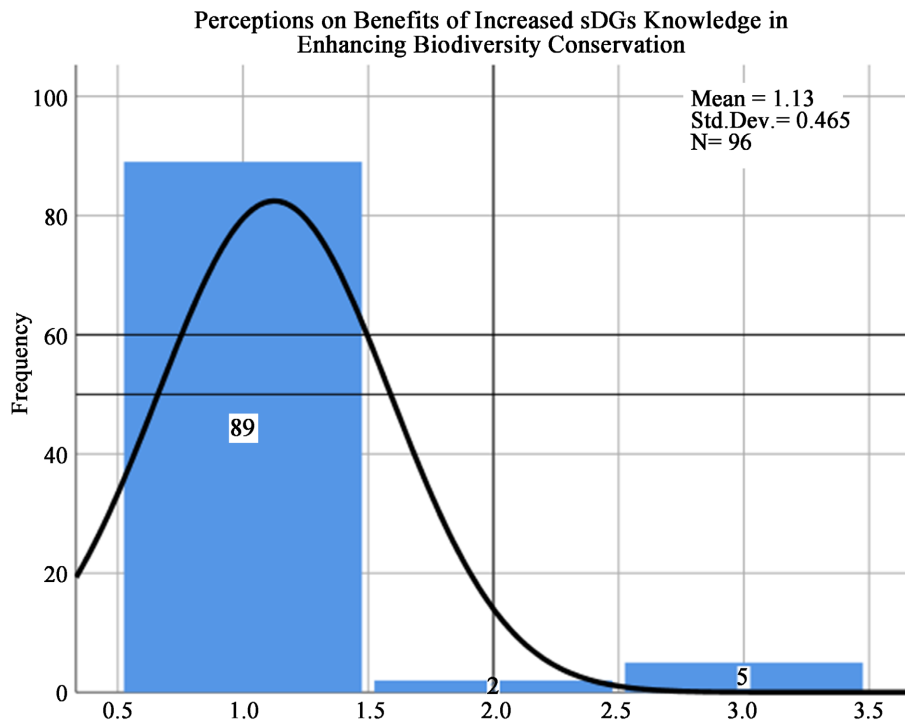


Figure 4. Perceptions on SDGs Knowledge in Protection of Biodiversity Spots in Nairobi, Kenya.

perceived it would help change their way of life 5% on how they impact biodiversity hubs. A minority had contrary perception on the need to increase their SDGs knowledge for enhanced biodiversity conservation in Nairobi.

4. Discussion

Knowledge of SDGs in biodiversity conservation is crucial if conservation and protection measures of habitats are to be implemented within city environs (Bhola et al., 2021; Menton et al., 2020). SDGs 11 and 15 which focus on sustainable global cities and life on land are instrumental in providing better avenues for enhancing biodiversity conservation (Hoffmann, 2022; Kathambi & Ogutu, 2021). Previous studies have projected biodiversity conservation as having the potential to aid the restoration of the earth and replenish the overexploited natural resources when employed (Obrecht et al., 2021; Pototsky & Cresswell, 2021). Thus, SDGs in totality provide the avenue to improve environmental sustainability thereby impacting positively the survival of humanity and securing resources for the future generation (Obrecht et al., 2021; Obura, 2020).

Moreover, a deficiency in the knowledge of SDGs on a critical aspect as biodiversity poses a critical threat to the restoration of the earth and the future of species in both flora and fauna (Hoffmann, 2022; IPBES, 2019). Results in **Table 1** illustrate the urgency of reducing the knowledge gap on SDGs if biodiversity conservation has to bear tangible results in the preservation, protection, and conservation of various species and their habitation (Frank & Schäffler, 2019; Kariuki et al., 2023). Increasing the level of awareness of SDGs fosters better practices that are environmentally friendly and habitable for biodiversity species in the long run (Díaz et al., 2020; Mwangi et al., 2022). Incorporating SDGs knowledge on biodiversity conservation in Nairobi would change the ecological destructions of biodiversity habitats through rapid unplanned urbanization and infrastructural development that is not eco-friendly (Kathambi & Ogutu, 2021; Obura, 2020).

Further, the results in **Table 2** support the discourse on why increased awareness of SDGs provides an avenue for restoring the earth through better environmental management (Kathambi & M'ikiugu, 2018a; Obrecht et al., 2021). This also affirms the need for upscaling SDGs awareness creation among the city residents for better conservation measures on biodiversity (O'Connell et al., 2019; Pototsky & Cresswell, 2021). Importantly, strengthening institutional capacity goes a long way in ensuring that knowledge of SDGs can be sustained and monitored by mandated personnel in Nairobi County (Kariuki et al., 2023; Stepputat & Van Voorst, 2016). The strengthening can take on SDG 17 which looks at partnerships and various institutions within the city that have different mandates can network to ensure SDGs knowledge is shared across and beyond (Kroll et al., 2019; Obura, 2020). The outlook for biodiversity conservation is better when institutions are well vast with SDG knowledge thereby inculcating

environmental stewardship in their policies and development plans (Bhola et al., 2021; Kariuki et al., 2023).

Despite the bright future of biodiversity conservation envisaged by strengthened institutions and increased awareness on knowledge of SDGs, some barriers are presented in **Figure 2** that are hindrances to better environmental management (Kathambi & M'Ikiugu, 2018c; Kenya Association of Manufacturers, 2020). Results indicate that a huge number of residents of Nairobi city lack awareness of SDGs and their importance to biodiversity conservation (Kathambi & M'Ikiugu, 2018a; Kroll et al., 2019; UNFCCC, 2021). Besides the huge number who lack awareness, results further illustrate that there is a limitation in the sharing of SDGs knowledge thereby impacting measures for biodiversity conservation within Nairobi County (Díaz et al., 2020; Kathambi & Ogutu, 2021; Mwangi et al., 2022).

Conversely, the results in **Figure 3** offer hope for enhancing biodiversity conservation in Nairobi County in that it explicates perceptions that residents would have when SDGs are implemented (Bhola et al., 2021; Hoffmann, 2022). Perceived uses of SDGs in biodiversity conservation posit that restoration of the earth would be possible even in a city setup and have far-reaching positive impacts on humanity and their lifestyles (Kroll et al., 2019; Makori, 2021; Seidl et al., 2021). Additionally, proper legal structures and policies foster the better implementation of SDGs in biodiversity conservation with an overall result of having measurable and tangible actions from mandated institutions in Nairobi County (Kathambi & M'Ikiugu, 2018b; Mwau & Thung, 2018).

Worth noting gaps in SDGs knowledge have a significant impact on efforts of biodiversity conservation thus necessitating the need to increase awareness and strengthen institutional capacity to yield better results (Obrecht et al., 2021; OECD, 2019). Majority of the respondent's perceived that there are benefits if their knowledge on SDGs was increased and which would result in a healthy and better environment as illustrated in **Figure 4** (Eisenmenger et al., 2020). When these gaps in SDGs knowledge are not attended to, threats to the future of biodiversity become a reality, and the result is devastating how habitat gets destroyed for socio-economic gains (Kenya Association of Manufacturers, 2020; Makori, 2021). There is urgency required in increasing awareness of SDGs and their pivotal place in enhancing biodiversity conservation to safeguard posterity for future generations (Kathambi & M'Ikiugu, 2018a; Kroll et al., 2019).

5. Conclusion

A knowledge gap in SDGs impacts greatly efforts and measures put in place to enhance biodiversity conservation. The centrality of how vital biodiversity is in the restoration of the earth elucidates why creating awareness of SDGs and strengthening institutional capacity will be useful in accelerating the conservation of biodiversity within Nairobi County. The fundamentals of SDGs are environmental sustainability for the future generation, and an increase in the

knowledge base through targeted campaigns on specific SDGs, adopting measured targets in the county integrated development plans and having an SDGs sensitization day will be an added advantage for Nairobi County biodiversity spots and habitations. Additionally, for Nairobi County to remain that unique global city, undertaking to increase its resident's knowledge of SDGs will ultimately contribute to its efforts to conserve and protect biodiversity species in flora and fauna.

Conflicts of Interest

The author declares no conflicts of interest regarding the publication of this paper.

References

- Alcamo, J., Thompson, J., Alexander, A., Antoniadis, A., Delabre, I., Dolley, J., Marshall, F., Menton, M., Middleton, J., & Scharlemann, J. P. W. (2020). Analysing Interactions among the Sustainable Development Goals: Findings and Emerging Issues from Local and Global Studies. *Sustainability Science*, *15*, 1561-1572. <https://doi.org/10.1007/s11625-020-00875-x>
- Ankit, Kumar, A., Jain, V., Deovanshi, A., Lepcha, A., Das, C., Baudh, K., & Srivastava, S. (2021). Environmental Impact of COVID-19 Pandemic: More Negatives than Positives. *Environmental Sustainability*, *4*, 447-454. <https://doi.org/10.1007/s42398-021-00159-9>
- Apuke, O. D. (2017). Quantitative Research Methods: A Synopsis Approach. *Arabian Journal of Business and Management Review*, *6*, 40-47. <https://doi.org/10.12816/0040336>
- Bengtsson, M., Alfredsson, E., Cohen, M., Lorek, S., & Schroeder, P. (2018). Transforming Systems of Consumption and Production for Achieving the Sustainable Development Goals: Moving beyond Efficiency. *Sustainability Science*, *13*, 1533-1547. <https://doi.org/10.1007/s11625-018-0582-1>
- Bhola, N., Klimmek, H., Kingston, N., Burgess, N. D., Soesbergen, A., Corrigan, C., Harrison, J., & Kok, M. T. J. (2021). Perspectives on Area-Based Conservation and Its Meaning for Future Biodiversity Policy. *Conservation Biology*, *35*, 168-178. <https://doi.org/10.1111/cobi.13509>
- Bottero, M., Caprioli, C., Cotella, G., & Santangelo, M. (2019). Sustainable Cities: A Reflection on Potentialities and Limits based on Existing Eco-Districts in Europe. *Sustainability*, *11*, Article 5794. <https://doi.org/10.3390/su11205794>
- Bowen, K. J., Cradock-Henry, N. A., Koch, F., Patterson, J., Häyhä, T., Vogt, J., & Barbi, F. (2017). Implementing the “Sustainable Development Goals”: Towards Addressing Three Key Governance Challenges—Collective Action, Trade-Offs, and Accountability. *Current Opinion in Environmental Sustainability*, *26-27*, 90-96. <https://doi.org/10.1016/j.cosust.2017.05.002>
- Brundtland, G. H. (1987). *Our Common Future: Report of the World Commission on Environment and Development*. World Commission on Environment and Development, Geneva.
- Bryan, E., Bernier, Q., Espinal, M., & Ringler, C. (2018). Making Climate Change Adaptation Programmes in Sub-Saharan Africa more Gender Responsive: Insights from Implementing Organizations on the Barriers and Opportunities. *Climate and Development*, *10*, 417-431. <https://doi.org/10.1080/17565529.2017.1301870>

- Cartwright, A. (2015). *Better Growth, Better Cities: Rethinking and Redirecting Urbanisation in Africa*. The New Climate Economy Working Papers.
- Chapman, C. A., Abernathy, K., Chapman, L. J., Downs, C., Effiom, E. O., Gogarten, J. F., Golooba, M., Kalbitzer, U., Lawes, M. J., Mekonnen, A., Omeja, P., Razafindratsima, O., Sheil, D., Tabor, G. M., Tumwesigye, C., & Sarkar, D. (2022). The Future of Sub-Saharan Africa's Biodiversity in the Face of Climate and Societal Change. *Frontiers in Ecology and Evolution, 10*, Article 790552. <https://doi.org/10.3389/fevo.2022.790552>
- Creswell, J. W., & Creswell, J. D. (2018). *Research Design: Qualitative, Quantitative, and Mixed Method Approaches* (18th ed.). Sage.
- Dasgupta, P. (2021). *The Economics of Biodiversity: The Dasgupta Review*. HM Treasury.
- Dekker, R. (2020). Social Data: CESSDA Best Practices. *Data Intelligence, 2*, 220-229. https://doi.org/10.1162/dint_a_00044
- Díaz, S., Zafra-Calvo, N., Purvis, A., Verburg, P. H., Obura, D., Leadley, P., Chaplin-Kramer, R., De Meester, L., Dulloo, E., Martín-López, B., Shaw, M. R., Visconti, P., Broadgate, W., Bruford, M. W., Burgess, N. D., Cavender-Bares, J., DeClerck, F., Fernández-Palacios, J. M., Garibaldi, L. A., Hill, S. L. L., Isbell, F., Khoury, C. K., Krug, C. B., Liu, J., Maron, M., McGowan, P. J. K., Pereira, H. M., Reyes-García, V., Rocha, J., Rondinini, C., Shannon, L., Shin, Y.-J., Snelgrove, P. V. R., Spehn, E. M., Strassburg, B., Subramanian, S. M., Tewksbury, J. J., Watson, J. E. M., & Zanne, A. E. (2020). Set Ambitious Goals for Biodiversity and Sustainability. *Science, 370*, 411-413. <https://doi.org/10.1126/science.abe1530>
- Eisenmenger, N., Pichler, M., Krenmayr, N., Noll, D., Plank, B., Schalmann, E., Wandl, M.-T., & Gingrich, S. (2020). The Sustainable Development Goals Prioritize Economic Growth over Sustainable Resource Use: A Critical Reflection on the SDGs from a Socio-Ecological Perspective. *Sustainability Science, 15*, 1101-1110. <https://doi.org/10.1007/s11625-020-00813-x>
- Frank, A. S. K., & Schäffler, L. (2019). Identifying Key Knowledge Gaps to Better Protect Biodiversity and Simultaneously Secure Livelihoods in a Priority Conservation Area. *Sustainability, 11*, Article 5695. <https://doi.org/10.3390/su11205695>
- Fried, T., Tun, T. H., Klopp, J. M., & Welle, B. (2020). Measuring the Sustainable Development Goal (SDG) Transport Target and Accessibility of Nairobi's Matatus. *Transportation Research Record: Journal of the Transportation Research Board, 2674*, 196-207. <https://doi.org/10.1177/0361198120914620>
- GoK (2019). *An Assessment of the Level of Awareness on Sustainable Development Goals in Kenya*. National Treasury and Planning State Department for Planning.
- GoK (2020). *Second Voluntary National Review on the Implementation of the Sustainable Development Goals*. National Treasury and Planning State Department for Planning.
- Hoffmann, S. (2022). Challenges and Opportunities of Area-Based Conservation in Reaching Biodiversity and Sustainability Goals. *Biodiversity and Conservation, 31*, 325-352. <https://doi.org/10.1007/s10531-021-02340-2>
- IPBES (2019). Summary for Policymakers of the Global Assessment Report on Biodiversity and Ecosystem Services of the Intergovernmental Science-Policy Platform on Biodiversity and Ecosystem Services. *Population and Development Review, 45*, 680-681. <https://doi.org/10.1111/padr.12283>
- Kariuki, C. N., Kathambi, B. E., & Inyega, J. O. (2023). Incorporating Capacity Building as a Pathway to Environmental Stewardship for Public Schools in Kenya. *Indonesian Journal of Social and Environmental Issues, 4*, 1-11. <https://doi.org/10.47540/ijsei.v4i1.739>

- Kathambi, B. E., & M'Ikiugu, H. M. (2018a). Implementing Sustainable Development Goals 1, 3.9, 7, and 13 through Adoption of Green Concept in Environmental Management: Case of Nairobi, Kenya. *Journal of Biodiversity and Environmental Sciences*, *12*, 1-10.
- Kathambi, B. E., & M'Ikiugu, H. M. (2018b). The Kenyan Perspective on Adoption of Green Concept in Biodiversity Conservation: Case of Nairobi, Kenya. *Journal of Biodiversity and Environmental Sciences*, *12*, 73-82.
- Kathambi, B. E., & M'Ikiugu, H. M. (2018c). Determinants of Compliance with Governance Instruments for Adoption of Green Concept in Environmental Management: Case of Nairobi. *Journal of Biodiversity and Environmental Sciences*, *12*, 28-38.
- Kathambi, B. E., & Ogutu, F. A. (2021). Ecological Impacts of Improper Waste Management Frameworks on Biodiversity Conservation in Nairobi County, Kenya. *Journal of Biodiversity and Environmental Sciences*, *19*, 91-101.
- Kenya Association of Manufacturers (2020). *SDGs Readiness Report*. Kenya Association of Manufacturers.
- KIPPRA (2020). *Creating an Enabling Environment for Inclusive Growth in Kenya, Kenya Economic Report*. The Kenya Institute for Public Policy Research and Analysis.
- KNBS (2020). *Inequality Trends and Diagnostics in Kenya, 2020*. Kenya National Bureau of Statistics.
- Kroll, C., Warchold, A., & Pradhan, P. (2019). Sustainable Development Goals (SDGs): Are We Successful in Turning Trade-Offs into Synergies? *Palgrave Communications*, *5*, Article No. 140. <https://doi.org/10.1057/s41599-019-0335-5>
- Kuosmanen, T., & Kortelainen, M. (2004). *Data Envelopment Analysis in Environmental Valuation: Environmental Performance, Eco-Efficiency and Cost-Benefit Analysis*. University Library of Munich.
- Leal Paço, C., & Cepeda Pérez, J. M. (2013). The Use of DEA (Data Envelopment Analysis) Methodology to Evaluate the Impact of ICT on Productivity in the Hotel Sector. *Tourism Review*.
- Makori, E. O. (2021). Sustainable Information Development Practices and Societal Transformation in Kenya. *International Journal of Library and Information Services*, *10*, 1-19. <https://doi.org/10.4018/IJLIS.20210701.oa7>
- Menton, M., Larrea, C., Latorre, S., Martinez-Alier, J., Peck, M., Temper, L., & Walter, M. (2020). Environmental Justice and the SDGs: From Synergies to Gaps and Contradictions. *Sustainability Science*, *15*, 1621-1636. <https://doi.org/10.1007/s11625-020-00789-8>
- Mugenda, M. O., & Mugenda, G. A. (2008). *Social Science Research: Theory and Principles*. ACTS Press.
- Mwangi, F., Zhang, Q., & Wang, H. (2022). Development Challenges and Management Strategies on the Kenyan National Park System: A Case of Nairobi National Park. *International Journal of Geoheritage and Parks*, *10*, 16-26. <https://doi.org/10.1016/j.ijgeop.2022.02.003>
- Mwau, B., & Thung, I. (2018). *Urban Planning for City Leaders: A Handbook for Kenya*. United Nations Human Settlements Programme (UN-Habitat).
- Myers, G. (2015). A World-Class City-Region? Envisioning the Nairobi of 2030. *American Behavioral Scientist*, *59*, 328-346. <https://doi.org/10.1177/0002764214550308>
- O'Connell, M. J., Nasirwa, O., Carter, M., Farmer, K. H., Appleton, M., Arinaitwe, J., Bhanderi, P., Chimwaza, G., Copsey, J., Dodoo, J., Duthie, A., Gachanja, M., Hunter, N., Karanja, B., Komu, H. M., Kosgei, V., Kuria, A., Magero, C., Manten, M., Mugo, P.,

- Müller, E., Mulonga, J., Niskanen, L., Nzilani, J., Otieno, M., Owen, N., Owuor, J., Paterson, S., Regnaut, S., Rono, R., Ruhiu, J., Theuri Njoka, J., Waruingi, L., Waswala Olewe, B., & Wilson, E. (2019). Capacity Building for Conservation: Problems and Potential Solutions for Sub-Saharan Africa. *Oryx*, *53*, 273-283.
<https://doi.org/10.1017/S0030605317000291>
- Obrecht, A., Pham-Truffert, M., Spehn, E., Payne, D., Altermatt, F., Fischer, M., Passarello, C., Moersberger, H., Schelske, O., Guntern, J., Prescott, G., Geschke, J., & de Bremond, A. (2021). *Achieving the SDGs with Biodiversity*. Zenodo.
- Obura, D. O. (2020). Getting to 2030—Scaling Effort to Ambition through a Narrative Model of the SDGs. *Marine Policy*, *117*, Article 103973.
<https://doi.org/10.1016/j.marpol.2020.103973>
- OECD (2019). *Policy Coherence for Sustainable Development 2019: Empowering People and Ensuring Inclusiveness and Equality*. OECD. <https://doi.org/10.1787/a90f851f-en>
- Ogutu, F. A., Kimata, D., & Kweyu, R. (2018). Factors Affecting the Use of Environmental Values and Ethics in Solid Waste Management in Nairobi City County. *International Journal of Environmental and Health Sciences*, *1*.
- Palinkas, L. A., Horwitz, S. M., Green, C. A., Wisdom, J. P., Duan, N., & Hoagwood, K. (2015). Purposeful Sampling for Qualitative Data Collection and Analysis in Mixed Method Implementation Research. *Administration and Policy in Mental Health and Mental Health Services Research*, *42*, 533-544.
<https://doi.org/10.1007/s10488-013-0528-y>
- Pototsky, P. C., & Cresswell, W. (2021). Conservation Research Output in Sub-Saharan Africa Is Increasing, but Only in a Few Countries. *Oryx*, *55*, 924-933.
<https://doi.org/10.1017/S0030605320000046>
- Seidl, A., Mulungu, K., Arlaud, M., Van Den Heuvel, O., & Riva, M. (2021). The Effectiveness of National Biodiversity Investments to Protect the Wealth of Nature. *Nature Ecology & Evolution*, *5*, 530-539. <https://doi.org/10.1038/s41559-020-01372-1>
- Stepputat, F., & Van Voorst, R. (2016). *Cities on the Agenda: Governance and Sustainable Development*. Danish Institute for International Studies.
- UNFCCC (2021). *Scoping Paper on Knowledge Gaps in Integrating Forest and Grassland Biodiversity and Ecosystems into Adaptation Strategies*. UNFCCC.