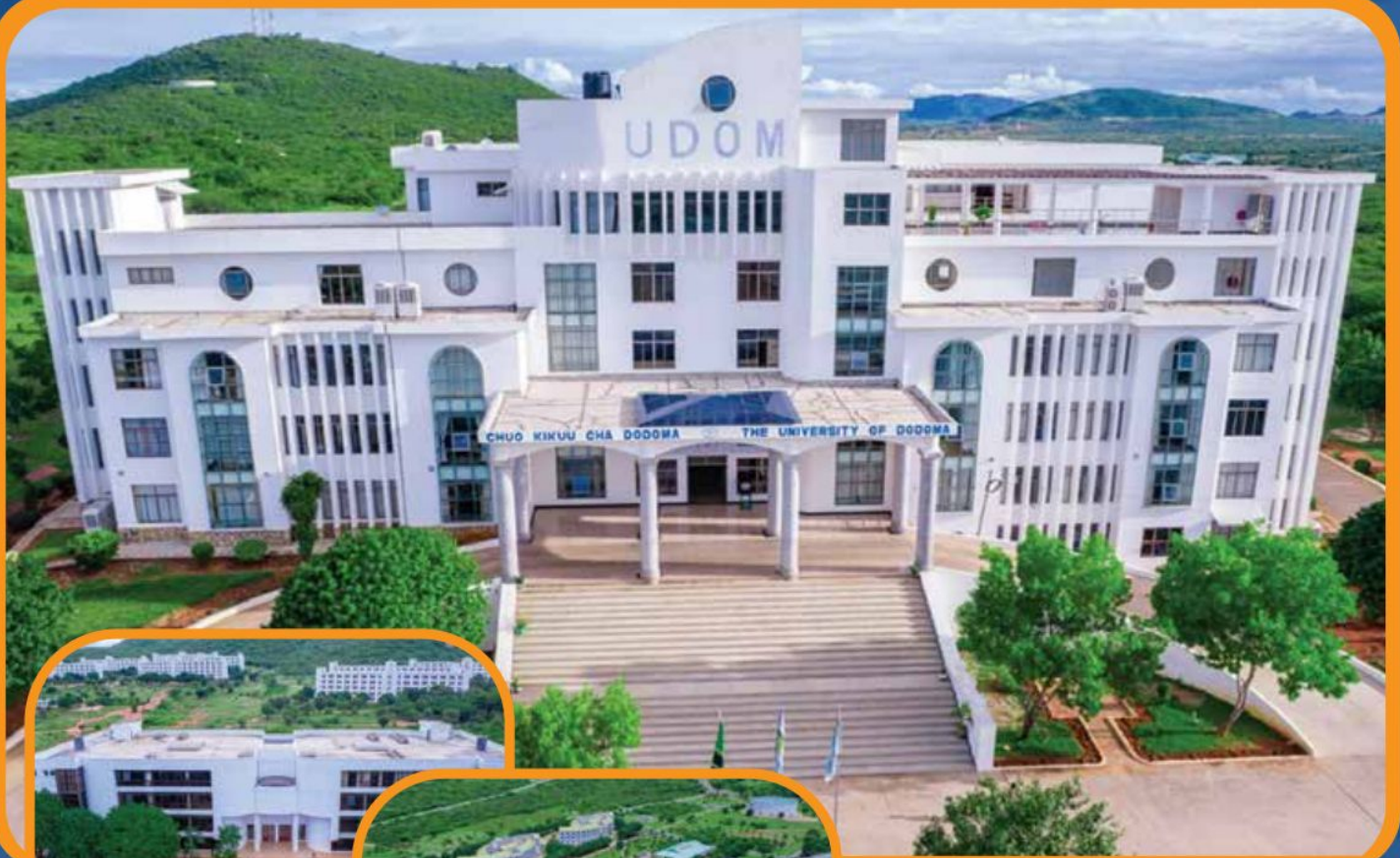




UDOMASA

e-Newsletter

Excellence is the Cornerstone



Inside

- Africa's AI Future** **1**
- Academic Excellence** **2**
- Human Rights** **3**

Contents

UDOMASA Leadership

01

Message From UDOMASA Chairperson

02

Message from Chief Editor

03

The Editorial Team

04

The University of Dodoma Co-hosts Major International Conference on Political Ecology, Bringing Together Global Experts to Tackle Environmental Inequalities

05

Why Must Africa Lead Its Own AI Future: An Analysis

08

Reclaiming Integrity in Tanzanian Universities: My Journey through Allegations of Sextortion

10

UDOMSoL's Growing Academic Excellence in Legal Profession: Recent Triumphs in Prestigious Moot Court Competitions

12

Human Rights: For Whom and to What Extent?

13

Understanding the Anatomy of Highly Cited Journal Articles

15

Dry-season Motorbike Movement Patterns in Four Villages in Serengeti and Dodoma Districts, Tanzania: Does the Movement Patterns Reflect the Night Usage in Illegal Hunting?

17

Poem

26

Habari katika Picha: Kongamano la Chama cha Kiswahili Afrika Mashariki (CHAKAMA) 15-16 Agosti 2024

27

News in Pictures: 15th Convocation Annual General Meeting, 2024

29

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Message From UDOMASA Chairperson

Dr. Gerald Shija



Esteemed UDOMASA Members,

I am excited to share the second edition of our UDOMASA e-newsletter. This publication reflects on our achievements, celebrates our community's progress, and looks ahead to the future we are building together. It offers an opportunity to connect and strengthen the collaborative spirit that defines the University of Dodoma.

My sincere gratitude goes to the editorial team for their hard work in bringing this edition to life. Their dedication to producing a well-crafted newsletter is evident, something we must all appreciate and be proud of it.

I also want to thank everyone who contributed news stories to this edition, sharing their thought-provoking ideas and perspectives. Your involvement is key to the

success of this publication and will undoubtedly play a vital role in the success of many more others to come.

As you read through this edition, I encourage you to reflect on our progress and the opportunities ahead. Together, we will continue to strive for excellence in all areas of academic, social, and professional life. Thank you for your ongoing support. I look forward to your increased participation in contributing to upcoming editions of our e-Newsletter.

Finally, I am delighted to inform you that I have been elected President of the *Academic Staff Association of Public Universities and Colleges of Tanzania (ASAPUCT)* for 2024-2026. It is an honour to serve in this capacity, and I look forward to working with you all to advance higher education in our nation.

Message From Chief Editor

Dr. Mandela P. Ryano



Our esteemed readers,

I am excited to welcome you all to the 2nd Issue of the UDOMASA e-Newsletter. This edition will not only enhance your festive season but also provide another enriching reading and learning experience, with motivating and inspiring news stories.

This edition brings you six news stories, carefully selected for their engaging and educational value. Highlights include a reflection on the POLLEN24 Conference and the remarkable victories of LL.B students in legal competitions, epitomising the University of Dodoma's journey towards academic excellence. Thought-provoking analyses on Artificial Intelligence (AI) and human rights broaden our understanding of the need to consider contextual values and needs when implementing new technologies and cultural ideals. One story explores how an individual's or institution's integrity can be unjustly tarnished, either by organised malicious intent or inability to uncover the truth. The final story delves into the criteria necessary for achieving high citation rates of published scientific articles.

This edition also features a captivating poem to stimulate your intellect. Additionally, we proudly present a published article, the product of what we believe is a unique and interesting research idea. In the final pages, you will find news presented through compelling images.

The Chairperson's message introduces all these stories, reflecting on the achievements and challenges that have shaped the Association's efforts to create a rewarding and supportive work environment. We greatly appreciate the dedicated commitment of the Chairperson and his Executive Committee in ensuring the continued success of our e-Newsletter.

We thank everyone who shared their feedback about the 1st Issue on improving the readability of our e-Newsletter. We welcome further suggestions to help us continue enhancing your reading experience.

We deeply appreciate the dedication and cooperation of all our contributors to this edition and hope that many of you will be inspired to contribute to future editions of our e-Newsletter.

Enjoy a rewarding reading experience!

The Editorial Team

**Dr. Mandela P. Ryano (Editor in Chief – CHSS),
Dr. Prudence P. Rwehabura (Managing Editor – CHSS),
Mr. Chrisostomus Lugongo (Copy Editor – CIVE).**

The University of Dodoma Co-hosts Major International Conference on Political Ecology, Bringing Together Global Experts to Tackle Environmental Inequalities

By Dr. Iddi Mwanyoka

Department of Geography and Environmental Studies



The University of Dodoma (UDOM) was involved in a ground breaking event from 10th to 12th June, 2024, hosting the POLLEN24 Conference that brought together leading experts in political ecology from across three continents. The conference, which marked a significant milestone in global political ecology discourse, was organised in partnership with the Political Ecology Network (POLLEN) by UDOM's Department of Geography and Environmental Studies (GES).

POLLEN, a global network of political ecology researchers and practitioners, provides a platform for sharing ideas and confronting urgent environmental challenges. The 2024 Conference, under the theme *"Towards Just and Plural Futures"*, sought to address long-standing inequalities in the field, with an emphasis on decolonising knowledge production. It united scholars and activists from Africa, South America, and Europe to discuss the future of political ecologies and to challenge the existing power imbalances in academic research, where much of the work is done in the Global South but largely controlled by scholars in the Global North.

A First of Its Kind

POLLEN24 was distinctive in multiple ways. It was not just another academic conference, it involved four universities from three continents: UDOM (Tanzania), Pontifical Catholic University of Peru (Peru), Lund University (Sweden), and the University of Copenhagen (Denmark). This international collaboration was made possible through a hybrid format that connected the universities in real-time, across multiple time zones.

The conference sessions were live-streamed, allowing participants in Tanzania, South America, and Europe to engage simultaneously. This approach reduced the need for long-haul flights, minimising the carbon footprint traditionally associated with international conferences. While the technical and logistical challenges of organising such an event were considerable, the dedicated efforts of the ICT team and the local organising committee ensured its success.

Professor Razack Lokina, UDOM's Deputy Vice Chancellor for Academic,

Research, and Consultancy, commented, when officially opening the conference, on the historical and ongoing issues surrounding knowledge production:

"During the colonial period, formal political debates over natural resources, including land, wildlife, and resource rights, were held in many countries, including Tanzania, without the involvement of those who actually managed these resources. In the post-colonial period, which saw significant growth in ecological scientific knowledge, the participation of citizens and local researchers in knowledge production remained skewed. This has led to inequalities within academia, particularly in the production and dissemination of knowledge between researchers from different regions. Over the next three days, you have the opportunity to reflect on these issues and discuss how they can be gradually addressed through POLLEN. The ball is now in your court."

'Smiling or Glowering' Participants?

Across the three days, over 700 participants attended the conference, engaging in lively discussions and



Prof. Razack Lokina (seated centre), Deputy Vice Chancellor for Academic, Research and Consultancy; Prof. Pendo Kasoga (left), Acting Director of Research, Publications and Consultancy; and Prof. Albino Tenge (right), Principal of CHSS, pose for a group photo with some of the POLLEN24 Conference delegates.

presenting over 70 papers. At UDOM, more than 100 people attended, contributing to a dynamic exchange of ideas. Topics ranged from the political ecology of commons and enclosure to the value struggles faced by rural communities. One particularly thought-provoking session focused on the future of indigenous communities in the face of climate change and forced evictions.

Despite some technical hiccups—such as internet disruptions and power cuts—the overall tone of the conference was positive. “It was far from perfect, but we made a meaningful attempt to create a more equitable conference in an often unfair world,” said one senior organiser. This comment encapsulated the spirit of the event, which sought to tackle global inequalities in knowledge production and foster a more inclusive academic community.

Conference Benefits

Networking and Collaborative Opportunities

POLLEN24 also provided an excellent opportunity for professional development and networking. Scholars, especially students, were able to present their research alongside prominent global figures in political ecology. UDOM students from the GES department particularly benefited from these interactions, engaging in discussions about political ecology and forming valuable academic connections.

After the conference, third-year students at the GES Department enjoyed a rare opportunity to interact with two international conference participants, Dr. Ryan Unks and Dr. Mitul Baruah, as guest lecturers. Dr. Unks shared his research on rangelands and livestock systems, while Dr. Baruah presented insights from his work on the political ecology

opportunity to interact with two international conference participants, Dr. Ryan Unks and Dr. Mitul Baruah, as guest lecturers. Dr. Unks shared his research on rangelands and livestock systems, while Dr. Baruah presented insights from his work on the political ecology of environmental disasters. This added a practical dimension to the students’ learning experience, allowing them to engage with cutting-edge research in their field.

The conference also brought together students, alumni, and volunteers, who helped manage the event and gain experience in academic logistics. For UDOM, hosting POLLEN24 boosted its international visibility, aligning with the university’s strategic plan to foster global collaborations.

Overcoming Challenges: Hard Work and Lessons Learned

Organising a conference of this scale was no small feat. The process took



Prof. Razack Lokina, Deputy Vice Chancellor for Academic, Research and Consultancy, officially opening the conference.



Some of the POLLEN24 Conference delegates.

more than 12 months, involving countless planning meetings and remote coordination with organising committees in Lima, Copenhagen, and Lund. At times, unreliable internet and power cuts in Tanzania posed serious challenges, making it difficult to maintain the necessary virtual connections.

Despite these challenges, the conference was a success, thanks to the commitment and resilience of the organising team. Financially, the committee faced hurdles in securing sufficient funding, often receiving polite but negative responses to their funding requests. However, after persistent efforts, they secured support from the University of Copenhagen and UDOM, which made the event possible.

To ensure the hybrid format ran smoothly, the committee invested in a standby generator to mitigate any risk of power outages disrupting the event. This turned out to be crucial, as power supply was unreliable throughout the conference.

Looking Forward: UDOM's Commitment to Future Conferences

The success of POLLEN24 has strengthened UDOM's resolve to host more international conferences in the future. The department has gained invaluable experience and is now better equipped to handle such complex, cross-continental events. Moving forward, UDOM plans to continue building on its international network and expand its role in global academic dialogues on political ecology and environmental justice.

Looking ahead, the next POLLEN conference will take place in Barcelona, Spain, in 2026. Participants are already preparing for the next gathering, which promises to build on the momentum created by POLLEN24.

See you in Barcelona in 2026!

The POLLEN24 Conference UDOM Organising Committee:

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Joseph Bukula
Jacob Nyangusi
Joan Tang'are
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Why Must Africa Lead Its Own AI Future: An Analysis

By: Dr. Deo Shao

Department of Information Systems and Technology



As artificial intelligence (AI) rapidly transforms global economies and cultures, it presents both opportunities and challenges for Africa. With the potential to boost productivity across various sectors, AI also raises critical questions about who controls its development and implementation. Unquestioningly adopting Western AI technologies risks perpetuating a form of algorithmic colonialism, a phenomenon that threatens to undermine Africa's rich diversity and cultural fabric. This analysis feature story explores the imperative for Africa to take charge of its own AI future, focusing on the need for indigenous strategies that reflect the continent's unique values and needs.

Africa's demographic landscape positions it uniquely within the global AI discourse. Approximately 60% of the continent's population is under the age of 25, making the youth a vital force for economic development and technological innovation. However, leading the AI revolution requires more than the mere importation of digital systems; it necessitates the creation of applications and datasets specifically designed for African contexts. Western AI solutions often stem from individualistic philosophies that may not resonate with collective African values.

To cultivate a truly transformative AI landscape, the continent must develop systems that reflect its beliefs, ideals, and practical realities.

Stereotypical narratives about Africa, often focused on migration, poverty, and civil conflicts, highlight the urgent need for an indigenous AI strategy. Such a strategy would empower Africans to use AI as a tool for addressing pressing local challenges while providing a platform for authentic self-representation. By harnessing AI to tell their own stories, Africans can challenge external biases and create a more nuanced understanding of their realities. Therefore, taking charge of its AI destiny is not merely a matter of technological progress; it is a crucial step in reclaiming narrative control and fostering a sense of agency.

To realise the full potential of AI, Africa must invest in the development of local talent and expertise. This involves enhancing educational curricula in universities and vocational institutions to focus on practical AI applications relevant to the continent, such as in agriculture, health care, and urban planning. By equipping young people with the skills to innovate and address local issues, Africa can cultivate a new

generation of leaders capable of driving meaningful change in their communities.

Furthermore, African governments must create a supportive regulatory environment that encourages innovation while safeguarding citizens' rights. This entails developing policies that promote research and ethical AI use. By engaging with a diverse range of stakeholders including tech entrepreneurs, academics, and civil society governments can create frameworks that balance progress with accountability. Such an approach will enable Africa to harness AI's potential effectively while ensuring the protection of its diverse communities.

Lastly, regional collaboration is essential for building a robust AI infrastructure across the continent. Countries should work together to share resources, knowledge, and best practices, establishing networks that enhance their collective capabilities in AI research and development. By fostering partnerships among governments, academic institutions, and the private sector, Africa can accelerate technological advancements while ensuring that AI solutions are culturally relevant and impactful. This united front will not only bolster



Curious students explore AI technologies at the College of Informatics and Virtual Education (CIVE) at UDOM.

Africa's position in the global AI landscape but also reinforce a shared commitment to shaping a future that truly reflects the continent's rich diversity.

In conclusion, while AI holds significant promise for Africa, its implementation must be approached with caution and a deep understanding of the continent's unique needs and values. The push for an African-led AI movement should encompass more than just technological advancement; it must also prioritise the preservation of identity and culture. By developing locally governed AI frameworks, investing in education, and fostering regional collaborations, Africa can take charge of its AI future, ensuring that it serves the interests of all its people and protects the continent's unique diversity.

Reclaiming Integrity in Tanzanian Universities: My Journey through Allegations of Sextortion

By: Mr. Jacob Nyangusi

Department of Geography and Environmental Studies



In recent years, I have witnessed firsthand unfounded allegations of sextortion and sexual misconduct which have surrounded some Tanzanian institutions, including higher learning. The negative spotlight on our universities reached its peak between 4th October 2018 and 28th March 2021, significantly threatening the reputation of some universities and individuals.

During this tumultuous time, I found myself wrongfully accused. In September 2024, I decided to take a stand and released a press statement revealing that many of such claims against our universities are mostly unfair accusations of probably malicious intent. This experience highlighted the importance of understanding the broader context behind these sextortion and extortion allegations.

It is unfortunate that incidences such as these false allegations tend to run viral on social media, ending up tainting images of the accused institution or individual. As it was in my case, the investigative organs can easily jump to conclusion even without solid evidence, as it was the case of the PCCB Dodoma Regional office. Rather than addressing its shortcomings, the PCCB chose to shift the blame. To manage public perception, the regional office resorted to three main strategies: amplifying media coverage, hosting seminars and workshops, and commissioning biased social science research.

Throughout this ordeal, I remained calm and focused. My investigation revealed that the media coverage surrounding sextortion often exaggerated the issue compared to its actual prevalence within our universities. Several factors contribute to this inflated narrative:

The PCCB's denial plays a significant role in shaping public perception. The regional office's reluctance to acknowledge its investigatory failures leads to a media campaign that obscures the truth. Rather than addressing the root causes, they deflect blame, which intensifies public scrutiny.

Struggling students also contribute to the distorted narrative. Some female students, especially those facing academic problems/issues, misuse the narrative of sextortion to cover-up their academic failures. This misrepresentation aims to divert attention from their actual struggles, in an attempt to rescue themselves from such academic situations. As in my case, this type of approach by misguided students normally ends up jeopardizing a person's image but cannot help such students get out of such academic issues.

Self-serving activists are another factor in the distortion. Certain individuals, claiming to advocate for girls' rights, often act out of self-interest. Their misrepresentation of the

situation ignores the real issues at hand, ultimately undermining genuine efforts to support students.

Corrupt officials within the universities exacerbate the challenges we face. Some staff members engage in dishonest practices, typically motivated by personal gain. Their actions further erode trust in the institutions meant to protect students and uphold integrity.

These insights are meant to mark a turning point for Tanzanian higher education institutions. I see a growing recognition among scholars and advocates that we can restore the integrity of our universities and of the educators within them.

As we move forward, it's vital that we support a culture of transparency and accountability. University instructors deserve respect, grounded in the principle of "innocent until proven guilty". The damaging narratives of the past should no longer define our institutions. Instead, I believe we can look ahead to a future where Tanzanian universities regain their dignity and serve as pillars of knowledge and integrity.

UDOMSoL's Growing Academic Excellence in Legal Profession: Recent Triumphs in Prestigious Moot Court Competitions

By: Mr. Nicodemus Msika

Department of Private Laws



The University of Dodoma School of Law (UDOMSoL) witnessed some glory moments in the year 2024, by securing in October top positions in two major national moot court competitions. These victories reflect the University's growing reputation as a leader in legal education in Tanzania.

On 16th and 17th October, UDOMSoL participated in the National Humanitarian Law (IHL) Moot Court Competition, organised by the International Committee of the Red Cross (ICRC). In the competition participated by the top eight universities in Tanzania, UDOMSoL was represented by three third-year law students: Amana Richard Mulungu, Brian Christopher Hiza, and Allen Juma Hamis. Demonstrating profound skills in advocacy and legal reasoning, the team delivered an outstanding performance that secured them second place in the competition. For this runner-up position in the competition, each student was awarded an individual trophy, and the University of Dodoma (UDOM) received a team trophy as a result of this outstanding performance by its students.

Just days later, on 19th and 20th October, UDOMSoL showcased its skills once again at the 4th Victory Attorneys National Moot Court Competition in Dar es Salaam. This year's theme, "The Regulation of Carbon Trading in Tanzania," challenged participants to engage with complex legal and environmental issues.

Representing UDOMSoL were LLB students Teckla Machibya and Michael Shayo, who delivered strong arguments and demonstrated exceptional legal research skills. Their efforts earned UDOMSoL the Best Memorial for Defendants Award-Winning Team, underscoring their mastery of legal writing and analysis.

The back-to-back victories in such highly competitive academic events reflect UDOMSoL's fast-growing academic excellence. Through moot court competitions, students gain invaluable practical experience in applying legal principles to real-world issues, sharpening their advocacy and research skills. This practical training is crucial in preparing them for successful careers in the legal profession.



One of UDOMSoL's Representatives (Center) in the 2024 National IHL Competition



Won Trophies in the the 2024 National IHL Competition

Founded in 2007, UDOM has rapidly become one of Tanzania's top public universities in academic excellence. UDOMSOL offers a robust and dynamic law curriculum that prepares students in the mastery of the complexities of the legal profession. The School's emphasis on critical thinking, legal ethics, and practical skills is critical in equipping students with the capacity to address pressing legal issues, both within and outside the borders of Tanzania.

Over the past few years, UDOMSOL has gained recognition for its high academic standards and its ability to adapt to the evolving demands of legal practice. By encouraging students to participate in national and international competitions, UDOMSOL fosters a culture of excellence that extends beyond the classroom. The School's profound success in such academic events demonstrates its growing prominence in Tanzanian legal education underscoring its ability to produce skilled and confident legal professionals.



As we at the School look forward to a much more bright future in terms of growing excellence, I congratulate our students, whose outstanding participation in these competitions flew high the flag of our University.

Human Rights: For Whom and to What Extent?

By: Dr. Emmanuel Kilatu

Department of Foreign Languages and Literature



Human rights are the fundamental freedoms that every person is entitled to simply by being human. These rights apply equally to all, regardless of nationality, age, gender, or background. The Universal Declaration of Human Rights, adopted in 1948 by the United Nations, enshrines rights such as the right to life, freedom from torture, and the right to education. However, the practical application of these rights often depends on social, cultural, and political contexts.

How Far Can Human Rights Stretch?

Despite widespread recognition of human rights, violations still occur in different parts of our world, including the West. For instance, the treatment of detainees at Guantanamo Bay illustrates the pretense of even the most powerful nations. Similarly, the bombing of civilian areas in conflicts like the Israel-Palestine war and the Russian invasion of Ukraine highlights how political agendas can override the protection of human rights.

Julius Nyerere, Tanzania's first President, emphasised the importance of human dignity for all citizens.

He believed that every Tanzanian deserved equal rights, stating, "We must ensure that no Tanzanian is deprived of his or her rights, regardless of background." His commitment to equality guided Tanzania's human rights policies.

The Western View on Human Rights

The West has shaped the modern understanding of human rights, prioritising individual freedoms. Hence, the West often criticises other countries, particularly in Africa and Asia, for limiting or restricting individual rights. In contrast, nations like China and Russia focus more on collective rights, and many African cultures prioritise community welfare over individual freedoms.

While the West pushes for the universal application of individual rights, countries like Tanzania view human rights through a lens shaped by local traditions and values. This disparity demonstrates that human rights, though universal in principle, are interpreted differently across regions on the basis of different values.

Benjamin Mkapa, Tanzania's third President, balanced the importance of human rights with national unity. He often stated, "Individual rights should not come at the expense of the nation's unity." His focus was on ensuring that human rights did not undermine social stability, recognising the unique needs of Tanzania's diverse society.

Human Rights and Multiculturalism

Human rights cannot be applied uniformly worldwide; they must account for local cultures, histories, and political systems. For example, some nations prioritise collective well-being over individual freedoms, which may be seen as a violation of human rights from a Western perspective but viewed differently locally.

In developing democracies, individual rights may be subordinated to national goals. The regimes of leaders like Gaddafi and Saddam Hussein were often accused of human rights violations but also credited with uniting their countries. This shows that the application of human rights is often a balancing act,



where political and national considerations must be taken into account.

Jakaya Kikwete, Tanzania's fourth President, recognised the importance of context in implementing human rights. He stated, "Each nation must adapt human rights to its own needs and cultural values." His approach was pragmatic, acknowledging that the reality of governance often requires prioritising collective over individual rights, especially in young democracies.

Dr. John Magufuli, Tanzania's fifth President, focused on development in an approach which many viewed as undermining human rights. He believed that economic progress could enhance the enjoyment of rights: "A strong economy helps people enjoy their rights, such as education and healthcare." However, his leadership also sparked debates over limits on certain freedoms, underscoring the tension between governance and rights.

Conclusion

Human rights are fundamental to our shared humanity, yet their implementation is shaped by cultural, political, and economic contexts. In Tanzania, the recognition of these rights must consider local realities, as the nation balances individual freedoms with the collective good. While progress has been made, challenges remain in fully enforcing these rights.

As human rights are context specific, in my view, they tend to be slippery or versatile in the manner different nations observe them. It is essential to stay informed of these varied interpretations when advocating for the protection of human rights, ensuring that future generations can enjoy these freedoms within their specific social, cultural, economic, and political contexts. For instance, in emphasising on its traditional culture and identity, Africa may judge same-sex marriages (between men and men and between women and women) as taboo that is not perceivable within the interpretations of human rights.

PUBLICATION CORNER

Understanding the Anatomy of Highly Cited Journal Articles

By: Dr. Lutengano Mwinuka

Department of Economics



The climax of a research process is often a production and publication of a manuscript in a reputable outlet. One of the most remarkable yet frequently overlooked achievements in academia is when an article is cited by other scholars. In recognition of this significant milestone, The University of Dodoma Academic Staff Association (UDOMASA) is working towards establishing an award to honour such contributions, by developing a formal procedure that can best guide the implementation.

A notable example of this success comes from Dr. Godwin Myovella, an academic in the Department of Economics at UDOM. His article has been recognised as the most cited piece in *Telecommunications Policy*, a respected journal published by Elsevier, for more than three consecutive years. Published online in

March 2020 in Volume 44, Issue 2, the article has amassed an impressive 615 citations by October 2024.

Co-authored with his supervisors from Ege University in Turkey and Heinrich Heine University in Germany, Dr. Myovella's article is titled *"Digitalization and Economic Growth: A Comparative Analysis of Sub-Saharan Africa and OECD Economies."*

According to the AD Scientific Index 2025, Prof. Gadde Srinivasa Rao and Dr. Stephen M. Kibusi are the top two scientists at UDOM with the highest citations over the past six years, receiving a total of 1,813 and 1,280 citations, respectively. In comparison, the citation count of Dr. Myovella's paper makes up approximately 35% and 49% of the citations attributed to these two leading scientists at UDOM. The reasons behind this high level of citations are not

entirely clear, but the following are ten likely factors and characteristics of the most-cited journal articles:

The reasons behind the remarkable citation count remain somewhat unclear.

However, certain features contribute to the likelihood of an article being cited extensively. This news article explores the key characteristics that often define the most cited journal articles:

Novelty and innovation are critical. Articles that present groundbreaking research or introduce innovative methodologies significantly advance their fields, attracting attention and citations.

Quality of research also plays a vital role. Well-written, thoroughly research and



methodologically sound articles gain recognition and credibility among scholars, making them more likely to attract enormous citations.

Relevance is another essential factor. An article that engages with ongoing research and current debates becomes a key reference point for other researchers, thus increasing its citation potential.

Influential authorship can further enhance citation rates. When articles are written by well-known and respected researchers, their established reputations naturally lead to more citations.

The impact factor of the journal in which the article is published cannot be underestimated. High-impact journals with wide readership significantly increase visibility, making it more likely for articles to be cited.

Interdisciplinary appeal broadens the audience. Research that spans multiple disciplines attracts citations from various fields, further enhancing its impact.

Timeliness matters as well. Articles addressing current and pressing issues easily become go-to sources for

other researchers and scholars, increasing the probability for them to be cited.

Comprehensive reviews that summarise and synthesise existing research are often highly cited. They provide valuable overviews that researchers rely on, making them essential references in the particular field.

Moreover, collaborative work can amplify citation counts. Articles resulting from partnerships between multiple institutions or countries benefit from a broader network, increasing their reach and citation potential.

Finally, effective promotion through conferences, social media, and open access enhances visibility. This strategic outreach contributes significantly to higher citation rates, ensuring that important research reaches a wider audience.

In summary, the journey to becoming a highly cited article is shaped by a combination of innovative research, quality writing, relevance, and strategic promotion. Understanding these features can help researchers enhance the impact of their work, ultimately contributing to the advancement of knowledge in their respective fields.



Contents lists available at ScienceDirect

Transportation Research Interdisciplinary Perspectives

journal homepage: www.sciencedirect.com/journal/transportation-research-interdisciplinary-perspectives

Dry-season motorbike movement patterns in four villages in Serengeti and Dodoma Districts, Tanzania: Does the movement patterns reflect the night usage in illegal hunting?

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Serengeti ecosystem
Illegal hunting

ABSTRACT

In recent years, bicycle usage has been replaced by relatively inexpensive motorbikes imported from Asia, which currently are claimed to participate in illegal activities including charcoal transportation and bushmeat hunting. The current study recorded the usage of motorbikes during dry season in three villages surrounding the north-western Serengeti ecosystem and compared the patterns with those observed in a control village (Ntyuka) located in Dodoma District, farther from any protected area, to confirm the possible usage of the motorbikes in illegal hunting. Nattambiso Village (highly patrolled area) and patterns observed at Ntyuka Village were similar. Interviewed anti-poaching personnel confirmed the usage of motorbikes in illegal hunting during the day and at night while all village leaders ignored the question relating to motorbike usage in illegal hunting. The movement patterns recorded and analysed from this study do not directly reflect the usage of motorbikes in illegal hunting but they demonstrate the differences that exist among villages with different law enforcement levels. A detailed study, including the application of advanced technology, should be conducted to reveal the day and the night usage of motorbikes in villages adjacent to protected areas. The abundance of resident herbivores in/and around the villages close to protected areas should be assessed too. All motorbikes operating in each village should be registered and the record kept available to public.

Introduction

In Africa, human population growth and development in urban areas stimulate development in rural areas (Adeoye, 2019). In the past, connectivity between urban and rural centers primarily depended on urban-rural commuting buses and trucks (Streit, 2018). However, in recent years following high human population growth in both urban and rural areas those commuting buses and trucks were no longer capable of transporting all people and goods between the two locations; hence bicycles, which were a cheaper transport system, were increasingly used for short distance transport i.e. for distances up to approximately 30 km (Luvunga, 2021).

In Tanzania, the usage of bicycles as a mode of transport for passengers and light goods was initially practiced in Tabora, Shinyanga, and Mwanza regions, probably due to topographical characteristics (i.e. extended flat environment) that favor the usage of bicycles, whereas the first two regions exceed the national household bicycle owning average by almost 50 % (Gikuri and Chetto, 2021). Later on, bicycles were used to transport passengers traveling between the border of Tanzania and

Uganda in the Kagera Region, smuggling commodities between the border of the two countries (Gikuri and Chetto, 2021; personal experience 1993). This system was locally known as bodaboda derived from the English term "border to border". In recent years, the reliance on bicycles has been replaced by relatively inexpensive motorbikes imported from Asia. The introduction of motorbikes and tricycles replaced, to a large extent, bicycles and taxis in rural and urban areas, respectively (Starkey, 2016; Gikuri and Chetto, 2021).

Motorbike transport was considered by most African governments as a more efficient and accessible form of transport than motorcars in both remote areas and narrow streets where motorcars could not get through, thus were licensed to transport passengers and goods (Nyachio, 2013; Turner, 2014; Zuure and Yiboe, 2017). The motorbikes were also considered as an employment opportunity that would increase household income for those engaging in the business and was considered to reduce the economic burden of transport for low-income earning people who could not afford to hire taxis (Luvunga, 2021). In Tanzania, in ten years (between 2006 and 2016), motorbikess increased from under 10,000 to 800,000 (Starkey, 2016). Unfortunately, only the positive

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J. William Nyahongo

Transportation Research Interdisciplinary Perspectives 28 (2024) 101246

impact of motorbike usage was considered as outlined above. The negative impact such as poor preparedness of the cyclists (i.e. poor riding skills), lack of proper road safety education, non-adherence to safety instructions, and the carrying of excessive loads were not considered before issuance of licenses (Starkey, 2016). Moreover, the common injuries or deaths resulting from careless riding behavior (Wickersham, 2023), the usage of motorbikes in illegal activities by robbers (Mugambi, 2021), and the problem of biodiversity loss associated with charcoal transportation and wildlife poaching (TRAFFIC International, 2018) were not considered too before issuing the license. Some authors and conservation institutions have reported the usage of motorbikes in illegal hunting and transportation of illegally obtained bushmeat (TRAFFIC International, 2018). For instance, Nyahongo et al. (2021) report that the usage of motorbikes in bushmeat transportation increases the volume of bushmeat packages and the frequency of their delivery to distant markets (i.e. 200 km) places thereby impacting bushmeat species, especially resident herbivores.

The scale of the current problem posed by motorbikes engaged in the transport of illegal bushmeat (Nyahongo, 2010) needs to be addressed systematically to reduce the impact on biodiversity as well as other environmental impacts such as direct pollution from exhaust emissions. It might be difficult to watch and record illegal bushmeat hunting and transportation, especially at night because those engaging in such activity consider it surreptitious and would not allow a stranger to accompany or follow them. Thus, investigative case studies using observational design may produce important information regarding the illegal activities under investigation. Observing and recording motorbike movement patterns early in the morning and late in the evening in villages that are close to protected areas and comparing the findings with a control village that is located farther from any protected area may help to reveal patterns of motorbike usage linked to illegal activities associated with bushmeat hunting and transportation at night that is currently claimed to present a big challenge to biodiversity conservation in a similar area (Nyahongo, 2010). The investigative case study adopted in this study (Fish and Fish, 2014) needs different approaches and steps that may require more studies to reach an informed and concrete conclusion about the involvements of motorbikes in illegal bushmeat hunting that emerged recently in protected areas; as such the current study would be considered the pioneer (step 1) for the following investigative case studies of motorbikes involvement in illegal hunting and transportation of bushmeat.

According to Capsambelis (2015), criminal investigations are designed to collect information and evidence for identifying, apprehending, and convicting criminal offenders. The two general types of investigation are reactive and proactive. Reactive investigations occur after a crime has been discovered; they involve conducting a preliminary investigation, in which physical evidence is collected at a crime scene, and a follow-up investigation, in which interviews of victims and witnesses are conducted and interrogations of suspects may take place. On the other hand, Capsambelis (2014) narrates that proactive investigations are conducted in anticipation of a crime being committed, to prevent it from occurring, or to apprehend offenders involved in ongoing criminal activities. The current study is anchored on the latter. These investigations typically involve the use of covert or undercover activities. Capsambelis (2014) concludes that the advances in science and technology have enhanced the ability of police to conduct criminal investigations.

When considering the decision of motorbike usage in illegal hunting and transportation, the cost-benefit theory may elucidate such a conclusion. According to Hayes (2024), a cost-benefit analysis is a process of comparing the projected costs and benefits of a decision to determine its feasibility. Businesses can determine whether a decision is worthwhile by summing up the potential rewards expected from an action and subtracting the associated costs. If the benefits outweigh the costs, the decision is likely worthwhile for the business. In this case, any bodaboda would consider the chances of being arrested and or attacked

by wild animals (cost) and the value of the meat hunted and transported successfully to a village (benefit). The value of one giraffe is equated to the value of a brand-new motorbike (Kubania, 2021). Thus, only a day of successful illegal hunting is worth a new motorbike; hence if ambushed and managed to escape alone leaving a motorbike in the field, the owner may obtain a new one after a few days of successful illegal hunting on one giraffe. As such there is an incentive for them to involve in such illegal activity.

The current study aimed to record the usage of motorbikes during the dry season in three villages located close to the boundary of the north-western Serengeti ecosystem (Fig. 1) and compares the movement patterns with those derived from a control village in Dodoma District in an attempt to confirm the possible usage of the motorbikes in illegal hunting, especially at night. The records were conducted in three different areas in the villages: the motorbike wash (a place for washing motorbikes), the motorbike garage, and those found in the passenger waiting lots (parking) during the day starting from 6:00 am to 6:00 pm for 14 consecutive days. The study had the following specific objectives: i) To determine the movement patterns of motorcyclists during the day (hereafter referred to as bodaboda) in the three villages adjacent to the Serengeti ecosystem and one control village in Dodoma District, ii) To explore the opinions of park rangers and anti-poaching personnel from SENAPA and Grumeti Fund, respectively, regarding the usage of motorbikes in illegal hunting in protected areas iii) To explore the opinions of the village leaders and community members regarding the usage of motorbikes in illegal hunting.

During the design phase, the current study assumed that each village office has registered lists of motorbikes and the names of motorbike owners (to facilitate the analysis of present and missing motorbikes during the data collection) and that both anti-poaching personnel and village leaders and the members of communities are people of integrity, loyal and love conservation of nature for the betterment of both communities and the nation, and thus, would not have any incentive to hide the truth or exaggerate the reality. Another assumption made was that the patterns of motorbike movements are not normally distributed i.e. expectations would be for all bodabodas to retire in the evening and rest till morning and that the activities increase from morning hours to noon and slowly decrease to the late evening hours responding to normal human day activities.

Methods

Study area

The study was conducted in Serengeti and Dodoma districts where a total of four villages; three villages in Serengeti District namely Nyamakendo, Robanda, and Nattambiso which were located adjacent to the Serengeti ecosystem, and one control village (Ntyuka Village) was located in Dodoma District far from any protected area (Fig. 1 below here). The bodaboda from these villages were assumed to engage only in transporting passengers and goods. In contrast, the majority of local communities in the three selected villages in Serengeti District including the bodaboda are subsistence farmers, many of whom obtain natural resources inside the protected areas for home consumption and use these natural resources, particularly bushmeat to generate income (Nyahongo et al., 2009; Mfunda and Roskaft, 2010). The four villages were visited during the dry season between August and September 2023 because field practical training takes place after university examinations that end in July each year. Moreover, rivers become overflowed and black cotton soil (which consists large part of western Serengeti) (Jager, 1982) would hinder the movement of both legal and illegal vehicles.

Research design

This investigative case study adopted observational research design which is a research technique where one observes participants and

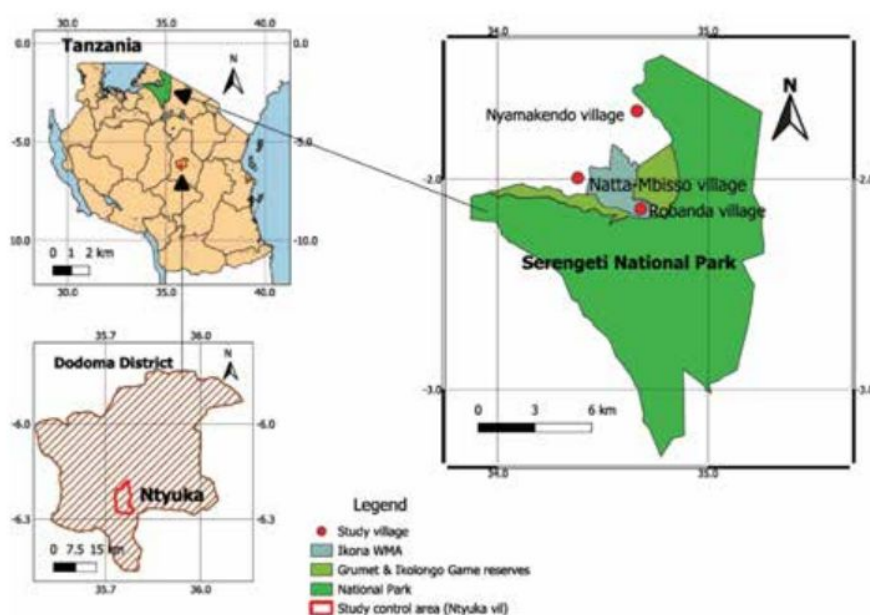


Fig. 1. Map of Tanzania showing villages where data were collected in Serengeti and Dodoma districts.

phenomena in their most natural settings enabling researchers to see their subjects, make choices, and react to situations in their natural settings without alerting the subject (Rezigalla, 2020). In addition, the study espoused survey research, which is often used to understand and analyze new trends, such as the usage of motorbikes in illegal bushmeat hunting and transportation (Owens, 2002).

Sampling techniques

Three villages in the Serengeti District were purposively selected based on the distance from the protected areas and the intensiveness of ranger patrols. In addition, the same villages in the Serengeti District are also used by the Department of Biology (the University of Dodoma) as field practical sites for graduate students and are visited each year when training is conducted in that part of the Serengeti ecosystem. However, the funds allocated for field practical training, timetable for field activities, and number of days allocated could not warrant the visiting of more equally important villages. A village in Dodoma District was conveniently selected because the principal investigator and three graduate students who assisted in data collection lived in the village hence reducing research costs. Specifically, Robanda Village was selected based on its position as the only village inscribed within a protected area (see Fig. 1). Thus, the village is assumed to be an area with the highest potential for illegal bushmeat hunting as wild animals interweave village land, particularly at night. Nyamakendo Village borders Serengeti National Park directly by the east and is about 15 km from the Tanzania-Kenya border. Hence, the village is assumed to engage more in cross-border business, especially in illegal bushmeat trafficking to Kenya influenced by profit gradient. It should be noted that Kenyan shillings currently is much more valuable than Tanzanian (i.e. as of 26th January 2024, 1 Kenyan shilling equals Tanzanian shillings 15.38, see <https://wise.com/us/currency-converter/kes-to-tzs-rate>). Nattambiso Village borders Grumeti Game Reserve by the north. If distance to a protected area and the intensity of patrols are the determinant of illegal bushmeat hunting and transportation this village is assumed to experience less involvement in illegal bushmeat hunting and hence transportation of bushmeat because the area is well patrolled by Grumeti Fund as well as Serengeti National Park (SENAPA) rangers (Grumeti antipoaching officer, personal communication). Thus, the usage of motorbikes in illegal bushmeat hunting is assumed to be

relatively highest at Robanda followed by Nyamakendo, and least at Nattambiso.

Antipoaching officers to interview were nominated by the park authority. Since conservation in Tanzania currently adopted a paramilitary mode, sensitive communication is militarily controlled. Hence, the agreement by order was to interview two park rangers from the northern part, two from the central and the other two from the western sections of the park. Why only two? The authority claimed that it is easier to handle the information coming from one or two people because degree of freedom is zero or one, respectively; if they disclose the issues that should be for only park consumption, it would be easier for the authority to know between the two who might have disclosed it from that particular section. The park considers the issues relating to antipoaching sensitive and must be controlled. Understanding the nature of the study and as claimed by the park authority, we also adopted a minimum number of respondents to include in the interview. Following that I only interviewed village leaders and three community members from each selected village at least to have three degree of freedom in each village. The three participants who were interviewed in each village were selected randomly using the list of names of individual people who attended the introductory meeting held between researchers and the village communities organized at an office chaired by village chairpersons or their representatives. Each respondent was interviewed separately in a secluded area for less than 10 min and was alerted not to disclose to others about the questions discussed. We did not disclose the following activities of recording motorbike movements to leaders and the other community respondents because that operation required several days to accomplish. Students had another assignment of enumerating human-wildlife conflict cases which was the main purpose of practical training, hence it was possible to stay in the villages collecting data without interference.

Data collection

Two sets of data were collected; direct recording of the motorbike activities every hour from 6:00 am to 6:00 pm in each village. The activities recorded included the number of motorbikes in 1) the motorbike wash 2) motorbike garage and 3) those waiting for passengers or just leaving the motorbike parking stations. The research assistants and graduate students stationed themselves at or near the motorbike wash,

J. William Nyahongo

Transportation Research Interdisciplinary Perspectives 28 (2024) 101246

motorbike garage, or passenger waiting lots where they could record the motorbike activities once every hour each day for 14 consecutive days. Data were also obtained from interviews with park rangers from SEN-APA and game rangers from Grumeti Fund and also from village communities including leaders. Both rangers and community members were requested to describe the usage of motorbikes in illegal bushmeat hunting. After a formal introduction, the rangers were requested to explain how long they had been serving the institutions they worked for. They were further requested to explain the noted difference in anti-poaching activities by comparing the current situation and the past (i.e. five, ten, and more than ten years). They were also requested to explain if they had encountered and apprehended poachers with motorcars, motorbikes, bicycles, donkeys, and/or walking groups inside the protected areas. Specific to motorbikes, the respondents were requested to explain how the poachers organize and use motorbikes, which species of animals were targeted, and what time of the day and season of the year the poachers use motorbikes more. Moreover, the respondents were requested to explain if they had arrested any poachers using motorbikes inside the protected areas and which villages were the arrested poachers coming from. Lastly, the respondents were requested to suggest the way forward. The respondents were assured that the information was for research purposes only and that researchers would not disclose their identities, ranks, and positions at their respective organizations. On the other hand, three village leaders and six village members from Robanda, Nyamakendo, and Nattambiso villages, after assuring them that the information was only for research purposes and not otherwise and that their names would not be indicated elsewhere, were requested to provide information about illegal hunting using motorbikes and any arrest of a villager or any member whose motorbike was confiscated by park authority or police due to illegal hunting or transportation of bushmeat. They were also requested to explain their attitude towards conservation and the current existing relationship between park authority and village communities. The assumption is made here that when the leaders and local communities have a negative attitude toward conservation, they would not have an incentive to support the program and hence would not disclose the illegal activities taking place in their respective villages. Finally, they were also requested to suggest the way forward.

Eight graduate students, one academic staff from the University of Dodoma, and three trained research assistants from each village in the Serengeti District participated in data collection. Students and research assistants participated in motorbike activities while the academic staff conducted the interviews. The research assistants (they assist students each year and are known to the academic staff) in each village were trained and worked with graduate students for five consecutive days before being left alone to follow the laid procedure for the next nine consecutive days. In a control village, three graduate students volunteered to collect data for 14 days; one at the motorbike park at the junction of Mvumi-UDOM road; the second visited the two established motorbike garages along Dodoma-Mvumi road, and the third student collected data at the motorbike wash along the later road.

Ethical consideration

The current study followed ethical principles to guide the research designs adopted and practices. These principles included voluntary participation, informed consent, anonymity, confidentiality, potential for harm, and results communication. Since the study only sought information about the illegal use of motorbikes, the participants were assured of confidentiality and were informed to decide voluntarily to participate in the current study. In addition, the participants were interviewed in secretive areas and alerted not to disclose what the questions were all about. The findings are important for conservation, hence, the conservation communities and policymakers are the beneficiaries of the findings of this study and thus were the ones to be informed of the findings.

Data analysis

Statistical tests were performed using the Statistical Package for the Social Sciences (SPSS, Version 22 for Windows). The normality test was done through a visual inspection of the database stored and the researcher's experience. This was done due to the small sample size experienced from the current investigative case study. Descriptive statistics were used to calculate the means and standard errors of the means. The results were presented as Mean \pm Standard Error and summarized as figures and texts. Non-parametric tests were employed to compare the mean number of motorbikes in any given hour found in the garage, motorbike wash, or parking lots. For the sake of analysis and comparison of hourly motorbikes movement patterns in the village, the patterns were grouped as follows: early morning (6 am to 8 am), late morning (9 am to 11 am) afternoon (12 pm to 2 pm), evening (3 pm to 4 pm) and late evening (5 pm to 6 pm). For all comparisons among test categories, $p > 0.05$ was considered insignificant.

Results

An overview

During the data collection, the researchers, especially those who were recording motorbikes activities, had sufficient time to socialize with village members. For ethical reasons, the names of rangers who participated in interviews during the data collection were sheltered. Village leaders and community members were not cooperative, especially when requested to disclose information about the number of village members arrested and the number of motorbikes confiscated due to illegal hunting from their respective villages. Rather, they responded by blaming rangers whom they considered harsh to communities while failing to protect their farms from elephants (*Loxodonta africana*). No village office had registered motorbikes operating within its area of jurisdiction. Most motorbikes that were operating in the three villages located in Serengeti District were not new; their ages of operation ranged from 10 or more years except nine motorbikes at Nattambiso which were less than two years in operation, five at Nyamakendo and four at Robanda.

Motorbikes hourly recorded activity patterns

Hourly activity patterns of motorbikes recorded in four selected villages are summarized in Fig. 2. In all four sampled villages, the early morning hours (i.e. 6 am to 8 am), motorbike numbers recorded at the passenger waiting lots were relatively low. However, the numbers increased at an increasing rate from 6 am to about 9 am thereafter assuming irregular movement patterns in all villages throughout the day. The motorbikes found at the bike-wash and at the garage were relatively high early in the morning and declined in numbers during the day at Robanda and Nyamakendo villages. In the same villages, the number of motorbikes at the garage increased from 15 h to 18 h in the evening, but the numbers recorded at the motorbike wash were relatively low. In contrast, the numbers of motorbikes recorded at the garage and the motorbike wash early in the morning and throughout the day were low (Fig. 2) at Nattambiso and Ntyuka villages. However, the two villages experienced increasing numbers of motorbikes at the garage and motorbike wash from 15 h to 18 h when the data collection stopped.

Overall, the mean number of motorbikes at the parking lots early in the morning (06:00–08:00 am) almost differed significantly among villages including the control village (Parking: Kruskal-Wallis, $\chi^2 = 7.738$, $df = 3$, $p = 0.052$). However, the mean numbers of motorbikes found in the garage and motorbike wash early in the morning differed significantly among the four villages (Garage: Kruskal-Wallis, $\chi^2 = 41.901$, $df = 3$, $p = 0$; Motorbike wash: Kruskal-Wallis, $\chi^2 = 42.289$, $df = 3$, $p = 0$). However, when movement patterns from Nattambiso were compared to those observed in Nyamakendo and Robanda villages, the patterns

J. William Nyahongo

Transportation Research Interdisciplinary Perspectives 28 (2024) 101246

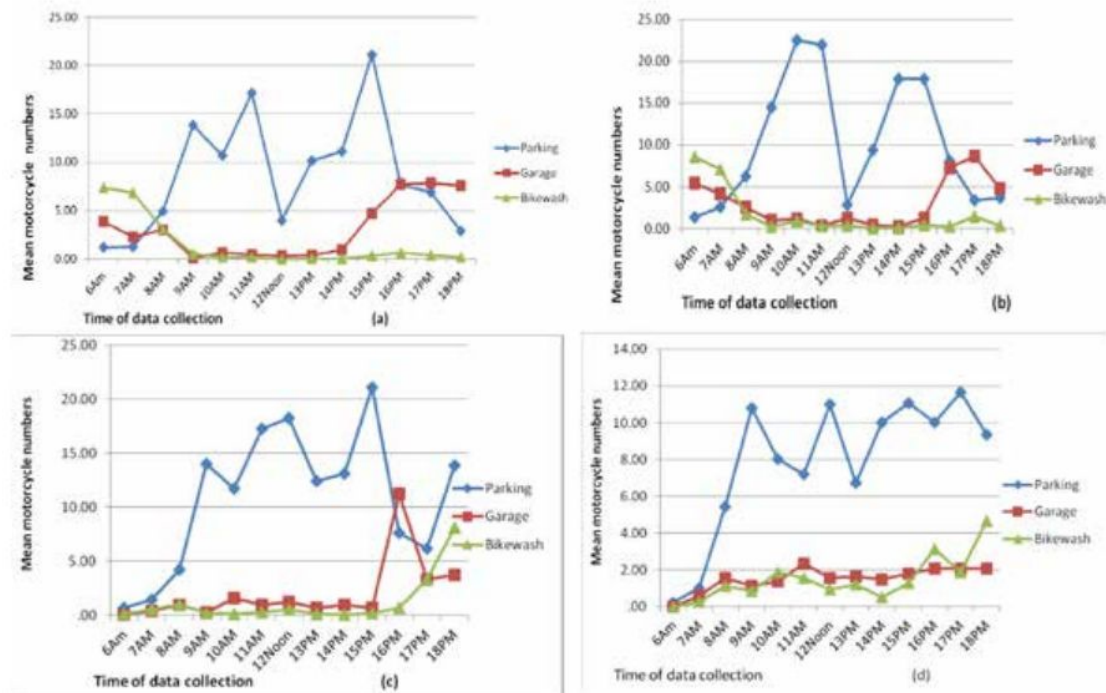


Fig. 2. Mean motorcycles' daily movement patterns in four villages: a) Nyamakendo, b) Robanda, c) Nattambiso, and d) Ntyuka.

differed significantly (Parking: Kruskal-Wallis, $\chi^2 = 6.469$, $df = 2$, $p = 0.039$; Garage: $\chi^2 = 28.103$, $df = 2$, $p = 0$; motorbike wash: Kruskal-Wallis: $\chi^2 = 28.407$, $df = 2$, $p = 0$). When Ntyuka Village (control) patterns were compared to patterns from Nattambiso Village which is adjacent to the Serengeti ecosystem, but more patrolled, the patterns did not differ significantly (Mann-Whitney test. Parking: $U = 93.500$, $p = 0.835$; Garage: $U = 67.500$, $p = 0.146$; Motorbike wash: $U = 86.500$, $p = 0.576$).

Comparing the late evening motorbikes movement patterns was possible because during this time, following human daily activity patterns, assumption was made that the bodaboda were preparing for night rest. Thus, the expected patterns would be similar among villages (i.e. mean number of motorbikes at parking lots, at the garages, and the motorbike wash). The overall trend among four villages suggested a significant difference (Parking: Kruskal-Wallis, $\chi^2 = 35.683$, $df = 3$, $p = 0$; Garage: Kruskal-Wallis, $\chi^2 = 31.965$, $df = 3$, $p = 0$; Motorbike wash: Kruskal-Wallis, $\chi^2 = 40.686$, $df = 3$, $p = 0$). Moreover, when three villages adjacent to the Serengeti ecosystem were compared, the patterns for all parameters revealed a significant difference (Parking: Kruskal-Wallis, $\chi^2 = 20.547$, $df = 2$, $p = 0$; Garage: $\chi^2 = 16.516$, $df = 2$, $p = 0$; Motorbike wash: Kruskal-Wallis: $\chi^2 = 28.114$, $df = 2$, $p = 0$). Again, data from Nyamakendo and Robanda villages suggested similar patterns during that time of the day (Mann-Whitney test, Parking: $U = 93.500$, $p = 0.836$; Garage: $U = 86.000$, $p = 0.580$; Motorbike wash: $U = 76.000$, $p = 0.258$). However, when late evening patterns from Ntyuka Village (control) were compared to patterns from Nattambiso Village, the only patterns that differed significantly were those recorded at the motorbike wash (Mann-Whitney test, Parking: $U = 90.000$, $p = 0.712$; Garage: $U = 57.500$, $p = 0.061$; Motorbike wash: $U = 86.500$, $p = 0.001$).

Discussions with Officials

Discussions with rangers regarding the usage of motorbikes in illegal hunting.

In total six park rangers and two game rangers from SENAPA and Grumeti Fund, respectively, were interviewed. All eight ($N = 8$) rangers

interviewed revealed that motorbikes are used in illegal bushmeat and trophy hunting and are rapidly replacing snare wires and pitfall traps that have been in use since time immemorial. One ranger from SENAPA lamented:

"These days, patrols in the park are difficult because, unlike those years when we were hiding and ambushing the walking group of poachers, today we are dealing with bodaboda who understand the park very well and recognize the paths and roads they use. If you use a car to chase them, they would lead you to large gullies or the meandering paths along the river banks, sometimes they carry with them on the motorbikes the pointed nails welded on a long bar of iron or a chain, when you approach them, they would drop it to puncher your tires".

Other interviewed game rangers from Grumeti Fund ($n = 2$) had similar observations and conclusions. One of the two rangers from Grumeti Fund claimed that poachers from Nattambiso would not dare to get into the reserves close to their village because the Headquarter of Grumeti Fund is located in the village and trained Village Game Scouts patrol the area regularly. The respondent claimed further that the usage of motorbikes in illegal hunting is widespread in villages bordering the reserves like Kyandegge, Mariwanda, Mihale, Ihumbu, Mgeta, and Nyamatoke. The respondent added that the poachers are well coordinated and they understand the movement of anti-poaching squads; they have their intelligent systems or informers who explain to them the anti-poaching plans and movement patterns. The ranger said:

"In the past, our company used to ground all vehicles for general service on Tuesday of every week; a mistake that the poachers took advantage of. It looked like they had their informer right in our company who was explaining to them what was taking place in the company probably daily. Informed of such an arrangement they (poachers) took that advantage and went inside the reserves to conduct illegal hunting without facing any challenge from armed rangers."

Rangers from SENAPA ($n = 6$) were requested to list villages whose

J. William Nyahongo

Transportation Research Interdisciplinary Perspectives 28 (2024) 101246

communities frequently engage in illegal hunting using motorbikes in the Serengeti District. The following were villages that were listed (in the parentheses are the frequencies of a village name repeated by individual park rangers: Park Nyigoti (100 %), Tabora B (100 %), Rwamchanga (100 %), Nyamakendo (100 %) and Mbalimbali (100 %). Other villages included Kisangura (83.3 %), Tamkeri (83.3 %) and Karakatonga (83.3 %). Villages that scored less than 70 % included Itununu (66.7 %), Manyata (66.7 %), Nyichoka (66.7 %) and Matanka (66.7 %). Villages that scored 50 % or less included Kibanchabancha (50 %), Zanzuri (50 %) and Rung'abure (33.3 %).

Additional questions posed to respondents requested them to explain how illegal hunters use motorbikes off-road. A ranger from SENAPA who claimed to have witnessed the hunting operation when hiding before ambushing the poachers from the hideout explained that the illegal hunters usually come in groups of two persons per motorbike. The ranger explained further that the bodaboda would select and target one individual animal from a group and would chase it while the one in the back of the motorbike held a spear and/or machete ready to spear or cut the Achilles tendons while running. After injuring the animal, they would keep on chasing it until it is exhausted and ultimately fall down. The respondent claimed that this method of spearing or chopping on motion is common to eland (*Tragelaphus oryx*), zebra (*Equus quagga*), wildebeest (*Connochaetes taurinus*), topi (*Damaliscus lunatus*), and hartebeest (*Alcephalus buselaphus*) but not to buffalos (*Syncerus caffer*), giraffes (*Giraffa camelopardalis*) or any other large mammals like elephants. The ranger claimed that buffalos usually retaliate while giraffes are tall and are capable of kicking using all four limbs independently. When targeting smaller ungulates like gazelles, the illegal hunters on the motorbike use a rope that is thrown around the neck of a targeted animal to strangle it. Once they are successful in killing the animal, they just cut the carcass into pieces and carry the meat to skin it in the villages sometimes leaving the offals behind. Finally, the ranger said that small-sized ungulates, or young ones, are carried intact on the motorbike to process the carcass in the village. He concluded that Bodaboda would choose the open flat terrain for such operations.

Moreover, the respondents were requested to explain if they had ever been arrested or participated in an operation that led to the arrest of such illegal hunters using motorbikes. All rangers from SENAPA and the two from Grumeti Fund ($n = 8$) claimed to have more than five times participating in arrest of such illegal hunters between 2016 and to date and said that in most cases when the illegal hunters realized that they were surrounded, they would run away on feet leaving their motorbikes loaded with illegally hunted carcass. They claimed that most motorbikes apprehended were missing registration numbers and when scrutinized, most of the motorbikes were the stolen ones. One ranger from SENAPA said:

"If one visits police stations around the Serengeti ecosystem, he or she will find a good number of motorbikes that were either collected inside the park or game reserves whose owners ran away when rangers ambushed them or were jailed. However, some poachers are normally involved in accidents and may die on the spot or perhaps are killed by large carnivores inside the park or by buffalos, or elephants. When that happens, rangers would encounter the lone motorbikes and sometimes human skeleton; because they would have been scavenged by carnivores. This is bad because they make these carnivores taste human flesh and soon would go for easy prey in villages or attack rangers when patrolling the park on foot".

Furthermore, respondents were requested to explain based on their experience, the season when the motorbikes are widely used. All six rangers and the two anti-poaching personnel claimed that the usage of motorbikes, based on the number of poachers arrested, usually takes place during the dry season. One ranger explained that the soil in the northwestern part of the Serengeti ecosystem is black-cotton type which becomes sticky when wet, thus motorbikes cannot effectively be used during such period. Finally, the ranger concluded that there are also big rivers (i.e. Grumeti, Robana, and Orangi rivers) and their tributaries that

become flooded during the rainy season and hence would act as barriers blocking bodaboda from crossing.

Likewise, the researcher asked the respondents about the time of the day when the motorbikes are widely used. This question produced mixed responses; five rangers claimed that illegal hunting using motorbikes mostly takes place at night and that the poachers do not venture far into the park; they would just hunt animals that come close to villages at night. The ranger claimed further that the poachers would go inside the park on foot during the day to scan where to go at night and sometimes they take with them maize bran that they pour on the ground along the gradient of distance from the park towards the village land to attract wild animals close to the village at night. However, one ranger from SENAPA and the two anti-poaching personnel from Grumeti Fund claimed that the motorbikes used in illegal hunting take place during the day. One anti-poaching officer from Grumeti Fund also claimed that the usage of motorbikes during the day is preceded by a small group of individuals who would scan the area where the operation would take place. The respondent said:

"Usually, the scanners would climb on tall trees along the gradient of distance from the village towards the protected area. They would use mobile phones to lead the bodaboda to safer areas. Once they spot rangers they would alert the bodaboda who would change the direction or abort the operation and go back to their respective villages."

In addition, the respondents were requested to recommend the best way to stop illegal hunting using motorbikes. Regarding controlling the use of motorbikes in illegal hunting; all respondents claimed that the bodaboda are difficult to control because they are defended to a certain degree by politicians they are voting for or some influential people in the area or public offices, so any recommendation that needs political support could not work. They claimed that politicians consider the bodaboda business as a solution for a pressing challenge of unemployment to youth and hence include it in their political manifesto. A park ranger from SENAPA claimed:

"Fighting illegal bodaboda business is equal to campaigning for opposition parties to win the election to overthrow the ruling one. In the country, in every village and street you visit one will find conglomerations of bodabodas. Politicians may favor the business because some of them have purchased motorbikes and recruit these young individuals to ride for business. hence biodiversity conservation becomes a second priority for political leaders."

Finally, all rangers concluded by claiming that they were also designing a way to counteract the usage of motorbikes by poachers that they were not ready to disclose to researchers at that moment. One claimed:

"The medicine for motorbike usage in illegal hunting is already boiling in the kitchen, soon will be served to them."

Discussions with village leaders and community members regarding the usage of motorbikes in illegal hunting

Similar questions regarding the usage of motorbikes in illegal hunting that were discussed with rangers were posed to three village leaders and six community members in the three villages located in Serengeti District. Before asking standard questions, the researcher requested village leaders and community members to confirm if they owned motorbikes and how the motorbikes were used. All respondents, except one from Nyamakendo, had one or more motorbikes that they claimed to use as bodaboda and/or for private transport. In one village a respondent claimed that their leader had been purchasing a good number of motorbikes and contracted youth from the village to use and pay a certain amount of money each day for an agreed duration and thereafter the motorbikes belonged to the contracted persons. The respondent claimed

J. William Nyahongo

Transportation Research Interdisciplinary Perspectives 28 (2024) 101246

further that this arrangement by the village leader was important to reduce poverty and unemployment in the village. When one contracted bodaboda was asked about such an arrangement, the respondent confirmed that the leader was fighting poverty and unemployment among youth in the village and all were happy with him regarding this arrangement (William Omari Nyamboreti, personal communication, October 21, 2023). The respondent claimed further that when they are given new motorbikes on contract they are given 12 months at the return payment of Tsh. 10,000 per day (USD 3.9) per motorbike which totals up to Tsh. 3,600,000 (USD 1411.8) per year. The model of motorbikes they prefer is Kinglion, SUNLG, and SANLG. A new Kinglion model like the one the contracted bodaboda was using, cost about Tsh 2,550,000 (USD 1,000) in Musoma town, Tanzania. The leader does create employment by hiring out motorbikes and this provides a small profit (i.e. Tsh. 1,050,000 or USD 411.8 per year per motorbike equivalent to Tsh. 2,868.8 USD 1.12 per day). When I enquired why these three types of motorbikes were preferred rather than Boxer models which are considered by users in town to be fast, strong, and powerful, the respondent replied that the Boxer models do not have enough space in the back for carrying bulkier loads other than one or two passengers.

When village leaders and community members ($n = 9$) were requested to explain how motorbikes were used by owners or contracted riders in the village, all claimed that they were only used to transport people and goods. They insisted that the usage of motorbikes to ferry people and goods has created employment opportunities for especially youth who did not have any stable and legal source of income before. A leader from Nyamakendo village confidently claimed:

"In the past, we never used to sleep at night, especially for one with a herd of cattle. Cattle rustlers, most of them from this village were breaking into the livestock boma at night stealing some or all livestock. When you get up in the morning, if you slept carelessly, you find nothing. However, these days we are sleeping because the bodaboda are active almost throughout the night, hence, they deter the cattle rustlers. Also, some bodaboda who were suspected cattle rustlers have now a stable source of income and, hence would not engage in stealing cattle or collaborating with others to enhance such illegal activity."

Similar explanations were uttered and confirmed by other leaders and selected community members from the other two villages. In a way, indirectly, village leaders admit that bodaboda are active day and night. When requested to give their opinion regarding the usage of motorbikes in illegal hunting, they all said that nobody to their knowledge from their respective villages used motorbike in such illegal activity. When asked to produce the registered number of motorbikes operating in their area of jurisdiction, no leader had any figure or a register book for such motorbikes. They claimed that these days motorbikes are numerous and are purchased and sold like bicycles or goats.

Moreover, researchers also enquired if there were people from the three villages who had been missing after entering the park or reserves illegally. All claimed to know no one. However, a leader from Nyamakendo claimed that only one person who was killed by elephants was just attending his farm close to the park boundary. The village leader said:

"The only challenge we are facing here in the village is the elephants. We cannot do any domestic work other than guiding our farms from the time the seed germinates to the day we harvest. We have several people injured by elephants when attending their farms. Some lost their lives by elephants attacks. While all these happen, the park authority does not compensate people or the victims' families. But when you take livestock in the park for water or pasture, they are confiscated. To get them back, you have to pay huge fines up to Tanzanian shilling 100,000 (USD 40) per head of cattle. We have a person here in the village completely paralyzed after an elephant attack at his farm on November 4, 2016. The victim was admitted to

Bugando Hospital in Mwanza City and was demanded to pay Tanzanian shillings five million (USD 2000) to enable the hospital to operate him to correct the problem that caused paralysis but the victim and the family did not have that money. When the park authority was approached they did not help him. Communities in this village have negative attitudes towards conservation because when the wild animals cause problems to any community member, park authority does nothing but when a member of this community is encountered in the park even before breaking any law, they are punished severely."

General discussion

The findings of the current study reported here had several limitations that might have influenced the quality of data and subsequent analyses. Currently, there are few studies linking the usage of motorbikes in illegal bushmeat hunting, hence such limitation would influence the theoretical framework affecting the overall scope, depth, and/or applicability of the current study. Methodologically, a limited number of participants based on the sensitive nature of the study, lack of motorbike registration data in each village sampled, and the reluctant of village leaders and respondents from the community members might have negatively influenced the quality, quantity, or diversity of the data collected and analysed. Empirically, inadequate funds for sampling more villages, and a limited number of data collection days might also have limited the representativeness, validity, or reliability of the data hence affecting the overall quality of the findings. Repentantly, the analysis of the movement patterns of motorbikes reported in the current study is based on direct observations of public places like motorbike wash, motorbike garages, and parking stations. Thus it is possible that the persons of interest (illegal hunters) were storing their motorbikes in private places or were not concerned that their motorbikes were dusty, so they would not visit a motorbike wash the next day. Because of these factors, it is possible that relevant data are missing and that this influences the results of the current study.

Generally, the motorbike movement patterns recorded were monitored through direct observations without alerting any bodaboda on what was recorded hence the information presented in this study is likely to be the true representative information of what takes place each day in the selected villages during the dry season. On the other hand, the information gathered from park rangers and anti-poaching personnel from SENAPA and Grumeti Fund, respectively, were their own experiences that cannot be confirmed or disregarded. However, the information on motorbike usage in the villages gathered from village leaders and other community members may be false because village leaders and some community members interviewed own motorbikes and thus are generating income from the bodaboda business. The issue of illegal bushmeat hunting is considered sensitive to local communities living close to protected areas and hence cannot be disclosed to strangers who are not trusted (Loibooki et al., 2002; Mfunda and Røskaft, 2010; Nyahongo, 2010).

Two weeks of observation of motorbikes movement patterns in each village confirmed the complicated movement patterns of individual people in their respective villages during the day. Unlike wild animals that aggregate in relatively large numbers and move together while grazing or searching for food and water, humans are super-social animals whose activities are myriads and are so independent. Human being a diurnal animal, are therefore active and accomplish most of their daily activities during the day and therefore when monitored, their movement patterns would produce zigzag patterns as summarized in Fig. 2. NOE et al. (2021) report similar irregular movement patterns of people in rural Africa.

Motorbike movement patterns early in the morning suggested similarities between Nyamakendo and Robanda villages and the patterns observed at Nattambiso Village presented similar patterns as those

J. William Nyahongo

Transportation Research Interdisciplinary Perspectives 28 (2024) 101246

observed and recorded at Ntyuka Village (Fig. 2). The similarities and differences observed that are reported in the current study might have occurred by chance or may suggest similar activities at night of the bodaboda in the pair villages presenting similar patterns. One may argue that, when considering the patterns from Nyamakendo and Robanda villages, the relatively large number of motorbikes at the motorbike wash early in the morning were those that might have been involved in illegal hunting at night and had blood smears that needed to be thoroughly washed in the morning before being sent to carry passengers. However, others might argue that the motorbikes had dust and were dirty from the last service on the previous day and hence must be cleaned next service. The current study did not check the presence of any evidence of illegal activities that might include blood smears and or pieces of meat or fur, which of course, would require a special laboratory for species identification using DNA markers.

Similar arguments might be true for motorbikes recorded at the garage early in the morning; that the motorbikes had some problems when used at night and/or the previous day's service had resulted in minor breakdowns that needed to be maintained before the commencement of the present-day service. However, the question that remains is: why do the early morning patterns at Nyamakendo and Robanda differ from the patterns observed at Nattambiso and Ntyuka? Basing our arguments on what rangers lamented (see result section 3.2), it was difficult to conduct illegal hunting using motorbikes at Nattambiso Village because the patrol is relatively high at the village. Thus, it is tempting to suggest that the patterns observed at Nyamakendo and Robanda villages to some extent involved motorbikes that were used at night for illegal hunting and therefore must be cleaned and maintained before being used to carry passengers and goods during the day.

Understanding what is taking place in villages would be better documented by village leaders and community members who are in the villages and understand the business carried out by local communities, including bodaboda. However, perhaps due to political or economic reasons, village leaders and community members interviewed, declined to disclose the truth that might expose their voters and relatives. Leaders might be aware of motorbikes that were used in illegal hunting or transportation of illegal bushmeat but their priority would be to defend their voters to safeguard their positions in the villages they are leading and possibly to also benefit directly or indirectly from illegal hunting. This might involve the donation of motorbikes in return for receiving money collected from the transportation of people or bushmeat and/or the receipt of illegal bushmeat. Indirectly, leaders may increase their popularity in their communities by overlooking illegal activities such as illegal bushmeat hunting and transportation of illegally obtained bushmeat to attract voters in the next election season. Elsewhere, leaders had been reported to create their gangs of poachers to benefit directly from the accrued funds or illegally obtained bushmeat (Nixon and Haller, 2010; Nyahongo, 2010). On the other hand, the community members interviewed might decide to hide the truth about the usage of motorbikes for two reasons; to be wary of what might happen to them if the illegal bushmeat hunters realize that they were the people who disclosed and exposed their illegal activities or they might have been engaging in such illegal business directly or indirectly. This may be more likely to occur when the local leaders and the community members do not benefit directly from conservation-related businesses or projects. Village leaders interviewed in the current study chose to discuss the burden the communities incur from wild animal attacks on livestock or humans and damage to crops, plus negative interactions between local people and the protected areas authorities when no compensation was forthcoming following wildlife attacks. Thus the leaders and community members were generally reticent to talk about the problem of illegal bushmeat hunting on motorbikes or the use of motorbikes to transport illegal bushmeat.

All village leaders suggested a suitable way to improve the relationship between local communities and the protected areas authorities, which was regular meetings between the two parties i.e., the village

leaders representing communities and the park/reserve authorities. They also suggested the establishment of permanent committees to deal with challenges emanating from the park and those from the surrounding communities. The suggestions by the three leaders were similar and if the authorities consider this in their management plan and act quickly when an animal injures or kills a person, such negative attitude may change slowly to a positive. As put by Kaltenborn *et al.* (2008, p. 106) when conducted a study in a similar area, I quote:

"There is little interaction between park staff and adjacent communities, and while support is given to community projects, minimal benefits are distributed to the household or individual level. The current situation of supporting community-initiated projects seems to be incapable of facilitating improved people-park relationships."

The quoted phrase is from a study conducted in the early 2000 s; more than two decades, in the western Serengeti ecosystem. Even so, its message is relevant to the current situation between the national park and associated protected areas and people in local communities. How long should we wait to see positive interactions between Park and People? Almost a decade ago Bencin *et al.* (2016) suggested that to ensure coexistence between wildlife and humans, damage prevention through technical measures, compensation of incurred costs, social outreach, and educational initiatives should be listed as the top priority in conservation project planning as these may increase positive attitudes to wildlife. If protected areas are to conserve biodiversity and viable wildlife populations amid high human population growth, the wildlife authorities should be able to limit the negative impact of technological advancements that increase the efficiency of bushmeat hunting. In addition, revenue generated by national parks and protected areas should be used to compensate individuals for the damage or loss of crops and wildlife. A well-administered compensation scheme would build trust in local communities and with time might help decrease illegal activities such as bushmeat hunting within national parks and other protected areas. Given the current high rate of human population growth and the associated destruction of natural processes in terms of catastrophic declines in biodiversity and the severity of climate change, natural processes in national parks and protected areas must be preserved. This requires national and local political leaders working together with the national parks and protected areas authorities to develop protocols that facilitate the ability of local people to apply for and receive compensation for wildlife damage to crops and livestock or injury to people.

Conclusion and recommendations

Conclusion

Based on motorbike movement patterns during the day, it is difficult to derive a workable conclusion on the usage of motorbikes in illegal hunting but rather the patterns demonstrate the differences that exist among villages that raise an important question for researchers and scholars. The current study concludes that the views of game rangers were genuine and are the fact of how motorbikes are currently used in illegal bushmeat hunting during the day and at night in the villages adjacent to protected areas. As discussed earlier village leaders and community members seem to benefit directly or indirectly from the usage of motorbikes, their views on the usage of motorbikes in illegal hunting should be noted cautiously. Finally, the current study conclude that (based on village leaders and community members' opinions) the park-people relationship is currently poor.

Recommendations

The current study recommends a detailed study on the usage of motorbikes in the villages close to protected areas including the motorbike models. Moreover, the conservation authorities should

J. William Nyahongo

engage trusted people from the surrounding villages to act as game scouts who would assist in combating the poaching activities using motorbikes in their respective villages. The use of cameras set in remote places close to where the poacher would likely pass might confirm what game rangers suggested. Conservation and communities should work together to solve all challenges emanating from wild animals and those caused by poachers. For security purposes, the ministry responsible for transport should instruct all villages to prepare lists of all motorbikes operating in their areas of jurisdiction.

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CRediT authorship contribution statement

Julius William Nyahongo: Writing – review & editing, Writing – original draft, Visualization, Validation, Supervision, Software, Resources, Project administration, Methodology, Investigation, Formal analysis, Conceptualization.

Declaration of competing interest

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

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Data availability

The data that has been used is confidential.

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Transportation Research Interdisciplinary Perspectives 28 (2024) 101246

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POEM

When One Reads Books

By Dr. Naomi Isanzu,

Department of Sociology and Anthropology, Head of CHSS Library



*No man's brain
Can drain
In rain
Knowledge to attain
Attempt not to complain
When one reads books*

*I ponder
Yet I wonder
Is there wander?
No blunder
Sharp minds must thunder
When one reads books*

*Far away
One sees a way
But not if minds
Are fraught with play
We need the sway
When one reads books*

*The light
So bright
A beacon of insight
Lecturers must ignite
Curiosity's flight
When one reads books*

*Search and get
Knowledge is set
A ticket
To sunset
Let's not bet
When one reads books*

*Truth unveiled
Knowledge revealed
Yet those who guide
Must be well-prepared
Informed and seasoned
When one reads books*

*To challenge thought
With wisdom sought
Lecturers must weave throughout
A tapestry uncaught
Of insights ever fraught
When one reads books*

*In every page
A learned sage
Awaits to share
What's rich and rare
They must prepare
When one reads books*

*So let us strive
To keep alive
The quest for truth
And mental growth
In seasoned youth
When one reads books*



Habari katika Picha

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Mjadala Ukiendelea





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