Ministry of Tourism and Wildlife

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Situational Analysis on the Adoption of Sustainable best Practices,

Evaluation of the Impact of Climate Change on the Tourism Sector in Kenya, and Design Appropriate Climate Response

and

Sustainable best practices in Line with Global Benchmarks

SYSTEM OF ENVIRONMENTAL ECONOMIC ACCOUNTING FOR THE TOURISM SECTOR

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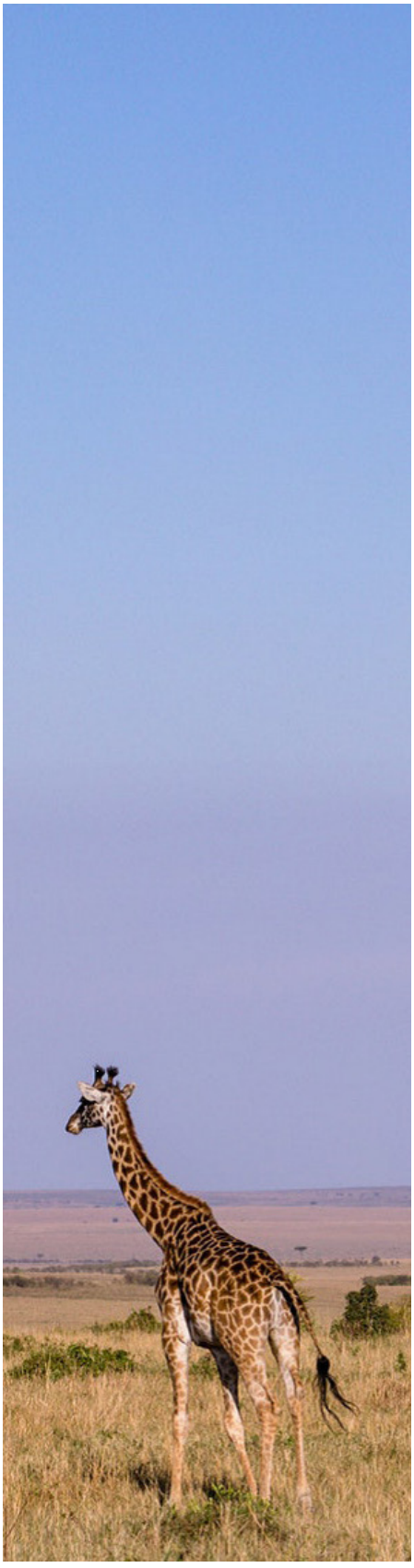
Mr. Vincent O. Bwire
Chair, Project Implementation Committee.

FOREWORD

The tourism sector in Kenya plays a significant role in driving social and economic development. Specifically, it contributes 10% to the Gross Domestic Product (GDP), provides 6% of direct formal employment, and consists of 4% of the National Gross Fixed Capital Formation (NGFCF). This contribution is projected to increase, with the sector's earnings expected to grow to Ksh 430 billion in 2024 and further reach Ksh 1.024 trillion by 2028, attributed to the anticipated rise in visitor numbers from 2.4 million in 2024 to 5.7 million in 2028. The sector also contributes to safeguarding cultural heritage, climate change mitigation, and environmental preservation. This demonstrates the vibrancy of the tourism sector in enabling Kenya to achieve sustainable development goals in a changing climate.



However, the tourism sector's contribution to the economy may be jeopardized due to the impacts of climate change. The Intergovernmental Panel on Climate Change (IPCC) data shows that with the rise in global temperatures due to emissions of greenhouse gases, climate-sensitive sectors such as tourism, which largely depend on natural resources, will be severely affected. The impacts include changes in destination attractiveness, increased operational costs (e.g., heating and cooling), limited water availability, reduced food diversity, infrastructure damage, and increased incidences of vector-borne diseases. These impacts may worsen, as the tourism sector's emissions are projected to rise by 25% in 2030 compared to 2016 emission levels.

Studies have shown that the hotel industry consumes significant quantities of resources and generates substantial amounts of waste. A five-star hotel for instance has been established to consume approximately 130 Megajoules of energy per guest per night, and on average, a guest generates 0.9 kg of waste daily. Additionally, daily water consumption per guest ranges from 170 to 440 liters, significantly higher than in a residential household.

Tourism and travel transport make significant contributions to global carbon emissions, with the aviation industry alone responsible for 2% of global emissions. Other tourism-related businesses also produce greenhouse gases, resulting in the tourism sector accounting for about 5% of global Carbon Dioxide (CO_2) emissions into the atmosphere.

It is in this context that during the twenty-fifth Conference of Parties (COP 25) of the United Nations Framework Convention on Climate Change (UNFCCC), the tourism sector declared a climate crisis. Parties were urged to embrace low-carbon pathways in their tourism activities. Kenya committed to this declaration, recognizing that its tourism sector is primarily nature-based, relying on wildlife-protected areas, natural landscapes, coastal ecosystems, and resources. The tourism sector must prioritize climate-resilient sustainable practices to minimize environmental degradation and preserve natural resources for future generations. This demands that adoption of best practices in sustainable tourism is paramount to mitigate adverse impacts on the environment, society, and culture, nurturing long-term climate-resilient positive outcomes. These practices aim to strike a balance between economic benefits, social responsibility, and environmental conservation.

In view of this, Kenya aims to remain globally competitive in the tourism sector as the destination of choice. This implies that the country has to develop actions, strategies, and programs that follow global benchmarks in order to curve the country's niche in the tourism sector. The country during the twenty-sixth Conference of Parties (COP 26) of the UNFCCC that was held in Glasgow, United Kingdom (UK) in 2021, pledged by 2030 to conserve and sustainably manage the tourism sector by committing to: restrict use of vehicular transportation within all national parks and game reserves that use non-fossil renewable energy; require all hospitality and tourism enterprises to adopt renewable energy and circular economy in their operations; mobilize the ecological assets in vast protected areas that act as carbon sinks to maximize on global carbon credit facilities available in order to raise additional resources to play an active role in meeting national goals of a net carbon neutral nation; restore degraded areas in national parks and games reserves with a concerted effort om reforestation; increase marine conservation areas network; establish a framework for documentation and measuring the economic impacts of climate change on tourism sector as basis of mainstreaming practical, quantifiable and accountable required measures on climate actions by tourism actors in the entire tourism value chain; and develop and enforce minimum sustainability standards that are in line with the global benchmarks for businesses in the sector that form the basis for operations of sustainable tourism businesses with accompanying incentives and disincentives.

This study generated various deliverables including; baseline report, best practices report, incentive and disincentives framework, system of environmental-economic accounting (SEEA) for the tourism sector, stakeholders engagement report, final and closure reports in response to undertaking a situational analysis on the adoption of sustainable best practices, evaluate the impacts of climate change on the tourism sector in Kenya and design appropriate climate response and sustainable best practices in line with global benchmarks. The key findings established and recommendations provided lays a foundation on how to track and report

Kenya’s progress in regard to commitments the country made during COP26.

I therefore welcome the stakeholders in Tourism Sector to take into consideration relevant findings and action areas for implementation so as to revitalize and spur growth of the tourism sector in Kenya. The Government of Kenya through the Ministry of Tourism and Wildlife remains steadfast in ensuring that right incentives and policy frameworks are place to provide required enabling environment for investment in tourism value chain.

Mr. David Gitonga
Ag. Chief Executive Officer,
Tourism Research Institute

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GLOSSARY OF TERMS

Adaptation	The process of adjustment to actual or expected climate and its effects. In human systems, adaptation seeks to moderate or avoid harm or exploit beneficial opportunities. In some natural systems, human intervention may facilitate adjustment to expected climate and its effects
Command and control instruments	Instruments including laws, regulations and licencing requirements that enable governments to exert control over certain aspects of development and operation.
Climate Change	Climate change refers to a change in the state of the climate that can be identified (e.g., by using statistical tests) by changes in the mean and/or the variability of its properties, and that persists for an extended period, typically decades or longer. Climate change may be due to natural internal processes or external forcing such as modulations of the solar cycles, volcanic eruptions, and persistent anthropogenic changes in the composition of the atmosphere or in land use
Disincentives	Economic, financial, voluntary, and regulatory barriers that discourage tourism enterprises from adopting climate change adaptation, mitigation, and sustainable tourism practices.
Economic instruments	Instruments influencing behaviour and impact through financial means and sending signals via the market.
Incentives	Economic, financial, voluntary, and regulatory instruments to promote the adoption of climate change adaptation, mitigation, and sustainable tourism practices by tourism enterprises.
Impacts	Effects on natural and human systems of extreme weather and climate events and of climate change. Impacts generally refer to effects on lives, livelihoods, health, ecosystems, economies, societies, cultures, services, and infrastructure due to the interaction of climate changes or hazardous climate events occurring within a specific time period and the vulnerability of an exposed society or system
Resilience	The capacity of social, economic, and environmental systems to cope with a hazardous event or trend or disturbance, responding or reorganizing in ways that maintain their essential function, identity, and structure, while also maintaining the capacity for adaptation, learning, and transformation.
Voluntary instruments	Instruments providing frameworks or processes that encourage voluntary adherence of stakeholders to sustainable approaches and practices.
Vulnerability	The propensity or predisposition to be adversely affected. Vulnerability encompasses a variety of concepts and elements including sensitivity or susceptibility to harm and lack of capacity to cope and adapt.
Resilience	The ability to withstand and recover from shocks and stresses to individuals, communities, businesses, and ecosystems
Return flows to the environment	The water that is released back into the environment after it has been used for irrigation, industrial purposes, or other purposes
Solid waste	Any garbage or refuse that is produced by households, businesses, and institutions. Solid waste can include things like food scraps, paper, plastic, and metal

Sustainability barriers	Factors that hinder sustainability and Sustainable practice
Sustainability communication	The process of communicating about sustainability to stakeholders
Sustainability drivers	Factors that help to promote sustainability
Sustainability education	The process of teaching people about sustainability through a variety of channels, such as schools, universities, and community organizations.
Sustainability reporting	The process of providing information about a Tourism enterprise's sustainability performance
Sustainability best practices	Methods or approaches that have been shown to be effective in a chieving sustainability goals
Sustainable planning and management	A process of developing and implementing plans and management practices that are designed to achieve sustainability goals. This process involves considering the environmental, social, and economic dimensions of sustainability
System of Environmental -Economic Accounting	A framework for measuring the economic and environmental dimensions of sustainability.
Tourism enterprises	Businesses and organizations that provide goods and services primarily to tourists and include accommodation, food and beverage services, passenger transport, travel agencies, and cultural and recreational activities
Tourism Industries	Sectors such as accommodation, transportation, food and beverage services, recreation, retail, travel agencies, and other indirect sectors, providing a comprehensive measure of the economic impact of tourism
Waste management	The process of collecting, transporting, treating, and disposing of waste.
Water flows	The movement of water resources between different environmental compartments, such as surface water, groundwater, and atmospheric water, accounting for both natural processes and human activities

LIST OF ABBREVIATIONS

BETA	Bottom-Up Economic Transformation Agenda
CBD	Convention on Biological Diversity
CBOs	Community-Based Organizations
CFA	Confirmatory Factor Analysis
CFI	Comparative Fit Index
CoP26	26th Conference of The Parties
CSR	Corporate Social Responsibility
EAC	East Africa Community
EFTs	Ecological Fiscal Transfers
EK	Ecotourism Kenya
EMCA	Environmental Management and Conservation Act
FGDs	Focus Group Discussions
GCF	Green Climate Fund
GDP	Gross Domestic Product
GFI	Goodness of Fit Index
GHG	Greenhouse Gas
GoK	Government of Kenya
GSTC	Global Sustainable Tourism Council
GTK	Green Tour Kenya
IBPs	Incentive-Based Conservation Programs
KAHC	Kenya Association of Hotelkeepers and Caterers
KATA	Kenya Association of Travel Agencies
KATO	Kenya Association of Tour Operators
KDC	Kenya Development Corporation
KenInvest	Kenya Investment Authority
KIIs	Key Informant Interviews
KPSGA	Kenya Association of Professional Tour Guides
KTB	Kenya Tourism Board
KTDGA	Kenya Tour Driver Guides Association
KTF	Kenya Tourism Federation
KWS	Kenya Wildlife Service

MDAs	Ministries, Departments, and Government Agencies
MITI	Ministry of Investment Trade and Industry
MMR	Mixed Method Research
MoE&NR	Ministry of Environment and Natural Resources
MoT&W	Ministry of Tourism and Wildlife
MSMEs	Micro, Small, and Medium Enterprises
NAP	National Adaptation Plan
NCCRS	National Climate Change Response Strategy
NCCS	National Climate Change Secretariat
NDA	National Designated Authority
NDC	Nationally Determined Contributions
NEMA	National Environment Management Authority
NFI	Normed Fit Index
NGOs	Non-Governmental Organization
PES	Payment for Ecosystem Services
PFM	Public Finance Management Act
PWDs	People Living with Disabilities
R&D	Research and Development
RMSEA	Root Mean Square Error of Approximation
SDGs	Sustainable Development Goals
SEM	Structural Equation Model
SMEs	Small And Medium Size Enterprises
STEPP	Sustainable Tourism – Eliminating Plastic Pollution
STERP	Sustainable Tourism for Effective Pandemic Response, Recovery, and Resilience
STPs	Sustainable Tourism Practices
TDGDP	Direct Gross Domestic Product
TF	Tourism Fund
TFC	Tourism Finance Corporation
TLI	Tucker-Lewis Index
T-O-E	Technical, Organizational and Environmental
TRA	Tourism Regulatory Authority

TRI	Tourism Research Institute
TVET	Technical Vocational Education and Training
UK	United Kingdom
UNFCCC	United Nations Framework Convention on Climate Change
UNWTO	United Nations World Tourism Organization
VAT	Value Added Tax
TSM	Tourism
TSA-RMF	Tourism Satellite Account Recommended Methodological Framework
UN	United Nations
UNCEEA	United Nations Committee of Experts on Environmental-Economic Accounting
UNEP	United Nations Environment Programme
UNEP-WC-MC	United Nations Environment Programme World Conservation Monitoring Centre
UNFCC	United Nations Framework Convention on Climate Change
UNSD	United Nations Statistics Division
UNWTO	United Nations World Tourism Organization
WASREB	Water Service Regulatory Board
WRA	Water Resources Authority
WSP	Water Service Provider
WWF	World Wide Fund for Nature

EXECUTIVE SUMMARY

This report presents the System of Environmental-Economic Accounting (SEEA) framework for Kenya's tourism sector, aligned with the SEEA-Central Framework (2012) and the UNWTO Tourism Satellite Account: Recommended Methodological Framework (2008). The report presents results of a situational analysis of environmental-economic accounting practices in Kenya's tourism sector. It details SEEA-Energy Accounts, SEEA-Water Accounts, SEEA-Greenhouse Gas Emissions Accounts, and SEEA-Solid Waste Accounts for Kenya's tourism sector. Sustainable tourism models foster socio-economic development. However, it is impacted negatively through resource use (water, energy) and waste discharge (solid waste, GHG emissions) into the environment. To harness this potential and mitigate environmental impacts, measuring and monitoring tourism-environment interactions is crucial.

The increasing trend in CO_2 emissions from fuel combustion necessitates robust monitoring and accounting mechanisms. This is because accurate tracking of emissions is crucial for assessing progress toward climate goals, formulating effective policies, and implementing mitigation strategies. Additionally, it underscores the necessity for transitioning to cleaner energy sources to curb emissions growth, ensuring sustainable development, and meeting international commitments such as those outlined in the Paris Agreement. The System of Environmental-Economic Accounting offers a robust framework for systematically accounting for environmental flows, integrating environmental data with national economic accounts. Developed in the early 1990s, the SEEA framework provides essential insights.

The general objective was to develop a System of Environmental-Economic Accounting (SEEA) for tourism sector activities in Kenya, in line with the System of Environmental-Economic Accounting-Central Framework (SEEA-CF) 2012 and the United Nations World Tourism Organization Tourism Satellite Account: Recommended Methodological Framework (UNWTO TSA-RMF) 2008. The specific objectives included undertaking a situational analysis of environmental-economic accounting practices in Kenya's tourism sector, and compiling pilot SEEA accounts for energy, water, greenhouse gas emissions, and solid waste for Kenya's tourism sector, all in accordance with the SEEA-CF 2012 and UNWTO TSA-RMF 2008.

To compile SEEA accounts for the tourism sector, a mixed-method research approach was employed, integrating both quantitative and qualitative methods. Numerical data on environmental flows were collected from a survey of tourism enterprises, administrative data from energy, water, and waste management institutions, and secondary sources, while qualitative data were gathered from key informants through Focus Group Discussions (FGDs). A literature review on SEEA development was also conducted. The Generic Statistics Business Process Model (GSBPM) guided the compilation of SEEA accounts, utilizing the SEEA Central Framework. Quantitative data were collected using a structured questionnaire from a representative sample (n=1253) of tourism enterprises across Kenya. Data collection and compilation adhered to ethical guidelines, including informed consent, confidentiality, minimizing harm, respect, transparency, and cultural sensitivity. Classification of tourism industries followed the Tourism Satellite Account Recommended Methodological Framework

(TSA-RMF), based on significant tourism expenditure or supply. The SEEA Central Framework guided the compilation of energy, GHG, water, and solid waste accounts, adhering to international standards

The findings of the situational analysis on Environmental Economic Accounting (EEA) for tourism in Kenya highlight gaps in environmental reporting among tourism enterprises in Kenya, particularly in documenting GHG emissions and solid waste management. Challenges such as lack of knowledge, tools, and perceived costs hinder comprehensive reporting. However, there are instances of awareness and application in sectors like travel and hospitality, indicating potential for broader implementation. Institutional factors, including environmental, organizational, and technological drivers, play a crucial role in shaping the adoption of environmental-economic accounting practices. Incentives such as rewards, reduced costs, and infrastructure support were identified as key drivers, while regulatory gaps and insufficient infrastructure posed challenges. Despite the absence of specific laws or regulations for environmental-economic accounting in tourism, existing policies and strategies provide a foundation for integration.

The compiled energy account for Kenya's tourism sector-2022 highlights a heavy reliance on biomass (93%), totalling 602,857.44 terajoules (TJ), alongside significant imports of 25,963.53 TJ, primarily motor spirit petroleum and light diesel. Industrial and household sectors contributed 48,444.94 TJ and 559,477.32 TJ, respectively, mainly from charcoal and firewood. The tourism sector consumed 14% of electricity (5,050.60 TJ) and notable quantities of motor spirit petroleum and light diesel. Total intermediate energy consumption reached 7,357.9 TJ, primarily driven by tourist expenditures. The report emphasizes the imperative for sustainable energy practices in tourism, advocating for renewable energy adoption and efficiency improvements to mitigate its carbon footprint, ensure long-term sustainability, and meet global environmental standards.

The SEEA GHG emissions account for Kenya's tourism sector-2022 revealed substantial contributions from various industries, totalling 1.87 million metric tons (Mt) of CO_2. Light diesel and coal/coke led at 0.48 Mt and 0.46 Mt, respectively, with households emitting 61.71 Mt CO_2 due to electricity and biomass use. The tourism sector's emissions were relatively low at 0.76 Mt CO_2e, mainly from passenger transport, accommodation, food and beverage services, and travel agencies. These findings underscore the sector's need for climate change mitigation strategies to align with global goals, enhance its reputation among eco-conscious travelers, and comply with tightening emissions regulations. Investing in energy-efficient technologies is crucial for cost savings, economic resilience, and sustainable resource use.

The SEEA-Water Account for Kenya's tourism sector in 2022 highlights significant water abstraction, with 32,320 million cubic meters (MCM) extracted, including 460 MCM from water services. Tourism industries used 21.30 MCM, yet 97% did not treat sewage for reuse, revealing gaps in wastewater management data. Enhanced reporting is essential for sustainable water practices.

The pilot Solid Waste Accounts for Kenya's tourism sector categorized 8,000,000 tonnes of waste into organic (70%) and inorganic (30%) types, with tourism contributing 64.28 tonnes, mainly from Accommodation for Visitors (82%) and Food & Beverage Serving Services (11%). Minimal recycling and composting (4%) highlight significant environmental implications from waste disposal practices.

To institutionalize environmental economic accounting, the report recommends that the government establish robust data collection mechanisms for solid waste, water, and energy to create a centralized accounting system. Additionally, the report advises investing in capacity-building through training and incentivizing the adoption of EEA practices. Strengthening partnerships and policy integration will ensure coherence and mainstream EEA in tourism policies and regulations. Tourism enterprises are encouraged to enhance their adoption of environmental economic accounting by improving internal data collection, implementing sustainable practices, fostering partnerships, and investing in capacity-building. These actions will empower enterprises to monitor environmental impacts effectively, reduce their footprints through the use of renewables and efficiency measures, and engage stakeholders in sustainable development.

Introduction

CHAPTER ONE

1. INTRODUCTION

1.1 Background

Globally, ecosystem accounting, as supported by the UN (2014; 2021), recognizes the environment's integral role in society and the economy. This aligns with SDG Indicator 15.9.1, integrating biodiversity values into national policies and economic accounting to support SDG 15. This includes aligning with Aichi Biodiversity Target 2 and implementing the Systems of Economic and Environmental Accounting (SEEA) for systematic biodiversity measurement and monitoring. Embedding SEEA into national accounting frameworks aids in sustainable ecosystem use, forest management, desertification combat, and reversing land degradation. This ensures environmental considerations are integral to economic decisions, supporting ecosystem protection, restoration, sustainable forest management, desertification prevention, and halting biodiversity loss.

SDG Indicator 15.9.1, as outlined by the United Nations Statistics Division (UNSD, 2023), monitors progress in integrating biodiversity values into national policies and economic accounting through two components. Component (a) tracks countries aligning their national targets with Aichi Biodiversity Target 2 within their development and poverty reduction strategies (UN Biodiversity Convention, 2020). Component (b) focuses on integrating biodiversity into national accounting via the System of Environmental-Economic Accounting (SEEA) (UN Statistics Division [UNSD], 2021). SEEA provides a framework for systematically measuring and reporting on economic-environmental interactions (UNSD, 2021). The 2023 Global Assessment on Environmental-Economic Accounting and Supporting Statistics reports that 90 countries are implementing SEEA, although to varying extents (UNSD, 2023). SEEA integration ensures consistent inclusion of environmental data in economic decision-making (UNSD, 2021). This fosters sustainable development and facilitates achievement of SDG 15.9.1 by structuring the accounting of natural assets and ecosystem services (UNSD, 2021).

The Global Assessment of Environmental-Economic Accounting and Supporting Statistics, administered by the United Nations Committee of Experts on Environmental Economic Accounting (UNCEEA) (UNSD, 2023), aimed at evaluating the progress of SEEA implementation worldwide and providing data for Sustainable Development Goal (SDG) indicator 15.9.1 (UNSD, 2023). The assessment categorized global SEEA implementation into three stages: pilot or initial compilation, compilation and dissemination, and regular compilation and dissemination (UNSD, 2023). Figure 1.1 shows the status of implementation of SEEA accounting globally:

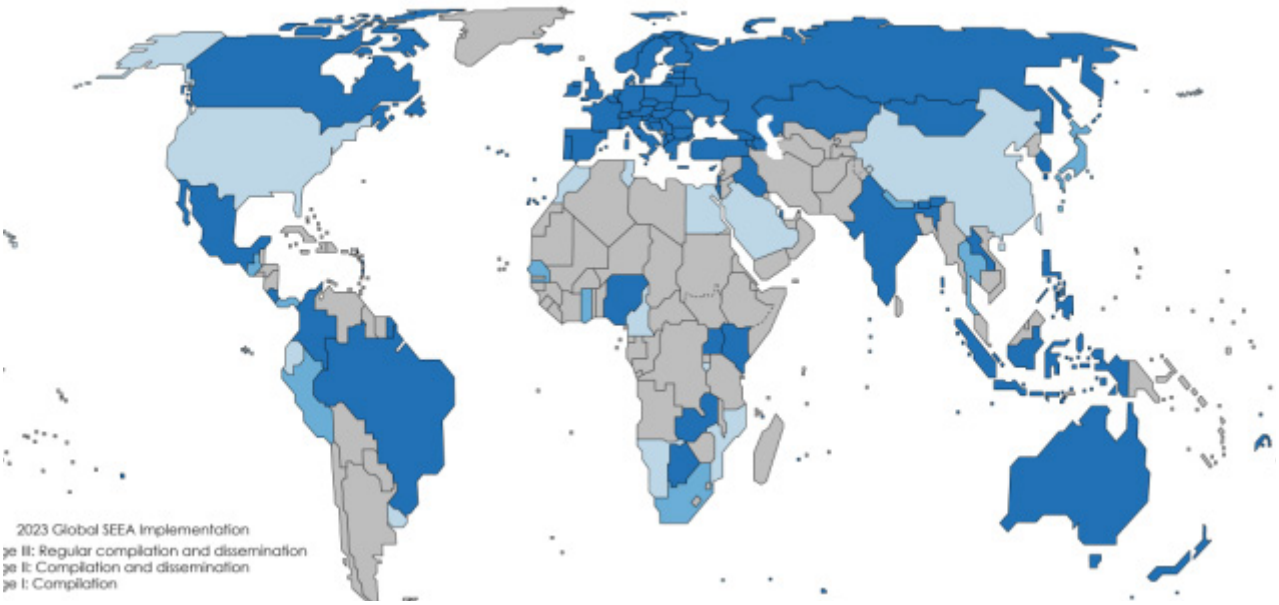


Figure 1.1 Status of Implementation of SEEA

Source: UNCEEA (2023)

The 2023 UNCEEA benchmark assessment, conducted in milestone years (2014, 2017, 2020, and 2023) as depicted in Figure 1.1, revealed that by 2023, 90 countries had implemented SEEA. Among these, 74% regularly published accounts, 11% did so on an ad-hoc basis, and 14% compiled accounts but did not publish them (UN). Almost all countries (89 out of 90) compiled SEEA Central Framework (SEEA CF) accounts, while nearly half also compiled SEEA Ecosystem Accounting (SEEA EA) or thematic accounts. This demonstrates a significant global commitment to integrating environmental-economic accounting into policy and decision-making (UNCEEA, 2023).

The Gaborone Declaration for Sustainability in Africa, issued in May 2012, initiated progress towards quantifying and integrating natural capital into development planning across the continent (RoB, 2021; UNEP-WCMC, 2016). In response, the adoption of the System of Environmental-Economic Accounting (SEEA) framework emerged as a pivotal tool for measuring sustainable development, underscoring the increasing recognition of the necessity for policy integration and change in Africa. Alfieri (2023) highlighted the insufficiency of GDP as a sole metric for fostering efficient, inclusive, and environmentally conscious economies in Africa, advocating instead for an integrated framework capable of monitoring progress toward sustainable and equitable development goals.

However, the adoption of SEEA in Africa faces notable challenges, leading to relatively low adoption rates of SEEA accounts across the region (United Nations Environment Programme [UNEP], 2023). These challenges include limited technical capacities within statistical agencies, inadequate guidance documentation tailored to the African context, and a lack of knowledge platforms for facilitating SEEA implementation and sharing best practices (UNEP, 2023). Despite these hurdles, some countries have demonstrated significant progress in

SEEA adoption. South Africa, for example, has developed advanced ecological indicators and accounts specifically for its national river ecosystems (Department of Environmental Affairs, Republic of South Africa, 2019). Similarly, Uganda has embraced SEEA by using it to develop species accounts for the Shea tree, integrating valuable biodiversity data with land-use information (Nsubuga, 2017). These examples showcase the potential of SEEA for African nations. However, a recent mapping of adoption rates in Africa reveals that SEEA has only marginally mainstreamed into sectoral planning and management processes across the continent (UNEP, 2023). Overcoming these challenges requires ongoing efforts from governments, regional organizations, and international partners to enhance technical capacity building, improve guidance documentation that reflects African needs, and facilitate knowledge exchange through dedicated platforms. By addressing these critical areas, Africa can accelerate the adoption and integration of SEEA into sustainable development initiatives, fostering a data-driven approach to environmental management and economic decision-making.

In Kenya, environmental economic accounting initiatives began in 2017 with technical assistance from the United Nations Statistics Division (UNSD). A national stakeholders' workshop convened in May 2017 endorsed three pivotal accounts: energy, water, and forests, with energy emerging as the primary account for production. In April 2018, Kenya, through the Kenya National Bureau of Statistics (KNBS), successfully produced and released its first set of pilot physical energy supply and use tables. Since then, KNBS has been producing physical supply and use tables for energy accounts, with the latest release in May 2024 (Economic Survey, 2024). The KNBS is currently in the advanced stages of preparing a National Plan for Advancing Environmental Economic Accounting 2023-2028 (NP-AEEA), which prioritizes the development of water, forest ecosystem, energy, and mineral accounts. The Kenya Tourism Board (KTB) has taken positive steps by incorporating an «Environmental and Sustainability Reporting» section in its annual reports (KTB, 2023). However, the scope and depth of this reporting may vary from year to year. The absence of standardized environmental accounting practices across the broader tourism sector complicates the assessment of the overall environmental impact (UNEP, 2023). This underscores the necessity for a more comprehensive framework for tourism enterprises in Kenya to monitor and report on their environmental impact.

1.2 Rationale for the Systems of Environmental-Economic Accounting for the Tourism Sector

At the 26th Conference of Parties to the United Nations Framework Convention on Climate Change (UNFCCC) (COP26) in 2021, held in Glasgow, United Kingdom, Kenya pledged to achieve net zero carbon emissions by 2030 and transition 100% of its energy needs to renewable sources. As part of this commitment, Kenya outlined several actions for conserving and managing the tourism sector. These include establishing frameworks for documenting and measuring the economic impacts of climate change on the tourism sector in Kenya as a basis for mainstreaming practical, quantifiable, and accountable measures on climate action by tourism actors throughout the tourism value chain.

The increasing trend in CO2 emissions from fuel combustion underscores the urgent need for robust monitoring and accounting mechanisms. Accurate tracking of emissions is crucial for assessing progress towards climate goals, formulating effective policies, and implementing mitigation strategies. It also highlights the necessity for transitioning to cleaner energy sources to curb emissions growth, ensuring sustainable development, and meeting international commitments such as those outlined in the Paris Agreement.

1.3 Objectives of the Incentives and Disincentives Framework

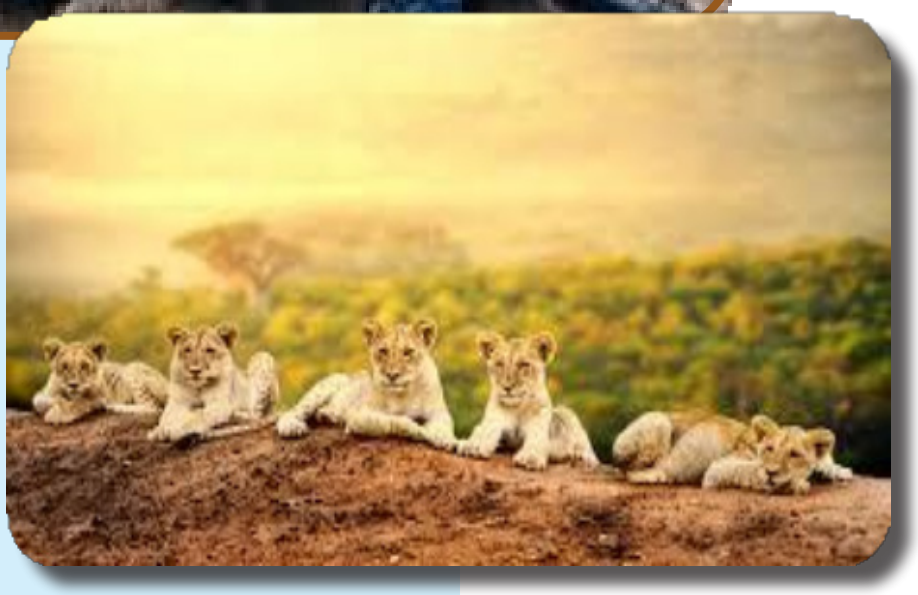
1.3.1 General Objectives

To outline a framework of incentives and disincentives for adopting climate change resilience strategies and enhancing the implementation of sustainable tourism practices among tourism enterprises in Kenya.

1.3.2 Specific Objectives

i. To undertake a situational analysis of the existing legal and regulatory framework for climate change adaptation, mitigation actions, and sustainable tourism in Kenya;
ii. To undertake a situational analysis of the existing institutional framework for climate change adaptation, mitigation actions, and sustainable tourism practices in Kenya;
iii. To assess the barriers and drivers to the adoption of climate change adaptation, mitigation actions, and sustainable tourism practices in Kenya;
iv. To assess the influence of existing incentives and disincentives for the adoption of climate change adaptation, mitigation actions, and sustainable tourism practices in Kenya; and
v. To recommend a framework of incentives and disincentives for the adoption of adaptation, mitigation actions, and sustainable tourism practices in Kenya.

Methodology



CHAPTER TWO

2.0 METHODOLOGY

2.1 Methodological Approach

The compilation of SEEA accounts for the tourism sector relied on a mixed-method research approach, adopting the Explanatory Sequential Mixed Method Research (ESMMR) design, which integrated both quantitative and qualitative approaches. The quantitative aspect involved gathering numerical data on environmental flows from a survey of tourism enterprises in the country, administrative data from institutions concerned with energy, water, and solid waste management, and secondary data from published reports by relevant institutions on energy, water, greenhouse gases, and solid waste. The qualitative component involved collecting primary data from key informants and conducting Focus Group Discussions (FGDs) to comprehensively understand environmental-economic accounting in the country's tourism sector.

2.1.1 Desk Research

The study conducted a desk review of literature related to the development of the SEEA. The desk research focused on global best practices, experiences, and lessons learned from other jurisdictions that have implemented the system of environmental-economic accounting. Additionally, the review appraised policy documents and official reports on the progress of SEEA implementation in Kenya to identify requirements for developing the SEEA framework for the tourism sector.

The literature reviews also appraised documentation on the development and implementation of economic and environmental accounting frameworks for the tourism sector. This included examining conceptual definitions, standards, classifications, and other relevant materials. Table 2.1 lists the standards and guidelines identified in the literature on the implementation of the SEEA-Accounts:

Table 2.1 Standards and Guideline for Development of the System of Environmental Accounting for the Tourism Sector in Kenya

Theme	Source
System of National Accounts (SNA)	• SNA 2008: System of National Accounts https://unstats.un.org/unsd/nationalaccount/sna2008.asp
System of Environmental-Economic Accounting Central Framework (SEEA-CF-2012_	• UN et al (2014) SEEA 2012 Central Framework (2012): http://unstats.un.org/unsd/envaccounting/seearev/ • UN et al. (2014) System of Environmental-Economic Accounting 2012 Applications and Extensions – White cover edition. • UN (2014) SEEA Implementation Guide – Draft for UNCEEA/9/6 - 2014. http://unstats.un.org/unsd/envaccounting/ceea/meetings/ninth_meeting/UNCEEA-9-6d.pdf

Theme	Source
Tourism Satellite Accounts (TSA)	• UNWTO, UN (2010) International Recommendations for Tourism Statistics 2008 https://unstats.un.org/unsd/publication/Seriesm/SeriesM_83rev1e.pdf • UNWTO et al (2010) Tourism Satellite Account: Recommended Methodological Framework 2008 https://unstats.un.org/unsd/publication/Seriesf/SeriesF_80rev1e.pdf • UNWTO, UN (2016) International Recommendations for Tourism Statistics 2008 – Compilation guide https://unstats.un.org/wiki/display/IRTSCG
SEEA -Water	• UNSD (2016) SEEA Technical note: Water accounting, Draft to UNCEEA • UN (2012) System of Environmental-Economic Accounting for Water. UN. Series F No. 100 (ST/ESA/SER.F/100) • UN (2012) International Recommendations for Water Statistics. UN Series M No. 91 (ST/ESA/SER.M/91). http://unstats.un.org/unsd/envaccounting/irws/ • UNSD (2013) Draft Guidelines for the Compilation of Water Statistics and Accounts. http://unstats.un.org/unsd/envaccounting/WCG14.pdf
SEEA-Energy	• UNSD (2016) SEEA Technical note: Energy accounting, Draft for UNCEEA Eurostat (2014) Physical Energy Flow Accounts Manual. IEA. • Eurostat (2013) Annual Energy Statistics Questionnaires & Explanatory notes http://epp.eurostat.ec.europa.eu/portal/page/portal/energy/questionnaires OECD/IEA/ • Eurostat (2005) Energy Statistics Manual. IEA, Paris. http://epp.eurostat.ec.europa.eu/portal/page/portal/product_details/publication?p_product_c ode=NRG-2004 • Schenau, S. (2012) Compilation of physical energy flow accounts (PEFA) for the Netherlands. https://circabc.europa.eu/w/browse/ad2ff2b8-f9cc-4d3d-b76e-499e09ed01b1 • UN et al (2013) SEEA Energy draft http://unstats.un.org/unsd/envaccounting/energy.asp
SEEA-GHG Emission	• UNSD (2016) SEEA Technical note: Air emissions accounting, Draft for UNCEEA. • Eurostat (2013) Compilation Guide (2013) for Eurostat's Air Emissions Accounts (AEA). http://ec.europa.eu/eurostat/documents/1798247/6191529/Manual-AEAPart-B-20130426.pdf/c242c290-0bf1-453e-b8d9-326869a50693 • Eurostat (2015) Manual for Air Emissions Accounts (AEA) 2015 edition. http://ec.europa.eu/eurostat/web/products-manuals-and-guidelines/-/KS-GQ-15- 009
SEEA-Solid Water	• Eurostat (2010) Manual on Waste Statistics: A handbook for data collection on waste generation and treatment http://ec.europa.eu/eurostat/documents/3859598/5915865/KS-RA-10-011-EN.PDF/39cda22f-3449-4cf6-98a6-280193bf770c • Australian Bureau of Statistics (2013) Waste Account, Australia, Experimental Estimates, 2013, Catalogue number 4602.0.55.005, Canberra, Australia http://www.abs.gov.au/AUSSTATS/abs@.nsf/DetailsPage/4602.0.55.0052013

2.1.2 Conceptual Approach

2.1.2.1 Generic Statistics Business Process Model

The Generic Statistics Business Process Model (GSBPM) was used to compile the SEEA accounts for tourism. Recognized and employed by statistical organizations, the model promotes consistency and comparability of economic data for SEEA accounts. It emphasizes quality control at each stage of the statistical production process, enabling the identification and resolution of data inconsistencies, errors, or gaps. The GSBPM provided clear guidelines and workflows, streamlining the statistical processes involved in producing the SEEA accounts. Table 2.2 summarizes the steps adopted in producing the SEEA accounts in line with the GSBPM:

Table 2.2 Methodological Approach for Development of the SEEA-Accounts - the Generic Statistics Business Process Model (GSBPM)

Step		Activities
i.	Specify Needs	• Specified the rationale and importance of elaborating the SEEA-accounts for tourism; • Determined concepts, definitions, classification and standards for the Accounts; and • Evaluated data availability and feasibility of developing the accounts
ii.	Design	• Designed the statistical outputs to be produced, including the systems and tools for dissemination of the outputs; • Defined the statistical variables to be collected in the data collection instrument, as well as any other variables that will be derived in the analysis process; • Determined appropriate data collection methods and instruments; • Identified and specified the population of interest, the sampling frame and sampling criteria and methodology; and • Determined the statistical processing methodology to be applied in the compilation of the accounts.
iii.	Build	• Developed the data collection instruments; and • Tested the data collection instruments
iv.	Collect	• Selected sample; • Set up and run data collection; and • Loaded the collected data and metadata into a suitable electronic environment for further processing.
v.	Process	• Integrated data; • Classified and coded the data; • Imputed missing data; • Computed tourism shares; • Calculated aggregates; and • Finalized data files.
vi.	Analyse	• Prepared draft outputs of the SEEA-Accounts; • Validated the accounts; • Scrutinized and explained the Accounts; • Finalized outputs
vii.	Disseminate	• Release the statistical product and support users to access and use the output.

2.1.2.2 Tourism Sector Classification

The compilation of SEEA for tourism relied on the Tourism Satellite Account Recommended Methodological Framework (TSA-RMF-2008) to classify tourism industries and activities (United Nations World Tourism Organization [UNWTO], 2008). According to this framework, a tourism sector consists of establishments whose main activity is the same tourism characteristic activity (UNWTO, 2008). The study defined tourism-characteristic industries as those activities that typically produce tourism-characteristic products (UNWTO, 2008). These products were identified based on one or both of the following criteria: (a) tourism expenditure on the product represents a significant share of total tourism expenditure (share-of-expenditure/demand condition), or (b) tourism expenditure on the product represents a significant share of the supply of the product in the economy (share-of-supply condition) (UNWTO, 2008). Table 2.3 lists the categories of tourism-characteristic consumption products and tourism-characteristic activities (tourism industries) that formed the basis for classifying tourism industries in constructing the SEEA accounts.

Table 2.3 Tourism characteristic consumption products and tourism characteristic activities (tourism industries)

Products	Activities
1. Accommodation services for visitors	1. Accommodation for visitors
2. Food- and beverage-serving services	2. Food- and beverage-serving activities
3. Railway passenger transport services	3. Railway passenger transport
4. Road passenger transport services	4. Road passenger transport
5. Water passenger transport services	5. Water passenger transport
6. Air passenger transport services	6. Air passenger transport
7. Transport equipment rental services	7. Transport equipment rental
8. Travel agencies and other reservation services	8. Travel agencies and other reservation services activities
9. Cultural services	9. Cultural activities
10. Sports and recreational services	10. Sports and recreational activities
11. Country-specific tourism characteristic goods	11. Retail trade of country-specific tourism characteristic goods
12. Country-specific tourism characteristic services	12. Other country-specific tourism characteristic activities

Source: UNWTO 2008

Table 2.3 adopts a consumption-side perspective (demand) for classifying tourism industries. This approach aligns with the Tourism Satellite Account Framework (TSAF) - Reference Manual 2008 (TSA-RMF) (United Nations World Tourism Organization [UNWTO] & United Nations Statistics Division [UNSD], 2008). Following the TSA-RMF, the classification focuses on primary tourism activities, which are industries that directly provide goods and services that satisfy the specific needs of tourists. This differs from the supply-side perspective often adopted in national tourism legislation, such as Kenya's Tourism Act 2011 Schedule Nine.

Consumption-side perspective (demand) adopted for construction of the SEEA-Tourism accounts focuses on the final consumption of goods and services by tourists. In the context of tourism, it emphasizes the industries that cater directly to tourist needs and expenditures (UNWTO & UNSD, 2008). On the other hand, the production perspective (supply): This perspective looks at the entire production chain within the tourism sector. It encompasses a broader range of industries that may indirectly contribute to tourism, even if their primary function isn't solely serving tourists (UNWTO & UNSD, 2008).

By adopting the consumption-side perspective, Table 2.3 offers a more precise understanding of the core industries that directly generate economic activity from tourist spending. This aligns with the core principles of the TSA-RMF, which aims to measure the economic impact of tourism through the lens of tourist consumption.

2.1.2.3 System of Environmental Economic Accounting Central Framework

The compilation of energy, GHG, water, and solid waste accounts for Kenya's tourism sector utilized the SEEA Central Framework. This statistical framework, consisting of comprehensive tables and accounts ensured creation of consistent and comparable statistics and indicators for policy-making, analysis, and research. The SEEA Central Framework is built on established concepts, definitions, classifications, and accounting rules, which guide the compilation process. As an accounting system, it organizes information into integrated and conceptually coherent tables and accounts. The SEEA Central Framework also ensured that the environmental flow accounts aligned with other international standards, recommendations, and classifications, such as the System of National Accounts 2008, the Balance of Payments and International Investment Position, the International Standard Industrial Classification of All Economic Activities (ISIC), the Central Product Classification (CPC), and the Framework for the Development of Environment Statistics.

2.1.3 Technical Approach

2.1.3.1 Data Collection Procedures

The compilation of the SEEA accounts for tourism relied on survey data to obtain data on flows of water and solid waste between the tourism industries and the environment. A structured questionnaire was used to collect quantitative data from a representative sample (n =1,253) of tourism enterprises across Kenya, facilitating generalizations about the larger population (N=16,964). The study employed trained research assistants, who visited the respondents' establishments to administer the questionnaire using the KOBO Collect mobile application.

Administrative data on waste and water flows was obtained using datasheets completed by relevant authorities, including county government departments and water service providers (Appendix I and II). Secondary data on energy, water, and waste flows was obtained from official government reports, including statistical surveys published by the Kenya National Bureau of Statistics (KNBS)and the Water Service Regulatory Board (WASREB) Impact Reports. Data on tourism shares was sourced from the Kenya Tourism Satellite Account (TRI, 2022), while data on emission factors and GHG global warming potentials (GWP) was obtained from the

International Energy Agency (IEA). Appendix III details the data sources used in compiling the SEEA- Accounts for Tourism.

Qualitative data was gathered using interview guides administered by the research team to 26 key informants during scheduled visits. The selection of key informants ensured representation from crucial institutions and organizations within the tourism sector, including government agencies, private sector associations, non-governmental organizations, community-based organizations (CBOs), and academia. Additionally, 24 focus group discussions (FGDs) were conducted during nationwide stakeholder engagements, involving a total of 301 participants.

2.1.3.2 Data Analysis

The analysis for compiling the accounts involved computing descriptive statistics, including means, standard deviations, frequencies, and percentage frequencies, to assess the flows of materials between the sampled tourism enterprises. These statistics were then used to generalize aggregate flows in the target population. Where appropriate, tourism shares were computed from the TSA Accounts (TRI, 2022) and applied to the tourism sector flows. Emission factors and GWP were applied to the intermediate energy use data to compute GHG flows in MtCO2e. The qualitative feedback from KIIs and FGDs was analyzed using content analysis.

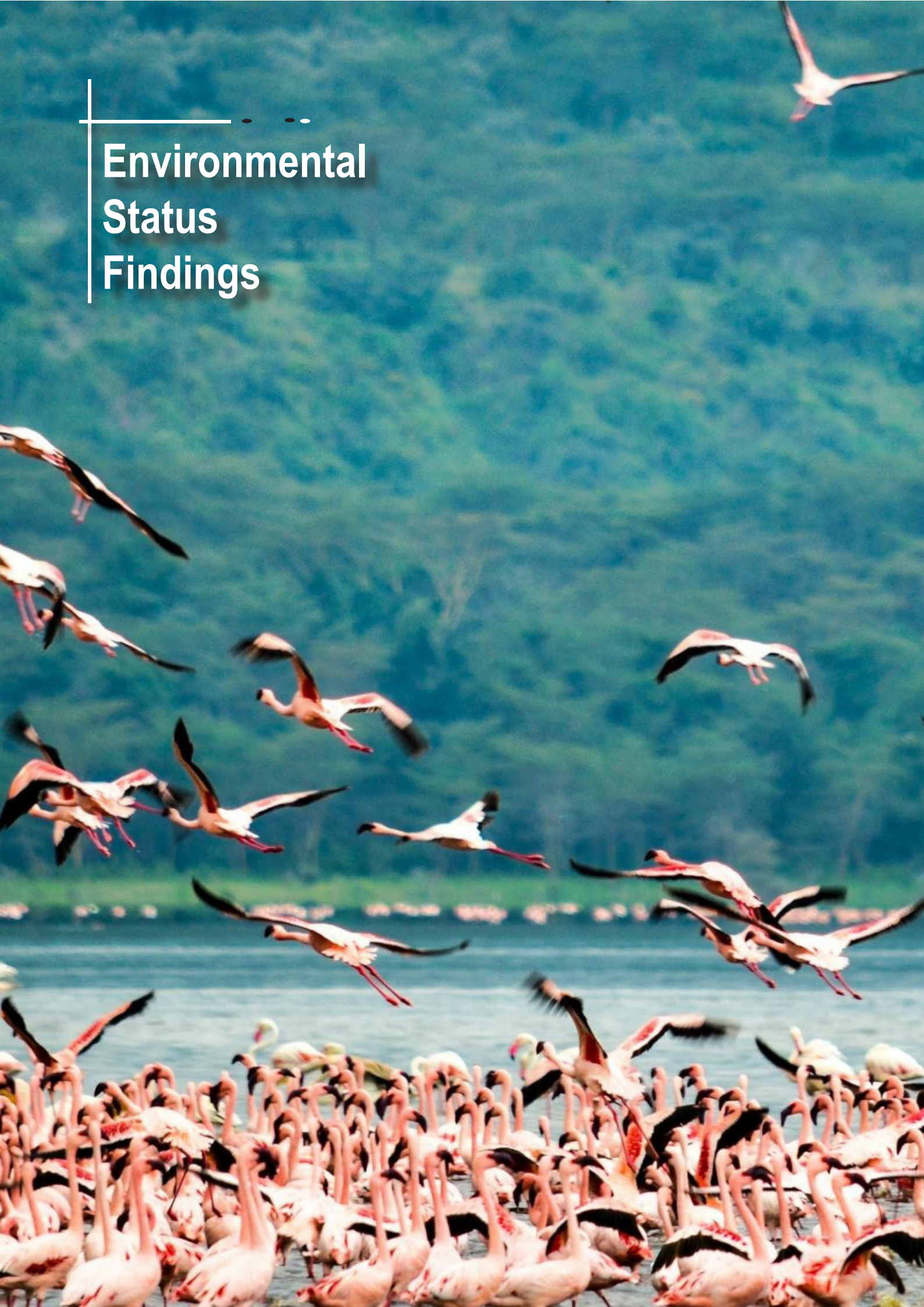
2.1.3.3 Ethical Considerations

Research for compilation of the SEEA accounts was guided by the following ethical considerations.

- **Informed Consent:** Each participant received detailed information outlining the purpose of the survey, the data collection procedures, the potential risks and benefits of participation, and their right to withdraw at any time. Verbal consent was obtained before starting the survey, ensuring voluntary participation and awareness of rights.
- **Confidentiality and Anonymity:** All data was anonymized, removing any personally identifiable information. Data was securely stored and accessed only by authorized personnel, ensuring participant confidentiality, and protecting their privacy.
- **Minimizing Harm:** Survey questions were carefully worded to avoid causing distress or discomfort. Participants could skip any questions they felt uncomfortable answering. Researchers were prepared to offer support or referral to appropriate resources if needed.
- **Respect for Participants:** All participants were treated with respect and courtesy. Their opinions and perspectives were valued and acknowledged. Researchers maintained a non-judgmental attitude and avoided imposing personal biases during data collection.
- **Transparency and Accountability:** The study design, data collection procedures, and ethical considerations were documented and made available to participants and stakeholders upon request. Researchers were open to feedback and addressed any concerns about ethical conduct.

- **Cultural Sensitivity:** The survey was designed and implemented with sensitivity to the cultural context of the Kenyan tourism sector. Local research assistants were involved in development and administration to ensure cultural appropriateness and understanding. Researchers avoided imposing biases or assumptions on participants' experiences and perspectives.

Environmental Status Findings



CHAPTER THREE

3. FINDINGS ON THE STATUS OF ENVIRONMENTAL-ECONOMIC ACCOUNTING IN KENYA

3.1 Status of Tourism Environmental Reporting

To assess the status of environmental reporting by tourism enterprises, the study interviewed key informants from the tourism sector and conducted focus group discussions (FGDs) across the country. The following section presents the results of the qualitative data analysis on the status of environmental-economic accounting by tourism enterprises:

3.1.1 Tourism Enterprises Environmental Reporting on Energy

Results from FGDs and KIIs revealed that tourism enterprises primarily rely on billing services from energy suppliers like Kenya Power for energy use documentation, which aids in financial audits and comparisons. Internal reporting, especially for solar power, was common but lacks formal systems or mandatory requirements, leading to regulatory gaps and hindering comprehensive energy management. As one participant noted:

«You cannot maybe record in terms of output, but you can record in terms of the amount you are using from the billing services (Kenya Power), because this one is good for auditing. It will help you by every end of the year, you are supposed to know whether the amount you used in terms of energy for the previous year is going down vis-a-vis the amount you are using for this year» [FGD003].

3.1.2 Tourism Enterprises Environmental Reporting on GHG Emissions

The findings from KIIs and FGDs revealed a lack of documentation and reporting on greenhouse gases among tourism enterprises in Kenya. Most respondents from both focus group discussions and key informant interviews noted the absence of such practices, with many simply stating «No documentation» or «We don't do that.» Overall, the tourism sector lacks systematic approaches to measuring and reporting greenhouse gas emissions, highlighting the need for more structured and consistent efforts to enhance environmental accountability and sustainability practices. Participants attributed the absence of these practices to a lack of knowledge, tools, and the perception that it is expensive, as highlighted in the excerpt:

«We have not yet……. So expensive……We don't know how to measure……We do not have the tools,» noted participants [FGD002].

A key informant identified a systemic gap in GHG monitoring within the tourism sector. This gap was evidenced by the absence of equipment for monitoring and the lack of a standardized carbon calculator. These findings highlight the critical need for standardized tools and practices to improve GHG monitoring in tourism.

Nevertheless, there are instances of awareness and application in sectors like travel and hospitality, indicating potential for broader implementation. A notable example is an organization actively engaged in carbon accounting. One participant affirmed, «We are a big fan of carbon accounting. So, we measure our footprint and we do this based on data» [FGD011].

3.1.3 Tourism Enterprises Environmental Reporting on Solid Waste

The findings from the FGDs and KIIs indicate a diverse approach to waste management documentation and reporting among tourism enterprises in Kenya. Some enterprises engage in systematic tracking of waste using spreadsheets, report books, and kitchen stock forms, with detailed segregation and weighing of different waste types. Regular meetings are held to review waste reduction strategies, as noted by one participant:

> *"Any kind of waste is recorded... Now, solid waste, this will include organic waste, recyclable... it's weighed and known this is waste that has been generated from either kitchen, workshop, construction, and all that" [FGD008].*

In contrast, other enterprises show sporadic or absent documentation practices, often conducting internal reporting without informing external stakeholders, highlighting the lack of comprehensive monitoring and standardized reporting requirements across the sector.

The findings also reveal inconsistencies in waste measurement practices among tourism enterprises. Some organizations measure waste in kilograms and maintain daily records, while others lack measurement practices entirely, focusing on basic segregation or facing capacity issues. Despite ambitions for accurate waste measurement, scepticism about its practicality and reliability persists. As one participant mentioned,

> *"They do not measure the amount of solid waste that they produce... most hotels do not measure because of lack of mechanisms or capacity to measure. No waste is documented"*[FGD006].

Additionally, some enterprises rely on alternative waste management methods like biogas instead of precise measurement. These findings underscore the need for improved measurement skills, capacity building, and consistent policies to enhance waste management practices in Kenya's tourism sector.

3.1.4 Tourism Enterprises Environmental Reporting on Water Use

Findings on water use documentation by tourism enterprises in Kenya reveal varied practices. Some enterprises track water usage daily, weekly, and monthly through record books and metering in guest rooms, aiding in accounting and consumption decisions. As one respondent noted, *"We document that on a daily basis. There is a record book and there are employees in the repairs and maintenance department who do that"* [FGD002]. Certain businesses employ metering systems to monitor water usage in specific areas such as laundry, kitchens, and guest rooms, measuring consumption in litres or cubic meters. Enterprises with boreholes are required to measure monthly water extraction as part of permit compliance, with one participant stating, *"If you have a borehole, there is that permit that allows you to every month measure how much water you extract from the ground"* [FGD005]. Additionally, some tourism businesses record daily water levels for accountability and rely on monthly readings from external water suppliers.

However, the sector faces significant challenges in water use documentation and reporting. Standardized reporting is often lacking, with many enterprises not documenting borehole or municipal water. Reporting usually occurs only for billing purposes, as noted by one respondent:

«Then in reporting, this is documented because every month you receive your bills in your various sectors, then you document on what you've used, how much you've paid for it» [FGD006]. Many establishments lack formal measurement systems, with some only reporting issues when there is a disruption in the water supply, as highlighted by a participant: «The only time you're going to report about water is maybe if you don't have a connection, you've not received water» [FGD006]. This inconsistency in documentation practices underscores the need for clearer guidelines, improved measurement skills, and robust reporting mechanisms to ensure sustainable water management in Kenya's tourism sector.

3.2 Drivers to Adoption of Environmental-Economic Accounting

The KIIs and FGD findings revealed that the adoption of environmental reporting of energy, water, GHG and solid waste for Kenya's tourism sector is driven by environmental, organizational, and technological factors. Environmental drivers include the need for clear responsibilities and raising awareness about sustainable practices like water harvesting and recycling. Recognition through environmental awards motivates eco-friendly practices, and involving local communities and establishing compulsory certification or eco-rating systems fosters compliance. As one participant noted, «Frameworks to be able to measure or contribute from. Because if those ones are not there, then it becomes difficult even for us to know where we are contributing to climate change» [KII005].

The findings suggest that organizational drivers include the necessity for clear policies, proper equipment, and standardized reporting tools to ensure accurate data collection. Continuous training and capacity building are essential, along with improving communication and collaboration between the government and enterprises. Adequate funding and budget allocation support these initiatives. One participant emphasized, «Sharing that information. Development of tools for the measurement. If they do not have the capacity, you develop the capacity at various levels» [FGD005].

On the other hand, the findings confirm that technological drivers involve the development of apps and tools to facilitate data collection and reporting, making the process accessible and efficient. Online connectivity supports these tools, enabling real-time access and data transmission. Raising awareness about technological solutions ensures their widespread adoption. One participant stated, «I am willing for this association to take the lead. In as far as reporting on environmental and economic accounting. If we develop a tool that is easy and friendly» [KII005].

3.3 Incentives and Disincentives for Implementation of SEEA in Kenya

Feedback from FGDs and KIIs suggests a mix of incentives for environmental accounting in tourism. Rewards like recognition and reduced energy costs for compliant facilities, alongside penalties for polluters, can motivate participation. Stakeholder engagement to address concerns over excessive taxes and regulations is crucial for a collaborative and cost-effective implementation. One participant summarized it well,

«It is also important to know that there is punishment for those who are dumping. It is also important for the facilities that are taking care of the environment to be rewarded. Those who are measuring and keeping the records should also be rewarded and recognized» [FGD003].

The interviews and discussions revealed a host of financial and economic incentives to promote compliance with environmental and economic reporting by tourism enterprises. The financial and economic incentives highlighted focus on making sustainable practices more affordable. This includes reducing costs for essential items (liquefied gas, biological chemicals) and services that support environmental responsibility. Financial rewards and recognition for maintaining eco-friendly systems are crucial, along with tax breaks and exemptions for sustainable technologies like water recycling plants and solar power equipment. These measures aim to ease the financial burden of adopting sustainable practices, as suggested by comments like:

«Like the government, the taxes that they are giving to the players in the tourism sector, they should just be favourable to enable them, even to motivate them» [FGD006].

Additionally, the discussions highlighted the need for infrastructure and development support to implement SEEA effectively. This includes providing tools like forms and measuring equipment for data collection and analysis, particularly for tracking greenhouse gas emissions. Additionally, ensuring proper waste management with regular government involvement in collection, segregation facilities, and infrastructure improvements like good roads were emphasized. These measures aim to streamline data collection and minimize environmental impact from tourism activities, as suggested by comments like «tools for documenting the reports» [FGD003] and «provide measuring equipment... know the amount of greenhouse gas» [FGD006].

At the same time, the FGD participants observed that Marketing and information incentives could play a key role in promoting SEEA adoption. Official government websites can be used to showcase businesses implementing sustainable practices. Additionally, rewarding proper waste management and recognizing facilities with best practices through awards can create marketing opportunities and encourage sector-wide participation. Understanding waste generation patterns was also seen as crucial for targeted collection methods. This approach highlights the value of showcasing sustainability efforts for marketing purposes, as noted by a participant: «If my business is running well and I go to the website of NEMA and I find my business there. I think that would be a good one» [FGD003].

3.4 Legal and Regulatory Framework for Environmental-Economic Accounting in for the Tourism Sector in Kenya

A review of literature, FGDs, and KIIs revealed no specific laws or regulations for environmental-economic accounting in tourism enterprises. However, several existing laws, regulations, policies, and strategies were identified as relevant to this area in Kenya. Table 3.1 summarizes the legal and regulatory landscape for environmental economic accounting in Kenya's tourism sector.

Table 3.1 Legal and Regulatory Landscape for Environmental-Economic Accounting in Kenya's Tourism Sector

Category	Details	Relevance/Implications to SEEA	Year
Policies			
Kenya Vision 2030	Aims for a globally competitive and prosperous Kenya with a high quality of life by 2030, emphasizing sustainable development.	Provides a long-term framework that integrates environmental sustainability into economic planning.	2008
National Environment Policy (NEP)	Provides a framework for an integrated approach to environmental management, emphasizing sustainable use of resources.	Supports comprehensive data collection on natural resources for informed policy-making.	2013
National Climate Change Action Plan	Focuses on mitigating climate change impacts and promoting low carbon development.	Facilitates the inclusion of climate data into national accounts, essential for SEEA.	2018
National Energy Policy	Promotes sustainable energy production and consumption, energy efficiency, and the use of renewable energy sources.	Encourages the inclusion of energy data in national accounts, crucial for SEEA energy accounts.	2018
National Solid Waste Management Strategy	Provides a comprehensive approach to managing solid waste, promoting recycling, and reducing waste generation.	Supports data collection on waste management, essential for SEEA material flow accounts.	2015
Strategies			
National Strategy for the Development of Statistics (NSDS)	Enhances the capacity of the national statistical system to produce reliable, accurate, and timely data, including environmental statistics.	Strengthens the statistical foundation necessary for SEEA implementation.	2019-2023
Green Economy Strategy and Implementation Plan (GESIP)	Promotes sustainable development through green economy initiatives, integrating environmental considerations into economic planning.	Encourages the integration of environmental and economic data, aligning with SEEA principles.	2016
Natural Capital Accounting (NCA) Program	Integrates environmental data into national accounts, supporting better decision-making and policy formulation.	Directly aligns with SEEA by promoting the valuation and accounting of natural capital.	2016
Legal Instruments			
Environmental Management and Coordination Act (EMCA), 1999	Provides the legal framework for environmental management, conservation, and sustainable use of resources.	Establishes a legal mandate for environmental data collection and management, crucial for SEEA.	1999

Category	Details	Relevance/Implications to SEEA	Year
Statistics Act, 2006	Establishes the legal basis for collecting, analysing, and disseminating statistical information, including environmental data.	Ensures legal support for the collection of environmental statistics required by SEEA.	2006
Climate Change Act, 2016	Provides a regulatory framework for enhancing climate resilience and low-carbon development.	Supports the integration of climate change metrics into economic accounting.	2016
Energy Act, 2019	Regulates energy production, distribution, and consumption, promoting renewable energy and energy efficiency.	Facilitates the integration of energy data into national accounts, supporting SEEA energy modules.	2019
Water Act, 2016	Regulates the management, conservation, use, and control of water resources in Kenya.	Provides essential data on water resources, a critical component of SEEA.	2016
Wildlife Conservation and Management Act, 2013	Provides for the protection, conservation, sustainable use, and management of wildlife in Kenya.	Supports the collection of data on biodiversity, contributing to SEEA ecosystem accounts.	2013
Sustainable Waste Management Act, 2022	Provides for the establishment of legal and institutional framework for the sustainable management of waste; ensure the realization of the constitutional provision on the right to a clean and healthy environment and for connected purposes	Supports data collection on waste generation and environmental management, crucial for SEEA Solid Waste accounts	2022
Regulatory Instruments			
Environmental (Impact Assessment and Audit) Regulations, 2003	Sets requirements for conducting environmental impact assessments and audits for projects.	Ensures consistent data on environmental impacts, valuable for SEEA environmental accounts.	2003
Renewable Energy Regulations	Promotes the use of renewable energy sources and sets standards for their production and distribution.	Encourages the integration of renewable energy data into SEEA energy accounts.	2012
Greenhouse Gas Inventory System	Establishes a system for tracking and reporting greenhouse gas emissions.	Provides essential data on greenhouse gas emissions, necessary for SEEA air emission accounts.	2016
Water Resource Management Rules, 2007	Provides regulations for the sustainable management and use of water resources.	Supports detailed water resource accounting, crucial for SEEA water accounts.	2007
Waste Management Regulations, 2006	Provides guidelines for the management, handling, and disposal of various types of waste.	Supports data collection on waste generation and management, crucial for SEEA material flow accounts.	2006
Climate Change (Carbon Markets) Regulations, 2024	Provides regulations for the carbon project development and management processes, an institutional framework, benefit sharing and direction on Kenya's engagement in Article 6 of the Paris Agreement.	Supports essential data collection on greenhouse gas emissions, necessary for SEEA air emission accounts.	2024

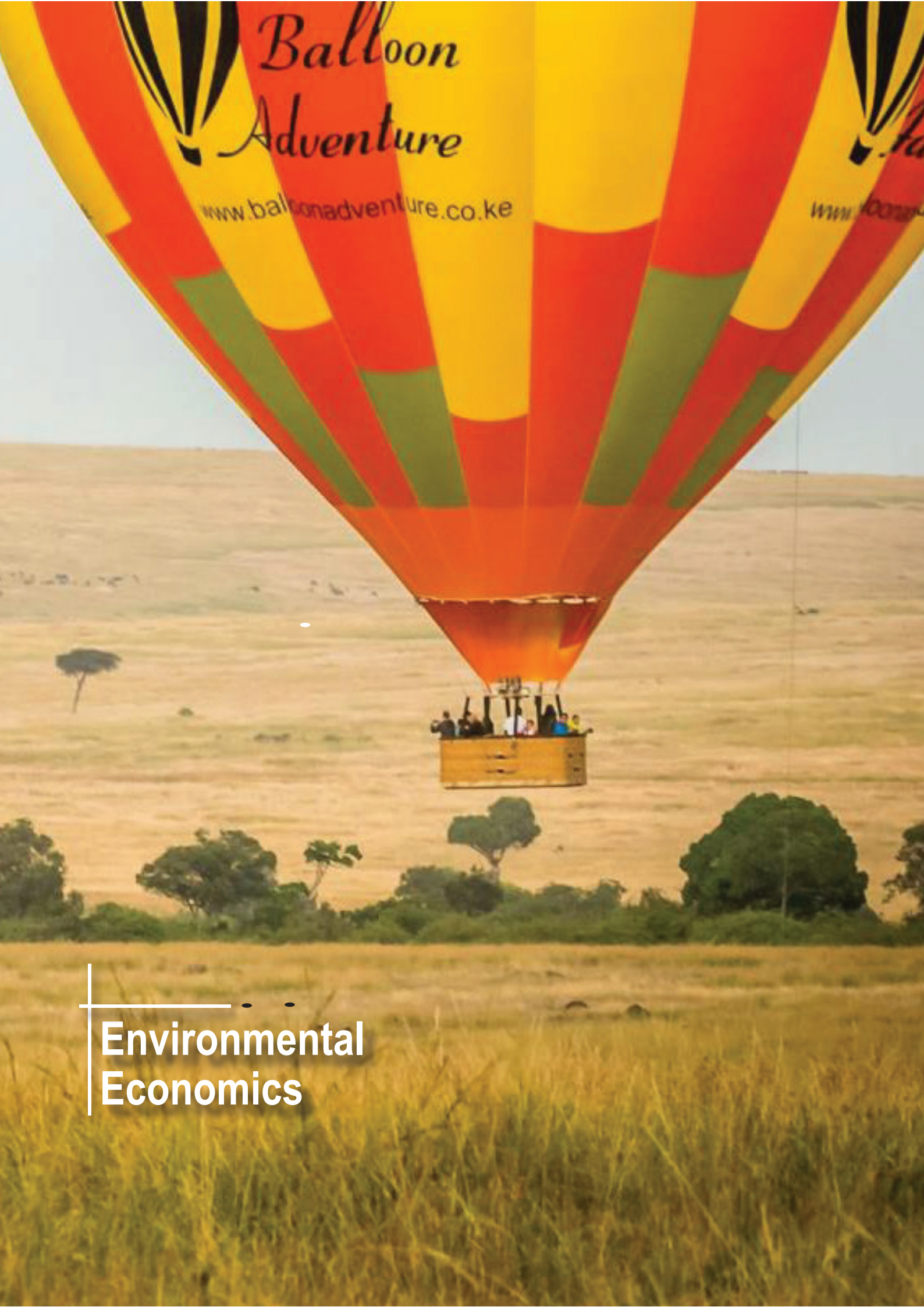
3.5 Institutional Framework

Table 3.2 outlines the institutional framework for Environmental-Economic Accounting in Kenya's tourism sector, detailing the roles of various public and private institutions. These entities can collaborate to collect, manage, and utilize environmental data specific to tourism, integrating it into national accounts to support sustainable tourism development and informed policy-making.

Table 3.2 Institutional Framework for Environmental-Economic Accounting

Type of Institution	Institution	Role
Public Institutions		
Government of Kenya	Ministry of Environment, Climate Change and Forestry	Oversees environmental policies, ensures implementation of SEEA, and coordinates data collection and management.
	Ministry of Energy and Petroleum	Provides data on energy production, consumption, and renewable energy sources for SEEA energy accounts.
	Ministry of Water, Sanitation and Irrigation	Supplies data on water resources, management, and usage, supporting SEEA water accounts.
	Ministry of Finance and National Planning	Integrate SEEA into national development plans and economic policies, ensuring resource allocation for SEEA activities.
	Kenya National Bureau of Statistics (KNBS)	Leads the compilation and dissemination of environmental-economic accounts, and ensures data quality and consistency.
	National Environment Management Authority (NEMA)	Collects environmental data, enforces regulations, and supports the development of SEEA frameworks.
	Kenya Forestry Service (KFS)	Provide data on forestry resources, contributing to SEEA land and ecosystem accounts.
	Kenya Wildlife Service (KWS)	Supply data on biodiversity and wildlife, supporting SEEA ecosystem and biodiversity accounts.
	Water Resources Authority (WRA)	Manage water resource data, crucial for SEEA water accounts.
	Ministry of Tourism and Wildlife	Provide data on tourism activities, impacts on natural resources, and supports SEEA tourism satellite accounts.
	Kenya Tourism Board (KTB)	Collect and provide data on tourism statistics, economic contributions, and environmental impacts, supporting SEEA tourism satellite accounts.
	Tourism Regulatory Authority (TRA)	Regulate and oversee standards in the tourism sector, collects data on compliance and performance for SEEA tourism accounts.
	Tourism Research Institute (TRI)	Conduct research and provides data on tourism trends, impacts, and sustainability, contributing to SEEA tourism accounts.
	Tourism Fund (TF)	Manage tourism revenues and funds projects, provides financial data relevant for SEEA tourism accounts.

Type of Institution	Institution	Role
Private Institutions		
Research Institutions	International Livestock Research Institute (ILRI)	Conduct research and provides data on agricultural and land use, contributing to SEEA land and ecosystem accounts.
	African Centre for Technology Studies (ACTS)	Research and provide data on sustainable development and environmental management for SEEA.
	Strathmore University's Energy Research Centre	Provide research and data on renewable energy and energy efficiency for SEEA energy accounts.
Non-Governmental Organizations (NGOs)	World Wide Fund for Nature (WWF) Kenya	Supply data on conservation efforts, biodiversity, and ecosystem services, supporting SEEA ecosystem accounts.
	Green Belt Movement	Provide data on reforestation, land restoration, and climate action, contributing to SEEA land accounts.
Private Sector	Kenya Association of Manufacturers (KAM)	Offer data on industrial production, waste management, and resource use, relevant for SEEA material flow accounts.
	Kenya Private Sector Alliance (KEPSA)	Advocate for sustainable business practices, promotes SEEA adoption among private sector entities.
	Kenya Renewable Energy Association (KEREA)	Provide data on renewable energy projects, supporting SEEA energy accounts.
	Eco-tourism Kenya	Promote sustainable tourism practices, collects data on eco-tourism activities, and supports SEEA tourism accounts.
	Kenya Association of Hotel-keepers and Caterers (KAHC)	Provide data on hotel and catering industry performance, resource use, and waste management, supporting SEEA material flow accounts.
	Kenya Association of Tour Operators (KATO)	Supply data on tour operations, resource use, and environmental impacts, relevant for SEEA tourism accounts.
	Kenya Association of Travel Agents (KATA)	Provide data on travel trends and agency operations, supporting SEEA tourism satellite accounts.
	Kenya Tourism Federation (KTF)	Coordinate efforts among tourism stakeholders, collects sector-wide data for SEEA tourism accounts.
	Kenya Coast Tourism Association (KCTA)	Provide data on coastal tourism activities, impacts on marine resources, and supports SEEA coastal and marine accounts.



Environmental Economics

CHAPTER FOUR

4. ENVIRONMENTAL ECONOMIC ACCOUNTS FOR THE TOURISM SECTOR IN KENYA

4.1 Core Accounts for Tourism Industries

Environmental economic accounts for tourism encompass a defined set of core accounts aimed at capturing material flows and linking them with tourism industries as defined in the Tourism Satellite Account (TSA) framework (UNWTO & UNSD [UNWTO] & [UNSD], 2008). These core accounts focus on key environmental aspects like energy use, greenhouse gas (GHG) emissions, water consumption, and solid waste generation (SEEA-CF 2013).

The sector disaggregation within these core accounts centers on five key tourism industries as defined by the TSA (UNWTO & UNSD, 2008):

- Accommodation for visitors' services
- Food and beverage serving services
- Passenger transport (encompassing railway, air, road, water transport, and transport equipment hire)
- Travel agencies and reservation services
- Cultural services, sports, and recreation services, country-specific tourism goods and services (aggregated as others)

For example, environmental flows related to tourism transportation activities are allocated under the «Passenger transport» industry within the SEEA's Physical Supply and Use Tables (PSUT) for energy, GHG, water, and solid waste accounts (SEEA CF, 2013). Additionally, depending on the specific core account, industries directly relevant to that aspect are also included. For instance, the water account might encompass water collection, treatment, supply industries, and sewerage industries (SEEA CF, 2013). The following sections describe the construction of the four core accounts for Kenya's tourism sector:

4.2 Energy Accounts

The study collected primary survey, administrative, and secondary data to compile initial energy physical flow accounts for tourism sector activities in Kenya. These accounts record energy flows in physical units (i.e., joules) from the initial extraction from the environment into the economy, the flows within the economy in the form of supply and use of energy products by industries, including tourism industries and households, and finally, the flows of energy back to the environment (as energy residuals). The accounts are based on the Kenya National Bureau of Statistics (KNBS) SEEA-Energy accounts for 2022. The most recent SEEA energy account and energy balances for 2022, published by the KNBS in 2023, served as a primary source of secondary data for constructing the country's initial SEEA-energy account for the tourism sector in this study.

The following section describes the compilation of the physical supply and use tables (PSUT) for tourism industries. The industries are aggregated into categories including accommodation for visitors, food and beverage services for visitors, passenger transport (road, railway, air, and water), travel agencies and reservation services, and other tourism industries.

4.2.1 Physical Supply Tables -Energy

The PST records the physical flows of energy from natural inputs, including renewable energy sources like solar, wind, hydro, geothermal, and biomass wood, from the environment into the economy, including tourism industries. The rows of the table also capture imports of energy products into the economy from the rest of the world and the production of energy products by the Electricity, Gas, Steam, and Air Conditioning Supply Industries.

The International Recommendations for Energy Statistics (IRES) describes energy products as those exclusively or mainly used as a source of energy directly (e.g., electricity) and products that release energy during some chemical or other processes, such as combustion. Peat, biomass, and waste are conventionally regarded as energy products when used for energy purposes. Additionally, the table records energy residuals generated by industries, including waste converted into energy. Energy residuals may also include other energy by-products, particularly heat generated when end users (either households or enterprises) use energy products for energy purposes (e.g., household lighting) (SEEA, 2016).

4.2.1.1 Energy Flows from Natural Inputs -2022

The study captured secondary data on energy flows from natural inputs, including hydro, solar, wind, geothermal, and biomass, during the year 2022 as recorded in the KNBS Economic Survey, 2023 (KNBS, 2023). Table 4.1 aggregates the flow of natural energy inputs from the environment in 2022 and highlights the natural energy mix (%) for the country during the period under focus.

Table 4.1 Natural Energy Inputs Flows -2022

Natural Energy Inputs	Flow from the Environment (TJ)	Percentage of Total (%)
Solar	1,381.40	0.00
Wind	7,714.91	0.01
Hydro	10,943.55	0.02
Thermal	19,863.18	0.03
Biomass	562,954.40	0.93
Total	**602,857.44**	**1.00**

Source: KNBS, 2023

Table 4.1 illustrates that in 2022, Kenya extracted 602,857.44 terajoules (TJ) of energy from the environment. Biomass dominated the energy mix, constituting a substantial 93%. Households extracted approximately 99% of biomass wood energy (559,477.3 TJ), with the remaining portion extracted by manufacturing industries. Thermal and hydro energies accounted for 3% and 2% respectively, while wind and solar energies combined made up less than 2% of the total natural energy flows from the environment. Results in Table 4.1 provide input for the flows of energy from natural inputs from the environment in the energy PST

4.2.1.2 Energy Products Imports in 2022

In the same year, the economy imported energy products from the rest of the world. Table 4.2 records the flow of energy products from other economies into the Kenyan economy, measured in kilojoules.

Table 4.2 Energy Products Imports in 2022

Energy Products Supply	Imports from Rest of the World (TJ)	Percentage of Total Imports (%)
Electricity	1,137.61	4.38
Coal and Coke	4,888.06	18.83
Motor Spirit Petroleum (petrol)	5,528.91	21.29
Aviation gasoline	5.78	0.02
Jet fuel	2,760.93	10.63
Kerosene	15.98	0.06
Light Diesel	8,380.31	32.28
Fuel oils n.e.c.	1,847.49	7.12
Lubricating oils	25.01	0.10
Lubricating greases	11.50	0.04
Liquefied Petroleum Gas (LPG)	1,354.43	5.22
Others	7.52	0.03
Total	**25,963.53**	**100.00**

Source: KNBS, 2023.

Table 4.2 indicates that in 2022, the primary energy product imports were motor spirit petroleum (petrol) and light diesel, utilized in manufacturing, transportation, and thermal energy generation industries, collectively constituting 54% of the total imports. Coal and coke comprised a significant 19% of the imports, while approximately 2,761 TJ of jet fuel, representing 11% of the energy product imports, were brought into the economy in 2022. Results in table 4.2 provide input on the flow of energy products from the rest of the world (ROW) in the PST.

4.2.1.3 Generation of Energy Product by Industries and Households in 2022

The SEEA-Energy PST records energy products produced by industries classified under International Standard Industrial Classification (ISIC) division D, involved in the generation, distribution, or sale of electricity, gas, steam, and air conditioning, as well as households. Table 4.3 presents excerpts from Kenya's SEEA Energy account (KNBS, 2023), illustrating the supply of energy products by industries and households in 2022.

Table 4.3 Generation of Energy Product by Industries and Households in 2022

Energy Product	Electricity, Gas, Steam and Air Conditioning Supply Industries (TJ)	Accommodation for visitors & Food & Beverage Serving Services	Households (TJ)	Total
1. Electricity	45,609.70		-	45,609.70
2. Charcoal	111.46	237.9	43,008.66	43,358.02
3. Firewood	2,723.78	402.9	498,490.26	501,616.94
4. Others	-		17,978.40	17,978.40
Total	**48,444.94**	**640.8**	**559,477.32**	**608,563.06**

Sources: KNBS, 2023 and TRI situational analysis data, 2023

Table 4.3 illustrates that in 2022, industries (Electricity, Gas, Steam, and Air Conditioning Supply Industries, Accommodation, and Food and Beverage serving services) and households added together transformed 501,616.9 TJ of biomass wood into firewood and 43,385.00 TJ into charcoal. The supply of firewood from biomass by households and industries constituted 41% of the total energy supply in the economy for the year, highlighting the country's dependence on biomass wood. Meanwhile, industries such as Kengen, Independent Power Producers (IPPs), REREC, and off-grid generation transformed a total of 45,609.70 TJ of energy into electricity, representing 4% of the energy available in the country in 2022.

The SEEA-Energy account anticipates the conversion of natural energy inputs by industries into electricity for own consumption. According to the KNBS (2023) energy account for Kenya, in 2022, an insignificant 265.2 TJ of electricity (0.02%) was generated from natural energy sources (solar, wind, and hydro) by industries. Similarly, a national baseline survey of tourism enterprises (n = 1253) conducted for the current study revealed that only 5% (n = 69) of the tourism enterprises generated their own electricity off-grid. The enterprises that generated their own electricity were mainly those offering accommodation to visitors and food and beverage service providers (n = 52).

Table 4.3 provides input on generation of energy by Electricity, Gas, Steam and Air Conditioning Supply Industries and households in the PST.

4.1.2 Physical Use Tables -Energy

The Physical Use Tables (PUT) are structured similarly to the SEEA-CF 2008, presenting energy usage within the economy by economic agents; industries, households, accumulations, and flows into the rest of the world and environment in a particular year, captured in physical quantities (Terra Joules).

These tables are divided into rows that document the extraction and utilization of energy from natural inputs, primarily by electricity, gas, steam, and air conditioning supply industries,

other industries (e.g., manufacturing), and households. In the case of Kenya, natural energy products encompass renewable resources extracted from the environment—such as solar, wind, hydro, geothermal, and biomass wood. The rows also encompass the use of energy products disaggregated by the Standard for International Energy Classification (SIEC) and the flow of energy residuals from extraction, transformation, and losses due to transmission.

The columns of the table record intermediate energy consumption by tourism industries classified according to the TSA-RMF, 2008, into Accommodation, Food and Beverage, Passenger transport, Travel agencies and reservations, and others. They also capture intermediate energy consumption by other industries in the economy and final consumption by households. Additionally, other columns in the table document flows of energy products to the rest of the world as exports, accumulation/stock, and flows to the environment.

4.1.2.1 Natural Energy Inputs Usage in Kenya, 2022

The study acquired secondary data on the usage of natural energy inputs in the Country in 2022. This encompassed the consumption of natural energy inputs by the electricity and gas industries for energy production and distribution, the consumption of natural energy inputs by other industries (e.g., manufacturing), as well as household final consumption of natural energy inputs. The data was sourced from the SEEA-Energy Account for Kenya, 2022 (KNBS, 2023). Table 4.4 presents a summary of the results of natural energy input usage in the country for the year 2022.

Table 4.4 Natural Energy Inputs Usage in Kenya, 2022

Natural Energy Inputs	Electricity, Gas, Steam and Air Conditioning Supply (TJ)	Manufacturing (TJ)	Accommodation for visitors & Food & Beverage Serving Services	Households (TJ)
1. Solar	1,381.40			-
2. Wind	7,714.91			-
3. Hydro	10,943.55			-
4. Geothermal	19,863.18			-
5. Co-Generation	0.97			-
6. Biomass Wood		2,835.30	640.80	559,477.30
Total	**39,904.01**	**2,835.30**	**640.80**	**559,477.30**

Source: KNBS, 2023 and TRI situational analysis data, 2023

The results in Table 4.4 reveal that 93% of this energy was consumed by households, mainly as energy from biomass used for the production of domestic firewood and charcoal, highlighting the economy's excessive reliance on this energy source. A significant 2,835.30 TJ of biomass wood was also utilized in production processes by manufacturing industries and 640.80 TJ of biomass wood was used for accommodation, food and beverage services for visitors. Additionally, 39,904.01 TJ of wind, solar, hydro, and geothermal energy was consumed by the energy generation industry for electricity production and distribution.

Table 4.4 provides input on natural energy usage by electricity, gas, steam and air-conditioning supply industries, other industries – manufacturing, tourism industries and households in the energy PUT

4.1.2.2 Intermediate, Final Consumption and Export of Energy Products in Kenya, 2022

The study obtained data on intermediate and final consumption of energy products from the Kenya SEEA-Energy Account for the year 2022. The data collection focused on key energy products, including petrol, diesel, electricity, kerosene, LPG, firewood and charcoal, jet fuel & aviation gas, fuel oils n.e.c , and lubricants. Intermediate consumption by industries was categorized into consumption by tourism sector activities and consumption by all other industries in the economy. Table 4.5 provides a detailed breakdown of intermediate energy product usage by both the tourism sector and other industries within the economy for the year 2022. Tourism sector energy uses are explicitly captured in the “Accommodation and Food Service activities” and include activities in the “transport and storage” industries as well as energy uses in the activities of “other commercial sectors”.

However, the results in Table 4.5 lack adequate detail on intermediate consumption by tourism sector activities. This limitation arises from the aggregation approach employed in constructing the SEEA-Energy Account. In this structure, consumption by the tourism sector is encompassed within the accommodation, food and beverage service activities. Additionally, tourism transport activities—encompassing road, rail, air, and water passenger transport—are consolidated under the broader category of transport and storage, and some tourism activities are implicit in the “other commercial sectors”.

4.1.2.3 Energy Products Usage by Tourism Enterprises in 2022

The study relied on primary data from a survey of tourism enterprises across the country to gain insight into the pattern of energy consumption by tourism enterprises across the TSA five classes. Table 4.5 summarizes the results of average monthly energy consumption by enterprises in the five categories

Table 4.5 Intermediate and Final Energy Products Consumption - 2022

Energy Product Consumption (TJ)												
Economic Sector	**Electricity**	**Coal and Coke**	**Motor Spirit Petroleum (petrol)**	**Aviation gas**	**Jet fuel**	**Kerosene**	**Light Diesel**	**Fuel oils n.e.c.**	**Lubricating oils & greases**	**Liquefied Petroleum Gas (LPG)**	**Charcoal & Wood fuel**	**Others**
Accom. for visitors	771.51	0.00	92.71	0.00	0.00	10.35	128.35	0.27	0.96	25.79	402.86	0.00
F&B Serving Services	455.54	0.00	54.74	0.00	0.00	1.12	75.79	0.16	0.57	15.23	237.87	0.00
Passenger Transport	3,451.10	0.00	414.71	0.14	87.15	0.04	574.14	47.85	4.29	10.80	0.00	0.00
Travel Ag. & Res.	211.17	0.00	25.38	0.00	0.00	0.92	35.13	9.13	0.26	2.34	0.00	0.00
Others Tsm. Industries	161.29	0.00	19.38	0.00	0.00	0.00	26.83	0.00	0.20	1.79	0.00	0.00
Total Tsm. Industries	**5,050.60**	**0.00**	**606.92**	**0.14**	**87.15**	**12.43**	**840.24**	**57.41**	**6.28**	**55.95**	**640.73**	**0.00**
Elec. and Gas Supply	153.98	0.00	0.00	0.00	0.00	0.00	-8.52	738.80	4.19	0.00	0.00	0.00
Other industries	19,151.28	4,858.99	4,264.25	3.78	2,354.03	49.76	6,529.92	613.31	35.42	176.13	2,835.35	0.00
Households	11,674.19	0.00	0.00	0.00	0.00	310.00	0.00	0.00	0.00	1,164.63	541,498.92	0.00
Accumulation.	0.00	0.00	657.73	1.55	318.54	-356.19	979.11	350.40	-114.08	-43.54	0.00	7.16
ROW	76.84	29.11	0.00	0.33	1.18	0.00	39.55	87.28	104.68	1.23	0.00	0.71
Environment	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Total	**36,106.90**	**4,888.10**	**5,528.90**	**5.80**	**2,760.90**	**16.00**	**8,380.30**	**1,847.20**	**36.50**	**1,354.40**	**544,975.00**	**7.87**

Source: KNBS (2023), TRI situational analysis data, 2023

Table 4.5 depicts the intermediate and final uses of energy products in the year 2022.

Table 4.5 shows that in 2022, the tourism sector was a significant energy consumer, using 14% of the electricity supplied by the Electricity, Gas, Steam, and Air Conditioning sector (5,050.60 TJ) and substantial amounts of motor spirit petroleum (11%) and light diesel (10%). Other notable energy sources included LPG and lubricating oils and greases, primarily for passenger transport. Despite this high consumption, only 5% of tourism enterprises produced energy from biomass, generating 640.73 TJ, a small fraction compared to the 544,334.27 TJ used by other industries and households, highlighting the sector's reliance on conventional energy sources.

Figure 4.1 shows the use of energy products by the tourism sector.

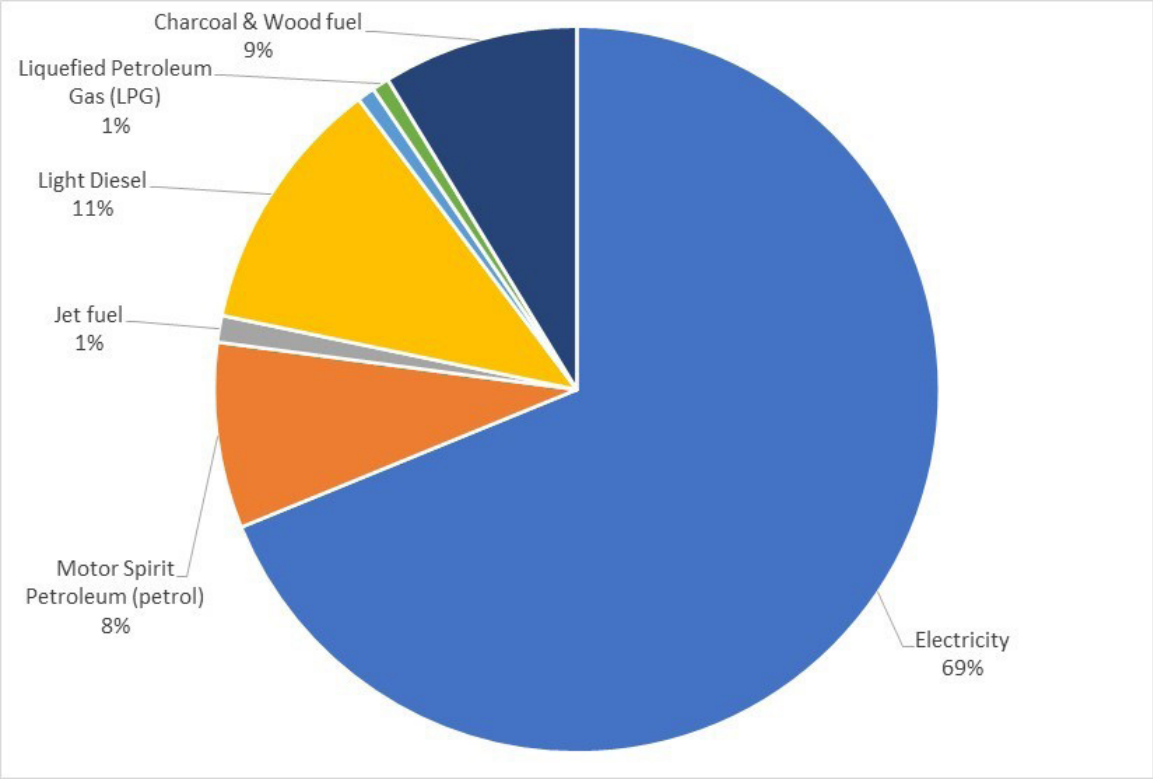


Figure 4.1 Intermediate Use of Energy Products by Tourism Industries in The Year 2022

Source: TRI situational analysis data, 2023, KNBS, 2023

Figure 4.1 shows the energy product mix as a percentage of total energy product intermediate consumption by tourism enterprises in Kenya (7,357.85TJ). The figure show that electricity makes up 69% (5,050.60TJ), Other significant energy products consumed by tourism enterprises include light diesel 11% (840.24 TJ), charcoal and wood fuel 9% (640.73TJ) and petroleum 8% (606.92TJ).

4.1.2.4 Tourism Share of Intermediate Energy Products Consumption-2022

In terms of energy product utilization within production processes, it's noteworthy that these products may be acquired for various purposes, including those related to tourism, thus contributing to environmental flows associated with tourism demand (Costantino, 2017). This observation is applicable to both tourism-related and other industries' outputs. In practical terms, expenditures in tourism represent a substantial portion of the supply within tourism

industries, while the majority of outputs from other industries are intended for non-tourism purposes (UNWTO, Glossary of Tourism terms). Consequently, the proportion of tourism-related acquisitions of products may significantly differ between tourism-specific activities and those of other industries. For instance, the share of tourism-related expenditure in accommodation services is likely to be considerably higher compared to that in transport and storage industries (Costantino, 2017)

Based on Costantino (2017), the study calculated tourism's share of intermediate energy consumption using output share ratios derived from the Kenya Tourism Satellite Account (TSA)-2019 (TRI, 2020). Due to the absence of direct data, these ratios were utilized to estimate the proportion of environmental flows (including water, energy, GHG emissions, solid waste, etc.) associated with visitor activities and thus attributable to tourism within each tourism industry. The TRI data from TSA-2019 provided the most recent output ratios available, and the study assumed stability in these ratios from 2019 to 2022 when computing the proportion of environmental flows attributable to tourism in 2022. Table 4.6 presents the computed tourism output ratios.

Table 4.6 Tourism Output Ratios

Tourism Sector	Output	Tourism share	Tourism Ratio (%)
Accommodation for visitors' service	130,245	116,092	0.89
Food and beverage serving services	76,904	61,287	0.80
Railway passenger transport	2,966	2,465	0.83
Road passenger transport	436,320	165,248	0.38
Water passenger transport	2,140	218	0.10
Air passenger transport	141,182	78,658	0.56
Transport and equipment rental	5,590	5,524	0.99
Travel agencies and the reservation industry	30,059	28,216	0.94
Cultural services	15,918	4,635	0.29
Sports and recreation services	11,310	11,273	1.00
Total	**852,634**	**473,616**	**0.56**

Source: Tourism Research Institute, 2020

To determine the share of energy usage in various sectors attributable to tourism, tourism ratios were aggregated from Table 4.6 as follows: accommodation services for visitors (89%), food and beverage serving services (80%), passenger transport (including railway, road, water, and air transport) (42%), travel agencies and reservation services (including car hire) (95%), and other tourism industries such as cultural services, sports, and recreation services (58%).

These ratios were then applied to the energy consumption data for relevant tourism industries by multiplying the energy consumption of each sector by its corresponding tourism ratio. This calculation provided the share of energy usage by tourists, reflecting tourism's impact on energy consumption for the year under consideration. Table 4.7 presents the energy consumption by tourism-specific industries attributable to tourism expenditure in the country. Table 4.7 suggests that 58% (4,281.83 TJ) of the tourism industries' total intermediate energy consumption (7,357.9 TJ) was attributable to expenditures by tourists on tourism goods and services.

Table 4.7 Tourism Share of Intermediate Energy Products Consumption by Tourism Industries in 2022

	Accommodation for Visitors		Food & Beverage Serving Services		Passenger Transport		Travel Agencies and Reservation Services		Other tourism industries		Tourism Industries	
Energy Products	**Tourism Share**	**Total**	**Tourism Share**	**Total**	**Tourism Share**	**Total**	**Tourism Share**	**Total**	**Tourism Share**	**Total**	**Tourism Share**	**Total**
Electricity	687.65	771.51	363.02	455.54	1,460.85	3,451.10	199.87	211.17	94.24	161.29	2,805.63	5,050.60
Coal and Coke	-	-	-	-	-	-	-	-	-	-	-	-
Motor Spirit Petroleum (petrol)	82.63	92.71	43.62	54.74	175.55	414.71	24.02	25.38	11.32	19.38	337.15	606.92
Aviation gasoline	-	-	-	-	0.06	0.14	-	-	-	-	0.06	0.14
Jet fuel	-	-	-	-	36.89	87.15	-	-	-	-	36.89	87.15
Kerosene	9.22	10.35	0.89	1.12	0.02	0.04	0.87	0.92	-	-	11.01	12.43
Light Diesel	114.40	128.35	60.39	75.79	243.03	574.14	33.25	35.13	15.68	26.83	466.76	840.24
Fuel oils n.e.c.	0.24	0.27	0.13	0.16	20.26	47.85	8.64	9.13	-	-	29.26	57.41
Lubricating oils &greases	0.86	0.96	0.45	0.57	1.82	4.29	0.25	0.26	0.12	0.20	3.49	6.28
Liquefied Petroleum Gas (LPG)	22.99	25.79	12.14	15.23	4.57	10.80	2.21	2.34	1.04	1.79	42.96	55.95
Charcoal & Wood fuel	359.07	402.86	189.56	237.87	-	-	-	-	-	-	548.63	640.73
Others	-	-	-	-	-	-	-	-	-	-	-	-
TOTAL USE	**1,277.06**	**1,432.81**	**670.21**	**841.02**	**1,943.04**	**4,590.22**	**269.12**	**284.33**	**122.40**	**209.49**	**4,281.83**	**7,357.86**

Source: KNBS (2023)

4.1.3 Balanced Energy Account for Tourism Enterprise

Tables 4.8 and 4.9 present the balanced energy physical supply and use tables for the tourism industries in Kenya for 2022. Table 4.8 (PST) highlights the flow of energy from the natural environment, the import of energy products from the rest of the world (ROW), the conversion of renewable energy sources into electricity by the Electricity, Gas, Steam, and Air Conditioning Supply industries, and the conversion of biomass into wood fuels and charcoal by households, tourism industries, and other sectors. Table 4.9 (PUT) details the intermediate consumption of energy products by tourism industries and other sectors, the final energy consumption by households, accumulation, exports of energy products, and the flow of energy residuals into the environment.

Table 4.8 Physical Supply Table for Kenya's Tourism Sector - Energy Account - 2022

PHYSICAL ENERGY SUPPLY TABLES																			
	Tourism Industries												Other Industries						
	Accommodation for Visitors		Food and Beverage Serving Services		Passenger Transport		Travel Agencies & Reservations		Others Tourism Industries		Total Tourism industries		Gas, Steam, and Air Conditioning Supply	Other Industries	H/holds	Accum.	ROW	Environment	Total
	TSM	Total	TSM	Total	TSM	Total	TSM	Total	TSM	Total	TSM	Total							
Energy from Natural Inputs																			
Solar																		1,381.40	1,381.40
Wind																		7,714.91	7,714.91
Hydro																		10,943.55	10,943.55
Thermal																		19,863.18	19,863.18
Biomass																		562,954.40	562,954.40
Energy Products																			
Electricity													45,609.70				1,137.61		46,747.31
Coal and Coke																	4,888.06		4,888.06
Motor Spirit Petroleum (petrol)																	5,528.91		5,528.91
Aviation gasoline																	5.78		5.78
Jet fuel																	2,760.93		2,760.93
Kerosene																	15.98		15.98
Light Diesel																	8,380.31		8,380.31
Fuel oils n.e.c.																	1,847.16		1,847.16
Lubricating oils																	25.01		25.01
Lubricating greases																	11.50		11.50
Liquefied Petroleum Gas (LPG)																	1,354.43		1,354.43
Firewood	359.07	402.9	189.56	237.9							548.63	640.73		2,835.30	541,498.92		-		544,974.95
Others															17,978.40		7.83		17,986.23
Energy Residuals															-	-	-	-	-
Energy from Solid Waste)															-	-	-	-	-
TOTAL SUPPLY	**359.069**	**402.860**	**189.559**	**237.870**							**548.628**	**640.73**	**45,609.70**	**2,835.30**	**559,477.32**	-	**25,963.51**	**602,857.44**	**1,237,384.00**

Source: KNBS, 2023. TRI situational analysis data, 2023

Table 4.9 Physical Use Table for Kenya's Tourism Sector - Energy Account – 2022

PHYSICAL USE TABLES																			
	Intermediate Consumption; Use of Energy preoducts and Receipt of Energy Losses														Final Consumption				
	Tourism Industries												Other Industries						
	Accommodation for visitors		Food and Beverage Serving Services		Passenger Transport		Travel Agencies & Reservations		Others Tourism Industries		Total Tourism industries		Electricity and Gas Supply	Other Industries	H/holds	Accumulation.	ROW	Envi	Total
									Tourism Industries										
	TSM	Total	TSM	Total	TSM	Total	TSM	Total	TSM	Total	TSM	Total							
Energy from Natural Inputs																			
Solar													1,381.40						1,381.40
Wind													7,714.91						7,714.91
Hydro													10,943.55						10,943.55
Thermal													19,863.18						19,863.18
Biomass														3,476.00	559,477.30				562,953.30
Co-generation													0.97						0.97
Energy Products																			
Electricity	687.6	771.51	363.02	455.54	1,460.85	3,451.10	199.87	211.17	94.24	161.29	2,805.63	5,050.60	153.98	19,151.28	11,674.19		76.84		36,106.90
Coal and Coke	-	-	-	-	-	-	-	-	-	-	-	-		4,858.99			29.11		4,888.10
Motor Spirit Petroleum (petro	82.6	92.71	43.62	54.74	175.55	414.71	24.02	25.38	11.32	19.38	337.15	606.92		4,264.25		657.73	-		5,528.90
Aviation gasoline	-	-	-	-	0.06	0.14	-	-	-	-	0.06	0.14		3.78		1.55	0.33		5.80
Jet fuel	-	-	-	-	36.89	87.15	-	-	-	-	36.89	87.15		2,354.03		318.54	1.18		2,760.90
Kerosene	9.2	10.35	0.89	1.12	0.02	0.04	0.87	0.92	-	-	11.01	12.43		49.76	310.00	- 356.19	-		16.00
Light Diesel	114.4	128.35	60.39	75.79	243.03	574.14	33.25	35.13	15.68	26.83	466.76	840.24	- 8.52	6,529.92		979.11	39.55		8,380.30
Fuel oils n.e.c.	0.2	0.27	0.13	0.16	20.26	47.85	8.64	9.13	-	-	29.26	57.41	738.80	613.31		350.40	87.28		1,847.20
Lubricating oils &greases	0.9	0.96	0.45	0.57	1.82	4.29	0.25	0.26	0.12	0.20	3.49	6.28	4.19	35.42		- 114.08	104.68		36.50
Liquefied Petroleum Gas (LPC	23.0	25.79	12.14	15.23	4.57	10.80	2.21	2.34	1.04	1.79	42.96	55.95		176.13	1,164.63	- 43.54	1.23		1,354.40
Charcoal & Woodfuel	359.1	402.86	189.56	237.87	-	-	-	-	-	-	548.63	640.73	-	2,835.35	541,498.92	-	-		544,975.00
Others	-	-	-	-	-	-	-	-	-	-	-	-			-	7.16	0.71		7.87
Energy Residuals	-		-		-		-		-		-								
Extraction	-		-		-		-		-		-							17,978.40	17,978.40
Transformation	-		-		-		-		-		-								-
Losses	-		-		-		-		-		-							10,640.39	10,640.39
TOTAL USE	**1,277.1**	**1,432.81**	**670.21**	**841.02**	**1,943.04**	**4,590.22**	**269.12**	**284.33**	**122.40**	**209.49**	**4,281.83**	**7,357.86**	**40,792.47**	**44,348.22**	**1,114,125.04**	**1,800.68**	**340.91**	**28,618.79**	**1,237,383.97**

Source: KNBS, 2023. TRI situational analysis data, 2023

The Tourism sector PSUT (Tables 4.8 and 4.9) confirms that tourism and other industries produce a minimal amount of energy products, such as wood fuel and firewood for their own consumption, accounting for less than 1% of total biomass energy products, compared to households, which produce 99%. Additionally, although 5% of surveyed tourism enterprises reported generating their own electricity from renewable energy sources like solar and wind, the overall electricity production by tourism industries is negligible. The tables support the notion that tourism is a significant consumer of electricity, accounting for 14% of total energy product consumption (5,050.6 TJ), as well as fossil fuel products, including motor spirit petroleum (11%, 606.92 TJ) and light diesel (10%, 840.24 TJ).

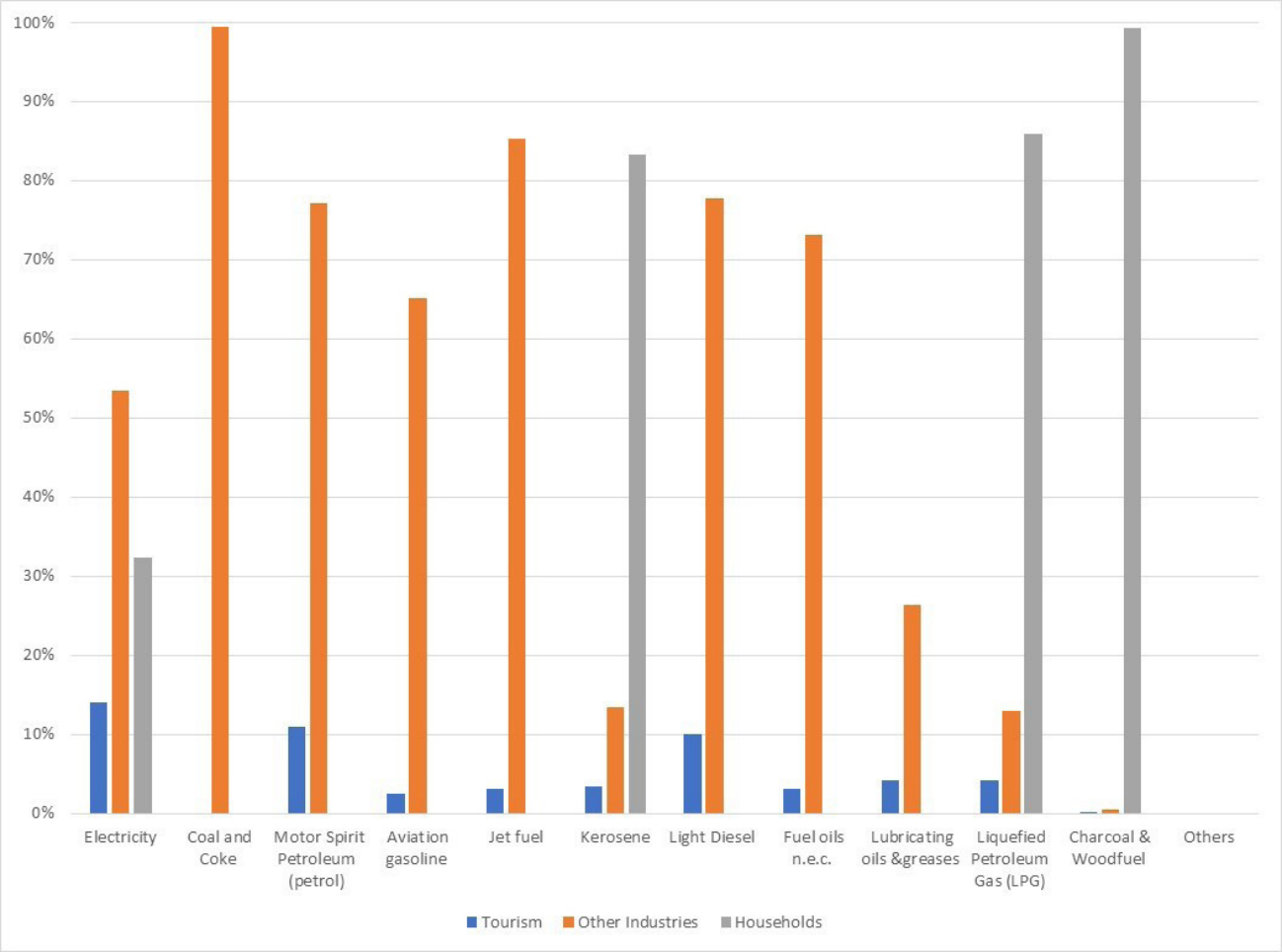


Figure 4.2 Proportion of Energy Product Use by Tourism Industries, Other Industries, and Households

Source: TRI Situational Analysis Data, 2023

The high levels of energy consumption highlight the need for the tourism industry to adopt more sustainable energy practices (Green energy). By transitioning to renewable energy sources and improving energy efficiency, the tourism sector can reduce on its carbon footprint and align with global sustainability goals, ensuring long-term viability and resilience in an increasingly eco-conscious market.

4.2 Green House Gases Account

The air emissions account captures data on gaseous and particulate substances released into the atmosphere by economic agents due to production, consumption, and accumulation activities. It aligns with the System of National Accounts (SNA) and records emissions generated by resident economic units categorized by substance (United Nations et al., 2009). In the context of tourism, the SEEA-UNWTO framework, adapted from the air emissions account in the SEEA Central Framework (SEEA-CF), focuses on greenhouse gas (GHG) emissions generated by tourism industries. These emissions are categorized by GHG type and the flow of the emissions into the atmosphere (United Nations et al., 2010; UNWTO, 2019).

The study utilized both primary and secondary data to compile greenhouse gas flow accounts from production and consumption activities across various sectors, including tourism industries, other industries, household consumption, accumulation, and the environment. Adopting an «energy first approach,» the analysis focused on anthropogenically generated greenhouse gases, drawing upon energy consumption data from economic sectors as the primary source (Smith et al., 2021). The SEEA-Energy Account for Kenya, published by the KNBS (KNBS, 2023), provided a useful basis for constructing the emission accounts. Subsequently, examining energy consumption patterns within tourism industries (including accommodation, food & beverage, passenger transport, travel agencies and reservations, and other tourism sectors) offered a valuable method for estimating the associated greenhouse gas emissions in tourism (Jones & Brown, 2020).

The emissions account captures the flow of Carbon Dioxide (CO2), Methane (CH4) Nitrous oxide (N2O), and nitrogen dioxide (NO2). These were converted into CO2 equivalents (CO2e) by applying the global warming potential (GWP) established by the Intergovernmental Panel on Climate Change (IPCC).

Complementary data on the country's total GHG emissions was obtained from the World Bank database, covering CO2 equivalent emissions (kt) from 1990 to 2019 (World Bank, 2023). This includes CO2 emissions (excluding short-cycle biomass burning), other biomass burning, all anthropogenic CH4 sources, N2O sources, and F-gases (HFCs, PFCs, and SF6). Emission factors were sourced from the International Energy Agency (IEA), whose reports provide valuable information for estimating GHG emissions from industries' energy use (IEA, 2022). Inputs to compute tourism's share of GHG emissions, as a proportion of total sector emissions, were sourced from the current TSA for the country (TSA-2019) published by TRI (2020).

The subsequent sections describe the construction of physical supply and use tables for GHG emission for Kenya's tourism industries -2022 and the structure of the accounts.

4.2.1 Physical Supply Tables -GHG

The foundational framework of the emissions account is built upon the physical supply table (PST), as outlined in the System of Environmental-Economic Accounting Central Framework (SEEA-CF) 2012. The PST provides a comprehensive view of GHG emissions generated by various industries and households. These emissions, categorized by type—such as CO_2, CH_4,

N_2O, and NO_2—are quantified in CO_2 equivalent tonnes (United Nations et al., 2014).

On the horizontal axis, columns of the PST represent the origin of emissions, distinguishing between economic units—industries and households—as their sources. Specifically, for creating a GHG-Emissions Account for the tourism sector in Kenya, the PST categorizes industries according to the Tourism Satellite Account: Recommended Methodological Framework (TSA-RMF) 2008. For brevity, these are aggregated into five tourism-specific industries: accommodation for visitors, food and beverage serving services, passenger transport, travel agencies and reservation services, and other tourism industries. All other industries in the economy are grouped together.

The column on households captured GHG emissions by households and was broken down by purpose (i.e., transport, heating, cooking, and other) based on information available from the Kenya Integrated Household Budget Survey 2015-2016 (KIHBS) (KNBS, 2018). The column for accumulation shows the release of air emissions to the atmosphere from controlled landfill sites, reflecting emissions from production, consumption, and accumulation activities in earlier periods. These emissions were attributed to the waste management units that operate the landfill sites (UNFCCC, 2020).

4.2.1.1 National GHG Emissions

Although Kenya accounts for less than 0.1% of global GHG emissions, the country's total GHG emissions increased from 56.8 MtCO2e in 1995 to 93.7 MtCO2e in 2015 (Government of Kenya [GoK], 2018). GHG emissions are projected to rise to 143 MtCO2e by 2030 as the country implements its Vision 2030 development agenda (GoK, 2018). The leading source of emissions in Kenya is agriculture, contributing 40% of total national emissions, primarily due to livestock enteric fermentation and manure management. This is followed by land use, land-use change, and forestry (LULUCF) at 38%, mainly due to deforestation, and energy use, including transport, at 18%. Industrial processes and product use (IPPU) account for 3%, and waste management contributes 1% (GoK, 2018). As the economy grows towards the 2030 targets, projections indicate that energy will become the leading contributor to emissions due to increased consumption of fossil fuels for electricity generation, transportation, and industrial, domestic, and commercial heating needs (GoK, 2018).

Carbon dioxide emissions account for the largest share of greenhouse gases associated with climate change and global warming in Kenya (World Bank, 2023). Data for carbon dioxide emissions include gases from the burning of fossil fuels and cement manufacture, but exclude emissions from land use such as deforestation. From 1960 to 2021, CO_2 emissions in Kenya averaged 7.99Mt, reaching an all-time high of 22.98Mt in 2019 and a record low of 2.4Mt in 1961 (World Bank, 2023). In 2021, CO_2 emissions in Kenya increased to 22.43 Mt from 21.11Mt in 2020. The Global Carbon Budget (2023) reports that by 2022, Kenya's CO_2 emission was at 24.85Mt. Figure 4.3 shows the International Energy Agency (IEA) estimates of emissions of CO_2 in Kenya in the period between 2000 and 2021 (IEA, 2022).

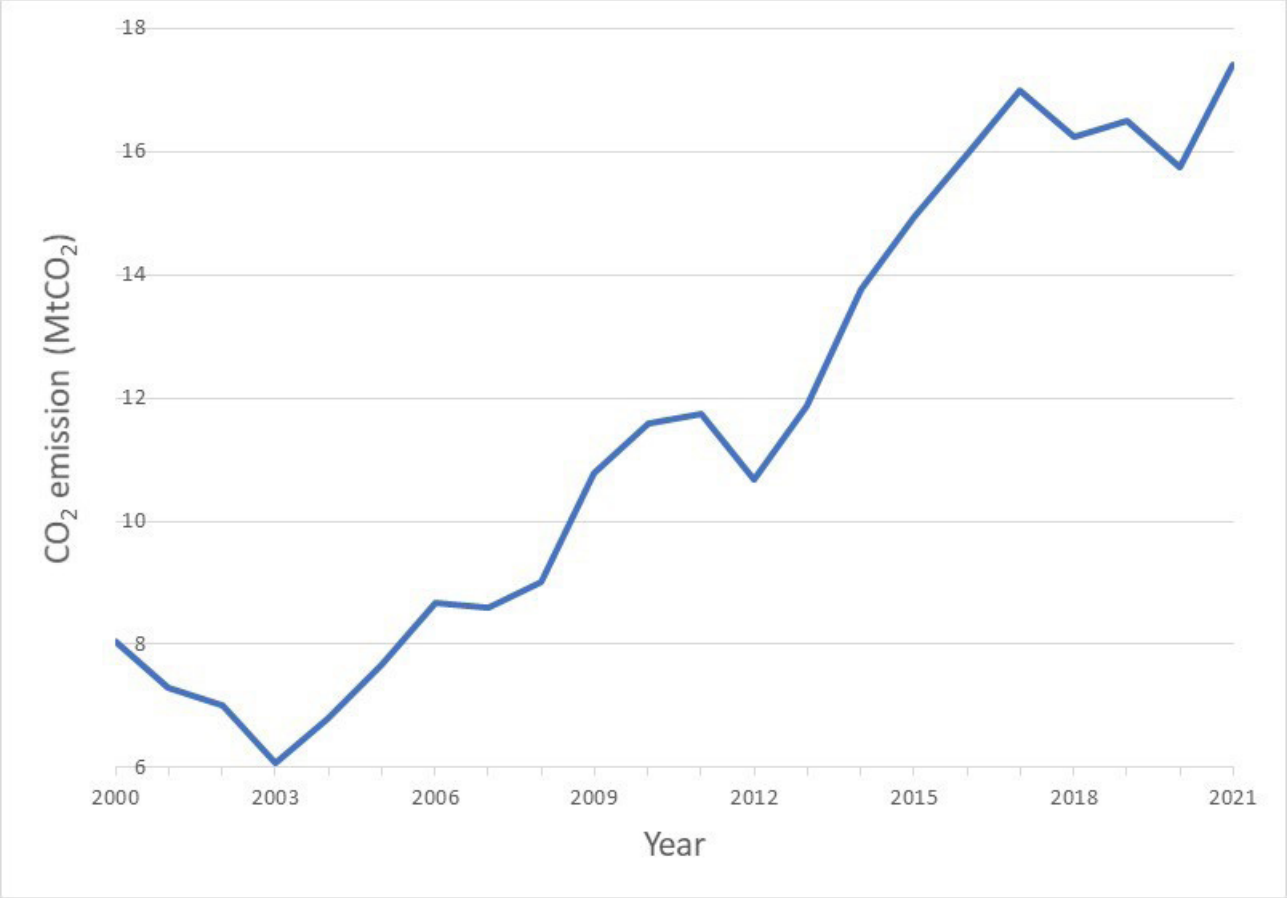


Figure 4.3 CO_2 Emission from Fuel Combustion in Kenya – 2000 -2021

Source: IEA, 2023

Figure 4.3 depicts an increasing trend in CO2 emissions from fuel combustion, with an average increase of 4% from 2000 to 2021. This trend is expected to contribute to the overall rise in GHG emissions, which are projected to reach 143 MtCO2e by 2030 (GoK, 2018). The increasing trend in CO2 emissions from fuel combustion underscores the urgent need for robust monitoring and accounting mechanisms. Accurate tracking of emissions is crucial for assessing progress towards climate goals, formulating effective policies, and implementing mitigation strategies. It also highlights the necessity for transitioning to cleaner energy sources to curb emissions growth, ensuring sustainable development, and meeting international commitments such as those outlined in the Paris Agreement.

4.2.1.2 GHG Emissions by Industries

Based on intermediate energy production data (KNBS, 2023), the study estimated GHG emissions from energy consumption by non-tourism industries in the economy. The estimation was computed by applying emission factors to the sector's intermediate energy consumption across various energy products. Table 4.10 summarizes the emission factors for stationary combustion used in the computation (IEA, 2022).

Table 4.10 Emission Factors for Stationary Combustion

Fuel Type	Emission Factor			
	CO_2 (kg/TJ)	CH_4 (kg/TJ)	N_2O (kg/TJ)	NO_2 (kg/TJ)
Coal and Coke	95,000	10	2.5	10
Motor Spirit Petroleum (petrol)	73,300	5	2	1
Aviation gasoline	70,000	5	2	1
Jet fuel	70,000	3	0.5	1
Kerosene	72,600	3	0.5	1
Light Diesel	74,100	1	0.5	1
Fuel oils n.e.c.	81,300	2	0.5	2
Liquefied Petroleum Gas (LPG)	56,100	5	0.5	1
Wood fuel & Charcoal	112,000	200	4.0	

Source: Adapted from IEA (2022)

Table 4.11 Electricity Usage Emission Factors

Usage	Emission Factor		
	CO_2 (kg CO_2 per kWh)	CH_4 (g CH_4 per kWh)	N_2O (g N_2O per kWh)
Industrial Electricity	0.40 - 0.60	0.01 - 0.03	0.01 - 0.02
Domestic Electricity	0.30	0.02	0.02

Source: Adopted from IEA, 2022

Table 4.12 Global Warming Potentials for GHGs

Gas	100 year – GWP
1. Carbon Dioxide (CO^2),	1
2. Methane (CH_4),	25
3. Nitrogen Oxide (N_2O)	298

Source: Intergovernmental Panel on Climate Change (IPCC), Fourth Assessment Report (AR4), 2007.

Table 4.13 presents the results of the estimation of GHG emission in $MtCO_2e$ from the combustion of fuel products by other industries except for tourism industries in 2022

Table 4.13 GHG emission by Industries due to intermediate Energy Products consumption -2022

	Energy Consumption (TJ)	CO_2 emission (Mt CO_2)	CH_4 ($MtCO_2e$)*	N_2O ($MtCO_2e$) **	NO_2 ($MtCO_2e$) ***
Electricity	(MtCO2 e) *	N□O	0.00	0.00	0.00
Coal and Coke	(MtCO2 e) **	NO2	0.00	0.00	0.01
Motor Spirit Petroleum (petrol)	(MtCO2 e) ***	0.31	0.00	0.00	0.00
Aviation gasoline	3.78	0.00	0.00	0.00	0.00
Jet fuel	2,354.03	0.16	0.00	0.00	0.00
Kerosene	49.76	0.00	0.00	0.00	0.00
Light Diesel	6,521.40	0.48	0.00	0.00	0.00
Fuel oils n.e.c.	1,352.11	0.11	0.00	0.00	0.00
Liquefied Petroleum Gas (LPG)	176.13	0.01	0.00	0.00	0.00
Wood fuel & Charcoal	2,835.35	0.32	0.01	0.00	0.00
Total	**41,721.07**	**1.87**	**0.01**	**0.00**	**0.01**

Source: Research Data, KNBS, 2023

From the results in Table 4.13 for 2022, industries emitted a total of 1.87 million metric tons (Mt) of carbon dioxide (CO_2) due to the intermediate consumption of various energy products. Light diesel with 0.48 Mt accounted for the highest CO_2 emissions, followed by Coal and coke at 0.46 Mt. Additionally, industries emitted a total of 0.01 Mt of methane (CH_4) and 0.01 Mt of nitrous oxide (NO2) equivalents. Notably, wood fuel and charcoal contributed significantly to CH4 emissions, totalling 0.01 Mt. Nitrogen dioxide (NO_2) emissions were relatively minor compared to CO_2 emissions. In total, 1.89MtCO2e GHG was supplied by industries' intermediate use of energy products with fossil fuels contributing 81% of the emissions.

4.2.1.3 GHG Emissions by Households

The analysis considered heating and lighting activities by households as sources of GHG emissions. It computed emissions from the use of kerosene, LPG gas, firewood, and charcoal by households for heating and lighting as sources of GHG from combustion. Table 4.14 presents the results of the calculation of GHG emissions from household final consumption of electricity, fossil fuel products (LPG and kerosene) and biomass (wood fuels and charcoal).

Table 4.14 GHG Emission by Households Due to Final Consumption of Energy Products -2022

Fuel Type	Energy Consumption (TJ)	CO_2 emission (Mt CO_2)	CH_4 ($MtCO_2$ e) *	N_2O ($MtCO_2$e) **	NO_2 ($MtCO_2$e) ***
Electricity	11,674.19	0.97	0.00	0.02	0.00
Kerosine	310.00	0.02	0.00	0.00	0.01
Liquid Petroleum Gas	1,164.63	0.07	0.00	0.00	0.00
Wood fuel & Charcoal	541,498.92	60.65	2.71	0.65	0.00
Total	**554,647.74**	**61.71**	**2.71**	**0.67**	**0.00**

Source: TRI situational analysis data, 2023, KNBS, 2023

In 2022, households in Kenya made significant contributions to greenhouse gas (GHG) emissions through their final consumption of energy products. Electricity, wood fuel and charcoal were the primary contributors, with an energy consumption of 554,647.74 TJ, resulting in CO2 emissions of 61.71 Mt. Additionally, the combustion of wood fuel and charcoal produced methane (CH4) emissions equivalent to 2.71 MtCO2e and nitrous oxide (N2O) emissions equivalent to 0.67 MtCO2e. Liquid petroleum gas (LPG) and kerosene, though consumed in smaller quantities, also contributed to GHG emissions, with 0.07 Mt and 0.02 Mt of CO2, respectively. Despite their lower emissions compared to wood fuel and charcoal, these findings underscore the need for sustainable energy practices and the promotion of cleaner energy sources to mitigate household GHG emissions in Kenya.

4.2.1.4 GHG Emissions by Tourism Enterprises - 2022

The analysis computed greenhouse gas (GHG) emissions in MtCO2e resulting from the use of various energy products by tourism industries, aggregated into accommodation for visitors, food and beverage services, passenger transport, travel agency and reservations, and other industries, by applying relevant emission factors. Table 4.15 summarizes the results of the computation.

Table 4.15 GHG Emission by Tourism Industries Due to Final Consumption of Energy Products -2022

	Emissions in $MtCO_2e$			
Tourism Sector	**CO_2**	**CH_4**	**N_2O**	**NO_2**
Accommodation for visitors	0.15	0.00	0.00	0.00
Food & Beverage Serving Services	0.09	0.00	0.00	0.00
Passenger Transport	0.46	0.00	0.00	0.01
Travel Agencies & Reservations	0.03	0.00	0.00	0.00
Other Tourism Industries	0.02	0.00	0.00	0.00
Total	**0.75**	**0.00**	**0.00**	**0.01**

Source: TRI situational analysis data, 2023; KNBS, 2023

The results in Table 4.15 suggest that in 2022, Kenya's tourism sector contributed relatively low GHG emissions. The largest contributor was passenger transport, accounting for 0.46 MtCO2e, followed by accommodation for visitors with 0.15 MtCO2e. Food and beverage serving services emitted 0.09 MtCO2e, while travel agencies and reservations contributed the least at 0.03 MtCO2e. Other tourism industries had negligible emissions. Notably, methane (CH4), nitrous oxide (N2O), and nitrogen dioxide (NO2) emissions were negligible in all sub-sectors except in the passenger transport sub-sector. Overall, the total GHG emissions from the tourism sector in Kenya amounted to 0.75 MtCO2e.

4.2.1.5 GHG Emission by Tourism

The study calculated tourism's portion of GHG emissions from tourism industries by applying respective output ratios (see Table 4.6) to the sector emissions. Table 4.16 displays the outcomes of this computation.

Table 4.16 Tourism Share of GHG Emission by Tourism Industries Due to Final Consumptio of Energy Products -2022

Tourism Sector	Emissions in $MtCO_2e$			
	CO_2	CH_4	N_2O	NO_2
Accommodation for visitors	0.13	0.00	0.00	0.00
Food & Beverage Serving Services	0.07	0.00	0.00	0.00
Passenger Transport	0.19	0.00	0.00	0.00
Travel Agencies & Reservations	0.03	0.00	0.00	0.00
Other Tourism Industries	0.01	0.00	0.00	0.00
Total	**0.44**	**0.00**	**0.00**	**0.00**

Source: TRI situational analysis data, 2023, KNBS, 2023

The analysis reveals that in 2022, tourism's share of tourism industries' GHG emissions due to the final consumption of energy products totalled 0.44 MtCO2e (Table 4.16). Among the tourism industries, tourism share in the passenger transport sub-sector was the highest contribution, at 0.19 MtCO2e, followed by the share in the accommodation sub-sector at 0.13 MtCO2e, and food and beverage serving services with 0.07 MtCO2e. Travel agencies and other tourism industries showed negligible emissions (0.03-0.01 MtCO2e).

4.2.2 Physical Use Tables -GHG

4.2.2.1 Emissions released to the environment - Total use of Emission

The physical use table displays the GHG emissions directly released into the atmosphere. Table 4.17 presents the total emissions from the use of energy resources and products by industries, including tourism, in their production activities, and by households in their consumption and subsistence production activities in 2022. It is noteworthy that due to incomplete data, emissions from accumulation, which represent air emissions released from controlled landfill sites and reflect emissions from earlier periods of production, consumption, and accumulation (SEEA-CF accounts – Air Emissions, 2016), were not included in the accounts.

Table 4.17 Use of GHG Emissions - 2022

Source	Emissions in $MtCO_2e$			
	CO_2	CH_4	N_2O	NO_2
Tourism Industries	0.75	0.00	0.00	0.01
Other Industries	1.87	0.01	0.00	0.01
Households	61.71	2.71	0.67	0.00
Total	64.33	2.72	0.67	0.02
Other Tourism Industries	0.01	0.00	0.00	0.00
Total	**0.44**	**0.00**	**0.00**	**0.00**

Source: TRI situational analysis data, 2023

In 2022, the use of various energy resources and products resulted in significant greenhouse gas (GHG) emissions from industries, including tourism, and households. Tourism industries contributed 0.75 MtCO2e of CO2 emissions, with no notable emissions of CH4, N2O, or NO2. Other industries emitted a more substantial amount, with 1.87 MtCO2e of CO2, 0.01 MtCO2e of CH4, 0.01 MtCO2e of NO2. Households were the largest emitters, releasing 61.71 MtCO2e of CO2, 2.71 MtCO2e of CH4, and 0.67 MtCO2e of N2O. Overall, the total GHG emissions into the environment amounted to 64.33 MtCO2e of CO2, 2.72 MtCO2e of CH4, 0.67 MtCO2e of N2O, and 0.02 MtCO2e of NO2. These figures highlight the substantial impact of household energy use on GHG emissions compared to industrial activities. In total, 67.74 MtCO2e was emitted into the environment. This quantity compares with the 2015 emissions declared in the Nationally Determined Contribution by Kenya (93.7 MtCO2e) (GOK, 2018). The current total excludes emissions from major sources such as agriculture (due to livestock enteric fermentation and manure management) and land-use change and forestry (LULUCF), capturing only emissions from energy use.

The tourism sector should be concerned about these findings for several reasons; Reducing CO2 emissions will promote climate change mitigation and preserve the natural environments that attract tourists. As today's travellers are increasingly environmentally conscious, adopting and showcasing sustainable tourism practices will enhance the sector's reputation and competitiveness, eventually attracting eco-friendlier tourists.

With the Kenyan government steadily tightening regulations on emissions and the environment, tourism enterprises can stay ahead of regulatory changes and avoid potential fines or restrictions by proactively reducing CO2 emissions. In terms of economic efficiency, increasing the implementation of energy-efficient practices and reducing reliance on fossil fuels will lead to long-term cost savings, improving the sector's economic resilience. Since tourism activities heavily depend on natural resources, continued implementation of sustainable practices will ensure the long-term viability of these resources, maintaining the sector's foundation for future growth and stability.

4.2.3 Balanced GHG Account for Tourism Enterprises

Table 4.18: Physical Supply and Use Tables for GHG Emissions - Kenya's Tourism Sector (2022)

Physical Supply Table for GHG emissions (Mf)																	
	Generation of GHG emission														**Accumulations**	**Flow from the environment**	**Total Supply of emissions**
	Tourism Industries												**Other Ind.**	**H/holds**	Emission from landfills		
	Accommodation for visitors		**Food & beverage Serving visitors**		**Passenger Transport**		**Travel Agencie & Reservations**		**Other Tourism Industries**		**Total Tourism Industries**						
	TSM	**Total**	**TSM**	**Total**	**TSM**	**Total**	**TSM**	**Total**	**TSM**	**Total**	**TSM**	**Total**	**Total**		**Total**		
Type of emissions																	
Carbon dioxide (CO2)	0.13	0.15	0.07	0.09	0.19	0.46	0.03	0.03	0.01	0.02	0.44	0.75	1.87	61.71			**64.33**
Methane (CH4)	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.01	2.71			**2.72**
Nitrous Oxide (N2O)	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.67			**0.67**
Nitorgen dioxide (NO2)	0.00	0.00	0.00	0.00	0.00	0.01	0.00	0.00	0.00	0.00	0.00	0.01	0.01	0.00			**0.02**
Total CO_2 equivalent	**0.13**	**0.15**	**0.07**	**0.09**	**0.20**	**0.47**	**0.03**	**0.03**	**0.01**	**0.02**	**0.44**	**0.76**	**1.89**	**65.09**			**67.74**
Physical Use Table for GHG emission																	
																Flow to the environment	**Total use of emissions**
Emissions released to the environment																67.74	**67.74**

4.3 Water Account

The System of Environmental-Economic Accounting for Water (SEEA-Water) is a framework that organizes hydrological and economic information using the System of National Accounts (SNA) and the SEEA 2012 Central Framework as its foundation. The study developed SEEA-Water Accounts for the Tourism Sector in Kenya, aligning with the SEEA-UNWTO framework that integrates SNA, TSA- RMF 2008, and SEEA 2012 Central Frameworks.

The SEEA-Water Account for the tourism sector includes physical supply and use tables that track the flow of water between the environment and the economy. The breakdown of economic activities in the SEEA-Water Account for tourism identifies water flows in the 11 tourism industries classified in the TSA-RMF 2008 grouped in five categories that distinguishes the main tourism sectors as well as those associated with water supply—water service providers, water usage, and consumption. The account captures the generation and distribution of water by the water service providers, along with wastewater treatment.

To construct the SEEA-Water Accounts, various data sources were utilized. This included primary data on water supply by tourism sector activities, water usage by the industries, and the physical flows of water back to the environment. Additionally, secondary and administrative data on water generation, supply, and usage in the economy obtained from various agencies in the water and sanitation sector were incorporated. The following sections report the SEEA-Water Physical Supply and Use Tables (PSUT).

4.3.1 Physical Supply Tables -Water

The structure of the Physical Water Supply Table (PWST) comprises columns representing different economic units: main tourism industries, industries involved in water collection, treatment, and supply, other aggregated industries, and households. Additionally, the table incorporates a column for documenting water flows from the environment. On the other hand, it contains five rows to document various aspects: sources of abstracted water, water distribution, self-use of abstracted water, wastewater and reused water, return flows of water, and water losses through evaporation, transpiration, and incorporation into products.

The survey instrument was used to gather data on water management practices. The instrument required tourism enterprises to indicate their main water sources including utilities, self-abstracted groundwater/surface water, rainwater, bottled water and also inquired about wastewater treatment either by external facilities or using -house practices. Additional questions explored specific water and wastewater management strategies employed by the tourism enterprises. This data provided insights into water consumption patterns and wastewater management approaches within the tourism sector.

4.3.1.1 Sources of Abstracted Water in Kenya-2022

Data on water produced in the country was obtained from the Kenya National Bureau of Statistics (KNBS, 2023). Figure 4.4, plots the quantity of surface water and total water abstracted in the country in year 2018 to 2022 as reported by KNBS (KNBS, 2023).

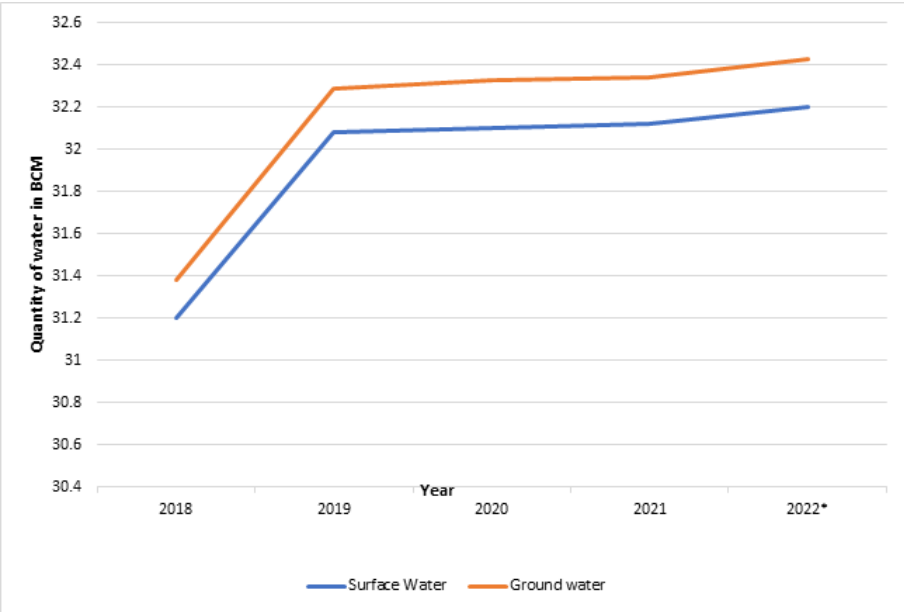


Figure 4.4: Quantity of Ground and Total Water Abstracted from the environment (2018-2022).

Source: KNBS (2023)

The figure reveals that on average about 31,840 million cubic meters (MCM) of water was abstracted annually between 2018 and 2022. The difference between total water abstracted is the sum of the volume of surface water abstracted and ground water abstracted (figure 4.4).

Table 4.18 Summary of Water Abstraction in Kenya- 2017 -2022

	Quantity of Water Abstracted per year (MCM)					
Source	**2017**	**2018**	**2019**	**2020**	**2021**	**2022***
Surface Water	30,740.00	31,200.00	32,080.00	32,100.00	32,120.00	32,100.00
Groundwater	140.00	180.00	210.00	230.00	220.00	220.00
Total Abstracted	**30,880.00**	**31,370.00**	**32,290.00**	**32,320.00**	**32,340.00**	**32,320.00**

Source: KNBS, 2023

Results in Table 4.19 provide information on the sources and volume of abstracted water – Total supply of abstracted water from the environment. The table reveals that in 2022, households for domestic consumption, water service providers for distribution, and industries for production activities collectively abstracted 32,320.00 million cubic meters (MCM) of water from the environment. The results in Table 4.19 differ from the latest data provided by the Food and Agriculture Organization (FAO) (FAO, 2023) on water sources for Kenya in 2020. The FAO data reports that in 2020, a total of 23,700 MCM was abstracted from the environment as surface and groundwater.

4.3.1.2 Distribution of Abstracted Water by Water Collection,Treatment and Supply Industries

The PWUT records the total use of abstracted water by ISIC division 36, which includes industries involved in water collection, treatment, and supply. In Kenya, private firms in this sector are registered by the Water Services Regulatory Board (WASREB). Secondary data on the amounts of water produced by regulated water service providers in Kenya from 2019 to

2022 were obtained from the latest WASREB impact report – Issue No. 15 (WASREB, 2023). Figure 4.5 presents the quantity of water produced by regulated water service providers and billed for the financial years 2019/2020 to 2021/2022 (WASREB, 2023).

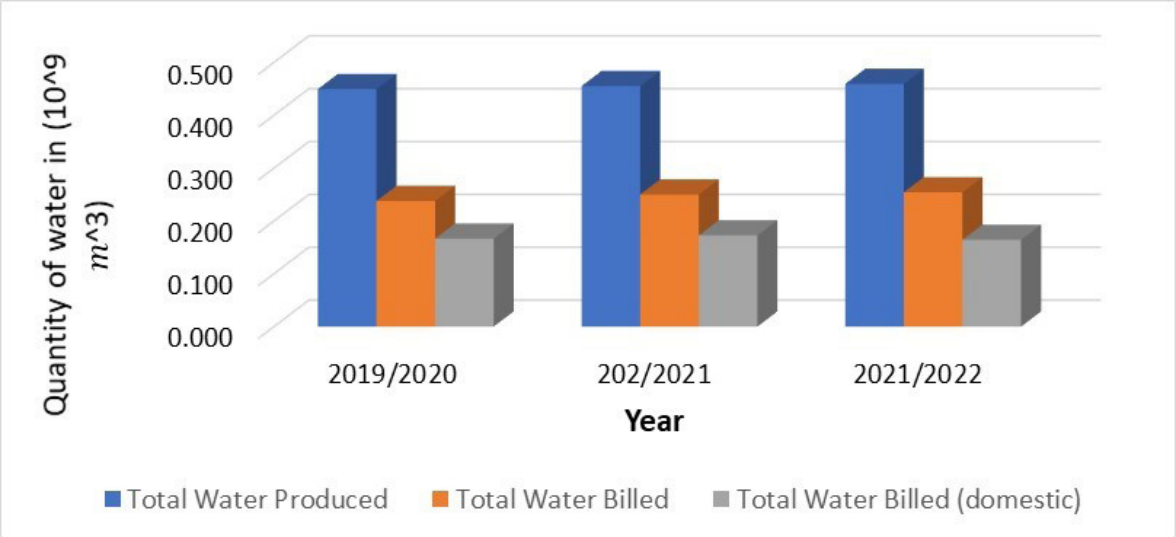


Figure 4.5 Quantity of Water Produced and Billed ay Water Services Providers 2019- 2022.

Source: WASREB, 2023

Figure 4.5 illustrates that, on average, 450 million cubic meters (MCM) of water were produced by regulated water service providers and distributed for domestic and industrial use each year between 2019 and 2022. Of the produced water, 55% was billed to households for domestic use annually, equating to an average of 167.81 MCM. The figure also indicates that industrial water usage from regulated water service providers remained slightly below 80 MCM yearly. Notably, approximately 45% of the produced water, amounting to about 207.4 MCM per year, was not billed. This can be attributed to low nationwide water coverage by regulated water service providers, which stood at 62% in 2022. Table 4.20 provides a summary of distributed abstracted water by water collection, treatment, and supply companies between 2019 and 2022.

Table 4.19 Distributed Abstracted Water by Water Collection, Treatment and Supply Industries 2019 -2022

Parameter (MCM) per Year	2019/2020	202/2021	2021/2022
Total Water Produced	450	460	460
Total Water Billed	240	250	250
Total Water Billed (domestic)	170	170	160

Source: WASREB,2023

The results in Table 4.20 show that 54% of the water produced by water collection, treatment, and supply industries (i.e., WSPs) was supplied to industries and households in 2022. Of the water billed, 64% was supplied to households for domestic use, and approximately 90 MCM was supplied to industries, including the tourism industry, for commercial use. An estimated

46% (210 MCM) of the produced water was not billed, representing the volume of non-revenue water (NRW) in 2022. The Water Services Regulatory Board (WASREB) estimates the NRW for 2022 at 45% a loss of Ksh. 11.2 billion (WASREB, 2023). The data in Table 4.20 provides input on the distribution of abstracted water by water collection, treatment, and supply industries in the PWST.

4.3.1.3 Ground and Surface Water Abstracted by Tourism Sector Enterprises - 2022

The data on the quantity of ground and surface water abstracted was aggregated for each tourism industry activity classification. The data from the baseline survey served as the basis for estimating the sources of abstracted water by tourism industry activities throughout the year. Table 4.21 presents the aggregated results, displaying the average quantity of water abstracted by each tourism industry activity for their own daily use, measured in MCM, in 2022.

Table 4.21: Quantity of Ground and Surface Water Abstracted by Tourism Industry Enterprises

Tourism Industry Activities	Quantity of Water Abstracted in 2022 (MCM)		
	Ground Water	Surface Water	Total
Accommodation for visitors	16.10	0.60	16.70
Food & Beverage Serving activities	3.40	0.20	3.60
Passenger transport	0.80	-	0.80
Travel agency services	0.10	-	0.10
Other services	0.10	-	0.10
Total	**20.50**	**0.80**	**21.30**

Source: TRI situational analysis data, 2023

Table 4.21 illustrates that visitor accommodation enterprises abstracted 16.70 million cubic meters (MCM) of water in 2022 from both ground and surface sources for their own consumption. Similarly, travel agencies and other reservation services abstracted approximately 0.1 MCM in the same year. Additionally, the data reveals that Food & Beverage Serving enterprises relied on their own water sources, abstracting approximately 3.60 MCM, compared to passenger transport enterprises, which abstracted 0.8 MCM in 2022. Travel agencies and other tourism industries abstracted 0.20 MCM of water from ground and surface water sources for own consumption. Results in Table 4.21 provided input for the PWST for Own use of abstracted water by tourism industries. Data on own use of abstracted water by households and other industries was unavailable.

4.3.1.4 Sewerage Treated for Own Use by Tourism Industry Activities in 2022

The PWST in the SEEA-Water account captures the quantity of wastewater recycled by economic entities during the accounting period. This is broken down into the quantity of wastewater sent to treatment plants and the quantity of wastewater treated for own use.

The survey required respondents to indicate whether they treated their own sewage for reuse. Most of the enterprises (97%, n = 1,253) indicated that they did not treat their sewage for their

own use. However, 35 enterprises provided monthly estimates of volumes of sewage treated for reuse in litres. On average, these enterprises treated 36,190.57 litres, with significant variation among the enterprises (SD = 81,958.28), and the data was significantly positively skewed (skewness index = 3.35, SE = 0.40). These results show that the sample mean volume was a biased estimator of the population mean and therefore could not be used to estimate the total volume of sewage treated for the tourism sector. Consequently, there were no estimates for the volume of treated sewage reused by the enterprises in the PSUT.

4.3.2 Physical Use Tables - Water

The structure of the Physical Water Use Table (PUT) comprises columns representing different economic units: main tourism industries, industries involved in water collection, treatment, and supply, other aggregated industries, and households. Additionally, the table incorporates a column for documenting water flows from the environment. On the other hand, it contains five rows to document various aspects: sources of abstracted water, water distribution, self-use of abstracted water, wastewater and reused water, return flows of water, and water losses through evaporation, transpiration, and incorporation into products.

In the 'Water Uses' row, the PWUT captures the usage of distributed water from ISIC division 36 industries by tourism sector activities. This is differentiated from the intermediate use by industries in other sectors of the economy. The row underwater uses records of the self-use of abstracted water, primarily by tourism enterprises that provide accommodation to visitors.

4.3.2.1 Use of Distributed Water by Tourism Sector Activities in 2022

The study surveyed tourism enterprises for the volume of water used. The questionnaire required the enterprises to indicate the average monthly bill incurred for water consumption from water service providers and water bottling companies in the year 2022. The average monthly water consumption by the tourism sector activities was aggregated to compute the total monthly expenditure on water—both bottled and supplied by water companies. Table 4.22 presents the results of this aggregation:

Table 4.22 Aggregate Tourism Sector Activities Average Monthly Water Usage in 2022

Tourism Sector Activity	n	Total Monthly WSP Bill/Ksh ('000)	n	Total Monthly Bottled Water Exp./Ksh ('000)
1. Accommodation for visitors	294	10,107.39	291	12,194.33
2. Food & Beverage Serving activities	162	3,943.68	144	3,858.85
3. Passenger transport	2	2.00	46	330.60
4. Travel agency services	31	470.82	109	835.10
5. Other services	82	2,752.36	237	7,519.55
Total		**17,276.24**		**24,738.43**

Source: TRI situational analysis data, 2023

The results in Table 4.22 served as the basis for calculating the annual water usage by the tourism enterprises in MCM. This is achieved by subjecting the total water expenditure to WSP typical retail tariff structure for water consumption. Table 4.23 shows the typical tariff structure for a WSP adapted from the WASREB Guide, 2023.

Table 4.23 Typical retail tariff structure for a WSP

Customer Category	Typical Tariff Structure Consumption Block in M^3	Ksh.
Domestic/Industrial	1-6	45
	7-20	50
	21-50	70
	51-100	80
	101-300	95
	300 and above	130

Source: WASREB Tariff Guide, 2023

Table 4.24 provides the estimated volume of water consumed by the tourism industry activities in MCM based on the total annual expenditure on both bottled water and water supplied by companies.

Table 4.24 Annual water consumption by tourism enterprises

	Annual Consumption From WSP in (MCM)	Annual Consumption of Bottled Water in (MCM)	TOTAL
1. Accommodation for visitors	0.14	0.17	0.30
2. Food & Beverage Serving activities	0.05	0.05	0.09
3. Passenger transport	0.00	0.02	0.02
4. Travel agency services	0.05	0.03	0.07
5. Other services	0.00	0.00	0.00
Total	**0.24**	**0.27**	**0.48**

Source: TRI situational analysis data, 2023

Table 4.24 shows the water consumption by tourism enterprises in MCM. The results suggest that in 2022, tourism enterprises used 0.48 MCM of water supplied by water service providers. Accommodation services accounted for 63% of this volume, followed by food and beverage serving activities at 19%, and travel agencies at 15%.

4.3.3.2 Own Use of Abstracted Water by Tourism Enterprises

Table 4.21 shows the quantity of ground and surface water abstracted by tourism enterprises in 2022. This volume, estimated from the survey data, is equivalent to the volume of own-use abstracted water by tourism enterprises in the physical use table.

4.3.3 Balanced Water Account for Tourism Enterprises

The water accounts for the tourism enterprises in Kenya are presented.

Table 25: Water Physical Supply Table for Tourism Enterprises

Physical Supply Table for water (MCM)																					
		Abstraction of water, production of water, and generation of return flows																			
		Tourism Industries												Water collection, treatment and supply	Sewerage	Other industries		H/holds	Flow from R.O.W	Flows from the environment	Total Supply
		Accommodation for visitors		Food & beverage Serving visitors		Passenger Transport		Travel Agency & Reservations		Other Tourism Industries		Total Tourism Industries							Imports		
		TSH	Total	TSH	Total	TSH	Total	TSH	Total	TSH	Total	TSH	Total			TSH	Total				
1. Sources of abstracted water																					
	Total Supply abstracted																				
	Ground Water																			32,100.00	32,100.00
	Surface Water																			220.00	220.00
	Total																			**32,320.00**	**32,320.00**
2. Water																					
	Distribution of abstracted													460.00					0.00		**460.00**
	Own-use abstracted water	14.88	16.70	2.87	3.60	0.34	0.80	0.09	0.10	0.06	0.10	18.25	21.30								**21.30**
3. Waste water and reuse water																					
	Waste water to treatment	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00								
	Own treatment of waste water	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00								
	Total waste water and reused	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**								**0.00**
4. Return flows of water																					
	Total return flows																				
5. Evaporation of abstracted water, transpiration and water incorporated into products																					
	Total																				
TOTAL SUPPLY		**14.88**	**16.70**	**2.87**	**3.60**	**0.34**	**0.80**	**0.09**	**0.10**	**0.06**	**0.10**	**18.25**	**21.30**	**460.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**32,320.00**	**32,801.30**

Table 26: Water Physical Use Table for Tourism Enterprises

Physical Supply Table for water (MCM)																					
		Abstraction of water, production of water, and generation of return flows																			
		Tourism Industries												Water collection, treatment and supply	Sewerage	Other industries		Hholds	Flow from R.O.W	Flows from the environment	Total Supply
		Accommodation for visitors		Food & beverage Serving visitors		Passenger Transport		Travel Agency & Reservations		Other Tourism Industries		Total Tourism Industries							Imports		
		TSM	Total	TSM	Total	TSM	Total	TSM	Total	TSM	Total	TSM	Total			TSM	Total				
1. Sources of abstracted water																					
	Total Supply abstracted water																				
	Ground Water																			32,100.00	32,100.00
	Surface Water																			220.00	220.00
	Total																				**32,320.00**
2. Water																					
	Distribution of abstracted water													460.00					0.00		**460.00**
	Own-use abstracted water	14.88	16.70	2.87	3.60	0.34	0.80	0.09	0.10	0.06	0.10	18.25	21.30								**21.30**
3. Waste water and reuse water																					
	Waste water to treatment	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00								**0.00**
	Own treatment of waste water	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00								**0.00**
	Total waste water and reused	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00								**0.00**
4. Return flows of water																					
	Total return flows																				
5. Evaporation of abstracted water, transpiration and water incorporated into products																					
	Total																				
TOTAL SUPPLY		14.88	16.70	2.87	3.60	0.34	0.80	0.09	0.10	0.06	0.10	18.25	21.30	460.00	0.00	0.00	0.00	0.00	0.00	32,320.00	32,801.30

4.4 Solid Waste Account

The SEEA-CF defines solid waste as discarded materials no longer needed by the owner, which can include both solid and liquid forms but excludes wastewater and small particulate matter released into the atmosphere. However, when solid materials like scrap metal are exchanged between economic units and the discarded receives payment, they are classified by SEEA-CF as products rather than residuals.

The solid waste accounts, outlined in the SEEA – Central Framework 2012 (UN et al., 2014), employ supply and use tables based on the SNA concepts to trace the physical waste flows within the economy. These accounts provide a structured framework for organizing data on waste types, generation, and users, allowing for the systematic tracking of physical flows between the economy and the environment.

The study developed solid waste accounts for the tourism sector, illustrating waste production categorized into organic and inorganic waste (waste supply), waste management by tourism enterprises, waste collection, and final treatment (waste final use). These accounts document waste exchanges between the tourism sector, the broader economy, and the environment

The SEEA-Tourism Solid Waste Account identifies the physical flows of solid waste in the 11 tourism industries classified according to the TSA-RMF 2008. For simplicity, the industries were grouped into five categories: accommodation for visitors, food and beverage services, passenger transport, travel agencies and reservations, and other tourism industries. The account highlights the primary sector responsible for waste collection, treatment, and disposal, classified under ISIC Division E.

Due to the lack of a standard international classification for solid waste, the study used a broad classification distinguishing between organic, inorganic, and other waste. Organic waste includes food waste, kitchen scraps, paper, leather, and other biodegradable materials. Inorganic waste encompasses non-biodegradable materials such as plastics, glass, metals, and paper, whether recyclable or not. Other waste includes discarded equipment, vehicles, and electronic waste

As is typical with the SEEA Central Framework, the SEEA-Solid Waste Account records physical solid waste flows by compiling supply and use tables (PSUT) in physical units of measurement (tonnes). Data for these tables was sourced from a national survey of tourism enterprises (n=1253). Reports from government agencies, such as the National Environmental Management Authority (NEMA) and the KNBS Economic Survey 2023, provided background data on national waste volumes. The following sections detail the construction of the PSUT.

4.4.1 Physical Supply Tables -Solid Waste

The PST captures the generation of solid waste residuals classified as organic, inorganic, and other solid waste by industries, including tourism industries and households. It also tracks the flows of waste from the rest of the world as imports of solid waste and from the environment in terms of recovered residuals.

4.4.1.1 Solid Waste Generation and Collection in Major Cities 2022

Data on solid waste in Kenya is limited. However, the KNBS annually reports waste generation and collection statistics for major cities—Nairobi, Mombasa, Kisumu, and Nakuru. This information is sourced from the respective county governments, which are mandated by law (Part 2 of the Fourth Schedule of the Constitution of Kenya, 2010) to maintain and report waste statistics in their areas. Table 4.27 presents the baseline data on waste generation in Kenya's major urban areas, as reported by KNBS (KNBS, 2023).

Table 4.27 Solid Waste Generation in Major Cities 2018 -2022 (103Tonnes)

	Year ('000 Tonnes)				
County	**2018**	**2019**	**2020**	**2021**	**2022**
Nairobi	730.00	839.50	876.00	1095.00	1095.00
Mombasa	804.00	879.00	914.00	920.00	1000.00
Kisumu	215.80	220.40	224.80	229.30	236.60
Nakuru	-	-	-	-	383.30
Total	**1,749.80**	**1,938.90**	**2,014.80**	**2,244.30**	**2,714.90**

Source: KNBS, 2023

Table 4.27 reveals that in 2022, approximately 2,714,900 tonnes of solid waste were generated in the four major cities. However, a report by NEMA suggests that every Kenyan generates about half a kilogram of waste daily, amounting to 22 metric tonnes per day and 8 million tonnes annually (NEMA, 2023). Studies indicate that about 20% of urban solid waste is composed of inorganic materials, mainly plastics, while food, paper, and other organic materials make up the remaining 80%. Additionally, up to 70% of urban waste is classified as domestic, with industrial waste accounting for the remaining 30% (Mugua, Kinyua, & Njogu, 2021). Due to incomplete administrative data, the study relied on these statistics to estimate national solid waste volumes, distinguishing between organic/inorganic and industrial/domestic waste, for the purpose of estimating the supply of solid waste in 2022. Table 4.28 shows the estimated volume of solid waste generated based on these assumptions:

Table 4.28 Supply of Solid Waste -2022

Source of Solid Waste		
Classification	**Domestic ('000 tonnes)**	**Industrial ('000 tonnes)**
Organic (food waste, kitchen scraps, paper, leather, and other biodegradable materials)	4,760.00	1,680.00
Inorganic (non-biodegradable materials such as plastics, glass, metals, paper, and other recyclable or non-recyclable materials)	728.00	600.00
Other (discarded equipment, vehicles and electronic waste)	112.00	120.00
Total	**5,600.00**	**2,400.00**

Source: TRI situational analysis data, 2023; NEMA (2023); Mugua *et al.* (2021).

The estimates in Table 4.28 suggest that in 2022, Kenya generated a total of 8,000,000 tonnes of solid waste, with 70% (5,600,000 tonnes) classified as domestic and 30% (2,400,000 tonnes) as industrial. Of the domestic waste, 85% was organic, while 13% was inorganic, and 2% fell under the 'other' category. For industrial waste, 70% was organic, 25% was inorganic, and 5% was 'other'. These proportions highlight the dominance of organic waste in both domestic and industrial sources, though domestic sources have a higher percentage of organic waste compared to industrial sources, which have a slightly higher proportion of inorganic waste. The results in table 4.28 provide input for generation of Solid Waste residuals from household and other industries in the PST.

4.4.1.2 Solid Waste Generated by Tourism Enterprises -2022

The study employed a survey questionnaire to gather primary data on solid waste generation by tourism enterprises. Respondents were asked to estimate the average monthly quantities of organic, inorganic, and other solid waste generated by their enterprises in 2022, measured in kilograms. Table 4.29 summarizes the volumes of solid waste generated by the tourism enterprises monthly in kilograms.

Table 4.29 Average Monthly & Annual Waste Generation by Tourism Sector -2022

Tourism Sector	n	Solid Waste Classification	Average Monthly Waste (Kg)	Annual Waste Generation (tonnes)	% Composition of S/Waste	% Proportion of Total S/Waste
Accommodation for Visitors	398	Organic Waste	3962.75	47.55	0.90	0.82
		Inorganic Waste	422.42	5.07	0.10	
		Other Waste	7.43	0.09	0.00	
Food & Beverage Serving Services	177	Organic Waste	444.12	5.33	0.75	0.11
		Inorganic Waste	138.08	1.66	0.23	
		Other Waste	12.49	0.15	0.02	
Passenger Transport	110	Organic Waste	5.45	0.07	0.39	0.00
		Inorganic Waste	7.27	0.09	0.50	
		Other Waste	1.85	0.02	0.11	
Travel Agency & Reservations	123	Organic Waste	3.83	0.05	0.02	0.05
		Inorganic Waste	6.02	0.07	0.02	
		Other Waste	254.42	3.05	0.96	
Other Tourism Industries	258	Organic Waste	69.22	0.83	0.77	0.02
	268	Inorganic Waste	19.29	0.23	0.21	
	250	Other Waste	1.3	0.02	0.02	
Total				**64.28**		**1.00**

Source: TRI situational analysis data, 2023

The survey results in Table 4.29 indicate that in 2022, accommodation for visitors' activities were the highest contributor to total solid waste, generating 82% of the waste (organic: 90%, inorganic: 10%). Food & Beverage Serving Services followed, contributing 11% (organic: 75%, inorganic: 23%, other: 2%). Travel Agency & Reservations generated 5% (organic: 2%, inorganic: 2%, other: 96%), while Other Tourism Industries contributed 2%. The results highlight that organic waste was the dominant type of waste in the accommodation, food & beverage, and other tourism industries. However, in the Passenger Transport industry, inorganic waste—mainly plastics—accounted for 50% of the waste, organic waste for 39%, and other wastes for 11%.

The results in table 4.29 imply that for hotels, restaurants, and other tourism industries, including curio shops, entertainment venues, and attractions, the bulk of the solid waste generated was inorganic, mainly consisting of food waste. For passenger transport activities, half of the solid waste generated was plastic waste associated with single-use plastic containers. On the other hand, for travel agencies and reservation services, the largest proportion of waste fell under the "other" waste categories, which included electronic waste such as discarded computers.

From the survey results (Table 4.29), the study computed the volume of solid waste generated by the tourism industries based on the population of tourism enterprises registered (N=16,964) (TRA, 2022).

For a population (N_i) of tourism enterprises in category (i), given a sample mean (x_{ij}) of category (j), solid waste generated by tourism enterprises in category (i) tourism subsector and the sample size (n_i) for the category of enterprises. The volume of category solid waste was computed using equation (1):

$$Q_{ij} = \frac{N_i}{n_i} * x_{ij} \qquad \text{Eqn.1}$$

Where:

Q_{ij} = is the estimated total volume of solid waste category *(j)* generated by the population of tourism enterprises in category *i*.

N_i = is the total number of tourism enterprises in category iii (population size);

n_i = is the number of sampled tourism enterprises in category iii (sample size);

x_{ij} = is the sample mean volume of the solid waste category *j* generated by category i tourism enterprises.

The computation proceeded on the assumption that, for a large sample size (n = 1,253), the sample mean ($\bar{x}$) is an unbiased estimator of the population mean (μ) and thus, the sample mean could be used to estimate the volume of waste generated by the population. Table 4.30 presents the results of these estimates:

Table 4.30 Volumes of Solid Waste Generated by the Tourism Sector (tonnes) - 2022

Tourism Sector	n	Solid Waste Classification	Annual Waste Generation (tonnes)	n	Total Annual (tonnes)	% Total Waste
	398	Organic Waste	47.55	5619	3.37	0.40
	390	Inorganic Waste	5.07		0.35	
	283	Other Waste	0.09		0.00	
Food & Beverage Serving Services	177	Organic Waste	5.33	2590	0.36	0.05
	170	Inorganic Waste	1.66		0.11	
	115	Other Waste	0.15		0.01	
Passenger Transport	110	Organic Waste	0.07	4083	0.00	0.00
	109	Inorganic Waste	0.09		0.00	
	106	Other Waste	0.02		0.00	
Travel Agency & Reservations	123	Organic Waste	0.05	4615	0.00	0.01
	123	Inorganic Waste	0.07		0.00	
	118	Other Waste	3.05		0.08	
Other Tourism Industries	258	Organic Waste	0.83	57	3.76	0.53
	268	Inorganic Waste	0.23		1.09	
	250	Other Waste	0.02		0.07	
Total					**9.21**	**1.00**

Source: TRI situational analysis data, 2023

The survey data reveals that, overall, other tourism industries, including entertainment facilities, conference and event services, game fishing outfitters, enterprises offering camps and camping equipment for hire, nature parks, nature reserves, nature trails, game ranches, amusement parks, and non-citizen tour leaders or guides, were the highest generators of solid waste, contributing 53% of the waste. They were followed by services offering accommodation for visitors at 40%. Food and beverage serving services produced 5% of the solid waste generated by the tourism sector, while travel agencies contributed 1%. Passenger transport overall produced a negligible volume of solid waste. The results suggest that in total, the registered tourism sector enterprises (N=16,964) generated 9.21 tonnes of solid waste 81% of which was organic waste. The results in table 4.30 provide input to the PST on generation of solid waste by tourism industries.

4.4.2 Physical Use Tables - Solid Waste

The physical use table captures waste collection and disposal activities carried out by major industries involved in waste management, encompassing landfill operations, incineration,

recycling and reuse practices, and various other treatment methods. The columns in this table record Intermediate Consumption, Collection, residuals, and solid waste flows into the environment. Conversely, the rows represent the collection and disposal of solid waste residuals, disaggregated by waste types into solid organic, inorganic, and other waste.

4.4.2.1 Collection and Disposal of Solid Waste Residuals - Waste Collection, Treatment and Disposal Industries

The National Environmental Management Authority estimates that out of the 8 million tonnes of solid waste generated in the country every year, 70% of that waste is collected and dumped (NEMA, 2023). On the other hand, the KNBS reported that in 2022, 65% of the waste generated in the four major cities was collected. In 2022, Nairobi City, Mombasa, Kisumu and Nakuru counties collected 74%, 65%, 30% and 60% of generated solid waste respectively demonstrating challenges in the management of solid waste. Table 4.31 shows the volume of solid waste collected against the volume generated by the major urban areas in Kenya (KNBS, 2023).

Table 4.31 Volume of Solid Waste Generated and Collected in the Major Cities

		Year ('000 Tonnes)					% of waste collected
County		**2018**	**2019**	**2020**	**2021**	**2022**	
Nairobi	Generation	730	839.5	876	1,095.00	1,095.00	0.74
	Collection	345	668.8	657.4	821.25	813.5	
Mombasa	Generation	804	879	914	920	1,000.00	0.65
	Collection	450	405	420	520	650	
Kisumu	Generation	215.8	220.1	224.8	229.3	236.6	0.30
	Collection	64.7	66.1	67.4	68.8	71	
Nakuru	Generation	-	-	-	-	383.3	0.60
	Collection	-	-	-	-	230	

Source: KNBS, 2023.

The study aimed to gather administrative data on waste management from county governments. However, data from the county government departments responsible for waste collection was incomplete or unavailable. The available data (KNBS, 2023) in Table 4.31 reveals that for major cities, the average waste collected was 57% of the total waste generated in 2022. Due to the lack of national data, the study relied on the NEMA estimate of the yearly volume of solid waste collected (8 million tonnes) and the estimated percentage of waste collected – 70% – to estimate the volume of waste collected in the country in 2022 as approximately 5.6 million tonnes.

4.4.2.2 Collection and Disposal of solid Waste – Tourism Sector Activities

The PUT captures data on waste management practices and quantities by tourism industries and other industries in the economy, representing intermediate consumption, collection, or residuals handled by waste collection, treatment, and disposal industries. The waste

management methods envisaged include disposal in landfills, incineration, recycling, and other practices.

The study surveyed tourism enterprises to obtain data on their organic and inorganic waste management practices. To start, respondents were asked to indicate whether they compost their organic waste. From the study sample (n = 1,253), 95 % responded to the question. Table 4.32 displays the frequencies of tourism enterprises that compost their organic waste among the surveyed enterprises.

Table 4.32 Number of Tourism Enterprises Composting Organic Waste

Tourism Sector	n	Frequency	% Frequency
Accommodation for Visitors	418	38	9.09
Food & Beverage Serving Services	201	10	4.98
Passenger Transport	119	0	0.00
Travel Agency & Reservations	156	2	1.28
Other Tourism Industries	301	6	1.99

Source: TRI situational analysis data, 2023

The results in Table 4.32 indicate a low level of adoption of waste composting among tourism enterprises. Accommodation for Visitors had the highest frequency at 9%, followed by Food & Beverage Serving Services (5%), Travel Agency & Reservations (1%), and Other Tourism Industries (2%). None of the surveyed Passenger Transport enterprises reported composting organic waste.

With regard to inorganic waste, enterprises were asked to indicate whether they recycled their waste. From the sample, 91% responded to the question. Table 4.33 displays the frequency count of enterprises that recycle their waste.

Table 4.33 Number of Tourism Enterprises Recycling Organic Waste

Tourism Sector	n	Frequency	% Frequency
Accommodation for Visitors	385	45	11.69
Food & Beverage Serving Services	199	41	20.60
Passenger Transport	116	4	3.45
Travel Agency & Reservations	153	4	2.61
Other Tourism Industries	283	28	9.89

Source: TRI situational analysis data, 2023

Table 4.33 reveals the varying adoption levels of recycling organic waste among tourism enterprises. Accommodation for Visitors leads with 12%, followed by Food & Beverage Serving Services (21%). Passenger Transport and Travel Agencies & Reservations show moderate adoption rates, with 4% and 3% respectively. Other Tourism Industries exhibit a slightly lower adoption rate at 10%. The data suggests that while some sub-sectors prioritize recycling, others have yet to fully embrace this practice.

The enterprises were asked to quantify the amount of waste composted and recycled monthly in kilograms. Table 4.34 displays the annual quantities of waste treated by the population of registered tourism enterprises (N=16,964) as computed from the survey data.

Table 4.34 Quantity of Solid Waste Treated by Tourism Enterprises in 2022

Tourism Sector	n	Solid Waste Treatment	Average Monthly Waste (Kg)	Annual Waste Generation (tonnes)	N	Total Annual (tonnes)
Accommodation for Visitors	34	Composting	583.000	7.00	5619	0.04
		Recycling	15050.000	180.60		0.03
Food & Beverage Serving Services	9	Composting	303.330	3.64	2590	0.01
		Recycling	0.000	0.00		0.00
Passenger Transport	0	Composting	0.000	0.00	4083	0.00
		Recycling	0.000	0.00		0.00
Travel Agency & Reservations	2	Composting	64.500	0.77	4615	0.00
		Recycling	0.000	0.00		0.00
Other Tourism Industries	5	Composting	274.000	3.29	57	0.29
	0	Recycling	0.000	0.00		0.00
Total						**0.38**

Source: TRI situational analysis data, 2023

The results in Table 4.34 suggest a very low level of solid waste treatment across the tourism sector, as enterprises recycled and composted only 0.38 tonnes of solid waste generated. This represents just 4% of the reported total quantity of waste generated (9.21 tonnes) in 2022. This implies that 96% of the waste generated by tourism enterprises was either disposed of in landfills/dumpsites or remained uncollected and passed into the environment.

The results indicate a significant gap in solid waste management within the tourism sector, with only 4% of waste being recycled or composted. This has practical implications for environmental pollution and public health, highlighting the need for improved waste management practices. Policymakers must prioritize policies that incentivize recycling and composting, enforce stricter waste disposal regulations, and provide support for sustainable waste management infrastructure to mitigate environmental impact and promote sustainability in the tourism industry.

4.4.3 Balanced Preliminary Solid Account for Tourism Enterprise

Table 35: Physical Supply Table – SEEA Solid Waste Account for Tourism

	Physical Supply Table for Solid Waste (tonnes)																
		Generation of Solid Waste													Flow from the R.O.W	Flow from the environment	Total Supply
		Tourism Industries												Other Ind.	H/ holds	Import of Solid waste	Recovered residuals	
		Accommodation for visitors		Food & beverage Serving visitors		Passenger Transport		Travel Agency and Reservations		Other Tourism Industries		Total Tourism Industries						
A. Generation of solid waste residuals		TSM	Total	TSM	Total	TSM	Total	TSM	Total	TSM	Total	TSM	Total					
	Organic waste	3.002	3.368	0.290	0.364	0.001	0.002	0.001	0.001	2.197	3.760	5.491	7.495	1,679,992.50	4,760,000.00	-	-	6,440,000.00
	Inorganic waste	0.314	0.352	0.087	0.109	0.001	0.002	0.002	0.002	0.636	1.088	1.039	1.553	599,998.45	728,000.00	-	-	1,328,000.00
	Other waste	0.004	0.004	0.005	0.007	0.000	0.001	0.074	0.078	0.040	0.068	0.123	0.158	119,999.84	112,000.00	-	-	232,000.00
	Total Solid Waste	**3.320**	**3.725**	**0.382**	**0.480**	**0.002**	**0.005**	**0.077**	**0.081**	**2.873**	**4.917**	**6.653**	**9.207**	**2,399,990.79**	**5,600,000.00**	-	-	**8,000,000.00**
B. Generation of solid wastes Products																		
	Total Solid Waste	3.320	3.725	0.382	0.480	0.002	0.005	0.077	0.081	2.873	4.917	6.653	9.207	2,399,990.79	5,600,000.00			8,000,000.00

Table 36: Physical Use Table – SEEA Solid Wast Account for Tourism

	Physical Use Table for Solid Waste (Tonnes)														
		Intermediate Consumption , Collection or residuals											Flow from the R.O.W	Flow from the environment	Total Use
		Tourism										Final Consumption			
		Landfill		Incineration		Recycling and reuse		Other treatment		Total		Other Ind.	Households	Export of Solid Waste		
A. Collection and disposal of solid waste residuals		TSM	Total	TSM	Total	TSM	Total	TSM	Total	TSM	Total					
	Organic waste	5.24	7.151	-	-	0.252	0.344		-	5.491	7.495	1,175,994.75		-	5,263,997.75	6,440,000.00
	Inorganic waste	1.017	1.521	-	-	0.021	0.032		-	1.039	1.553	509,600.00		-	818,398.45	1,328,000.00
	Other waste	0.000	0.000	-	-	0.123	0.158		-	0.123	0.158	78,400.00		-	153,599.84	232,000.00
	Total Solid Waste	**6.26**	**8.672**	-	-	**0.396**	**0.534**		-	**6.653**	**9.206**	**1,763,994.75**		-	**6,235,996.04**	**8,000,000.00**
B. Use of solid waste products																
	Total Solid Waste	6.26	8.672			**0.396**	**0.534**	-	-	**6.653**	**9.206**	**1,763,994.75**	-	-	**6,235,996.04**	**8,000,000.00**

Findings Summary

CHAPTER FIVE

5.0 SUMMARY OF FINDINGS, CONCLUSION AND RECOMMENDATIONS

The System of Environmental-Economic Accounting (SEEA) for Kenya's tourism sector highlights the interdependence between tourism and the environment. Tourism impacts the environment through resource use (water, energy) and waste discharge (solid waste, GHG emissions). Yet, sustainable tourism models can promote socio-economic development. To harness this potential and mitigate environmental impacts, it's essential to measure and monitor tourism-environment interactions. SEEA provides a robust framework for this, enabling systematic accounting of environmental flows. This study conducted a situational analysis of environmental-economic accounting in Kenya, assessing the legal, regulatory, policy, and institutional frameworks for environmental reporting by tourism enterprises. It also examined the extent of environmental reporting based on feedback from key informants and industry participants. Data on environmental flows were obtained from tourism enterprises, government agencies, and international institutions. This report presents initial SEEA accounts for energy, GHG, water, and solid waste in Kenya's tourism industry, developed according to SEEA-CF 2012 standards and adopting the TSA-RMF consumption perspective. Key results are detailed in the following sections.

5.1 Summary of Key Findings

5.1.1 Environmental Economic Accounting Practices in Kenya's Tourism Sector

The report assessed the prevailing legal, regulatory, and institutional framework underpinning environmental-economic accounting in Kenya's tourism sector. The findings revealed that while the SEEA framework is gaining traction globally, its implementation in Kenya is still in its early stages, similar to countries like South Africa and Uganda that are experimenting with the framework. The findings show that Kenya has successfully developed SEEA Energy Accounts for the national economy and is at the advanced stages of developing a National Plan for Advancing Environmental-Economic Accounting. The report confirms that tourism enterprises in Kenya have not formalized environmental-economic accounting, although some enterprises monitor their energy and water consumption for cost monitoring and billing purposes. Key informant interviews, FGDs, and survey results highlight limited practices in recording, monitoring, and reporting flows related to GHG emissions and solid waste by the tourism industry.

The report highlights several barriers to environmental-economic accounting in Kenya's tourism industry, including skepticism about its practicality and reliability and a lack of standardized reporting, with many enterprises not documenting borehole or municipal water except for billing purposes. Regulatory gaps also exist due to the absence of formal systems or mandatory requirements for comprehensive energy management. Additionally, the sector lacks systematic approaches to measuring and reporting greenhouse gas emissions, as evidenced by the absence of monitoring equipment and a standardized carbon calculator, and there is an overall lack of comprehensive monitoring and standardized reporting requirements across the sector.

On the other hand, drivers that could promote the adoption of Environmental-Economic Accounting (EEA) by the tourism industry, highlighted by the study, include the need for clear responsibilities and raising awareness about sustainable practices like water harvesting and recycling, recognition through environmental awards, involvement of local communities, compulsory certification or eco-rating systems, continuous training, development of data collection apps, rewards for compliance, and infrastructure support for tools and measuring equipment to track greenhouse gas emissions.

Findings on the policy, legal, regulatory, and institutional arrangements for EEA in tourism confirm a lack of specific laws or regulations for environmental-economic accounting (EEA) in Kenya's tourism sector, though several existing sectoral laws and strategies, particularly for climate change, are relevant. The findings highlight the involvement of multiple institutions, including various government ministries, the Kenya National Bureau of Statistics (KNBS), and private sector organizations. However, the report uncovers a lack of coordination, inadequate synergies, and conflicting roles among these institutions, necessitating harmonization to effectively promote EEA in the tourism industry.

5.1.2 SEEA-Energy Account for Kenya's Tourism Sector

The report presents initial SEEA energy accounts for the tourism sector elaborated based on the KNBS SEEA-Energy accounts for 2022. The SEEA Energy Account for Kenya's tourism reveals that natural energy sources, primarily biomass (93%), accounted for 602,857.44 terajoules (TJ). Energy imports totaled 25,963.53 TJ, mainly motor spirit petroleum and light diesel. Energy generated by industries was 48,444.94 TJ, with households producing 559,477.32 TJ, mainly from charcoal and firewood. Accommodation and food & beverage industries generated 640.8 TJ, with only 5% of tourism enterprises producing off-grid electricity. The tourism sector consumed 14% of the electricity from the Electricity, Gas, Steam, and Air Conditioning sector (5,050.60 TJ), 11% of motor spirit petroleum, and 10% of light diesel.

The tourism sector's total intermediate energy consumption was 7,357.9 TJ, with 58% (4,281.83 TJ) attributable to tourist expenditures on tourism goods and services. The report highlights the need for the tourism industry to adopt more sustainable energy practices, such as transitioning to renewable energy sources and improving energy efficiency. These changes can reduce the industry's carbon footprint and align with global sustainability goals, ensuring long-term viability and resilience in an increasingly eco-conscious market.

5.1.3 SEEA-GHG Emission Account for Kenya's Tourism Sector

In 2022, the SEEA GHG emissions account for Kenya's tourism sector, based on KNBS data, revealed significant contributions from various industries. Industries emitted 1.87 million metric tons (Mt) of carbon dioxide (CO2), with light diesel and coal/coke leading at 0.48 Mt and 0.46 Mt respectively. Household emissions were substantial due to electricity and biomass consumption, contributing 61.71 Mt CO2 emissions. Kenya's tourism sector had relatively low GHG emissions in 2022 (0.76 Mt CO2e), primarily from passenger transport (0.46 Mt CO2e), accommodation (0.15 Mt CO2e), food and beverage services (0.09 Mt CO2e), and travel agencies (0.03 Mt CO2e), with negligible emissions from other tourism industries.

The findings suggest that compared to other industries and households, tourism in Kenya was a low GHG contributor. However, the findings underscore the tourism sector's need for climate change mitigation strategies. Reducing CO2 emissions not only aligns with global environmental goals but also enhances the sector's reputation among eco-conscious travellers. Adapting sustainable tourism practices will not only attract environmentally aware tourists but also pre-emptively comply with tightening government regulations on emissions and environmental standards. Moreover, investing in energy-efficient technologies will yield cost savings and bolster economic resilience, ensuring the sustainable use of natural resources crucial for the sector's long-term growth and stability.

5.1.4 SEEA-Water Account for Kenya's Tourism Sector

The SEEA-Water Account for Kenya's tourism sector in 2022 details water flows from the environment to households and industries, including tourism. In 2022, 32,320 million cubic meters (MCM) of water were abstracted from surface and groundwater sources. Water services providers produced 460 MCM, supplying 54% to industries and households, with 90 MCM going to industries, including tourism. Tourism industries abstracted 21.30 MCM for their use: accommodation enterprises took 16.70 MCM, food and beverage serving enterprises 3.60 MCM, and passenger transport 0.8 MCM. Tourism enterprises also used 0.48 MCM of water supplied by water services, with accommodation services accounting for 63% of this volume. Most enterprises (97%) did not treat sewage for reuse, and the survey data on treated sewage was deemed insufficient for useful computation. Enhanced reporting of wastewater generation and treatment is needed for future SEEA water accounts for tourism.

5.1.5 SEEA-Solid Waste Account for Kenya's Tourism Sector

The study developed pilot Solid Waste Accounts for the tourism sector, categorizing waste into organic and inorganic (waste supply), waste management by tourism enterprises, waste collection, and final treatment (waste final use). In 2022, Kenya generated 8,000,000 tonnes of solid waste, with 70% (5,600,000 tonnes) domestic and 30% (2,400,000 tonnes) industrial. Domestic waste was 85% organic, 13% inorganic, and 2% other, while industrial waste was 70% organic, 25% inorganic, and 5% other. Survey data was used to compute the volume of solid waste generated by tourism enterprises. The waste account reveals that tourism generated 64.28 tonnes of solid waste in 2022. The results show that the Accommodation for Visitors industry was the highest contributor, generating 82% of the total solid waste (90% organic, 10% inorganic). Food & Beverage Serving Services contributed 11% (75% organic, 23% inorganic, 2% other). Travel Agency & Reservations generated 5% (1% organic, 2% inorganic, 96% other), and Other Tourism Industries contributed 2%. Organic waste dominated in the accommodation, food & beverage, and other tourism industries, while inorganic waste, mainly plastics, accounted for 50% of the Passenger Transport industry's waste. The study revealed a very low level of solid waste treatment by the tourism sector, with enterprises recycling and composting only 0.38 tonnes, or 4% of the total waste generated (9.21 tonnes) in 2022. This implies that 96% of the waste generated by tourism enterprises was either disposed of in landfills/dumpsites or remained uncollected, entering the environment.

Conclusions

The assessment of environmental economic accounting (EEA) practices in Kenya's tourism sector reveals a nascent but promising landscape. While the SEEA framework is gaining international momentum, Kenya's implementation is still in its early stages, mirroring the experiences of countries like South Africa and Uganda. The successful development of SEEA Energy Accounts and the advancement towards a National Plan for EEA are commendable steps. However, the lack of formalized EEA practices within tourism enterprises underscores the need for more structured approaches. Limited recording, monitoring, and reporting of GHG emissions and solid waste highlight significant gaps that need addressing. The report emphasizes the importance of establishing a robust framework and consistent practices to enhance environmental accountability in the tourism sector.

Several barriers hinder the adoption of EEA in Kenya's tourism industry. Persistent skepticism about its practicality and reliability, combined with a lack of standardized reporting, creates significant hurdles. Many enterprises only document water usage for billing purposes, and regulatory gaps due to the absence of formal systems exacerbate the issue. Additionally, the lack of systematic approaches to measuring and reporting GHG emissions and the absence of monitoring equipment and standardized tools further complicate efforts. Addressing these barriers is crucial for advancing EEA practices. Overcoming these challenges requires building trust in EEA's utility, establishing standardized reporting protocols, and implementing mandatory regulations for comprehensive energy management.

Conversely, drivers that could promote EEA adoption in the tourism sector include clear responsibilities and increased awareness about sustainable practices, such as water harvesting and recycling. Recognition through environmental awards and compulsory certification or eco-rating systems can incentivize eco-friendly practices. Involving local communities and continuous training and capacity building are also essential. The development of data collection apps and infrastructure support for measuring tools will facilitate easier adoption of EEA. Furthermore, rewards for compliance and penalties for non-compliance can motivate participation. By leveraging these drivers, Kenya's tourism sector can move towards more sustainable and accountable environmental practices.

Regarding policy, the report concludes that the policy and regulatory landscape for EEA in Kenya's tourism sector lacks specific laws or regulations, though relevant sectoral laws exist, particularly for climate change. The involvement of multiple institutions, including government ministries, KNBS, and private sector organizations, indicates a robust institutional framework. However, the lack of coordination and conflicting roles among these institutions hinder effective EEA promotion. Harmonizing these roles and fostering synergies is essential for a cohesive approach to EEA in the tourism industry. Establishing clear mandates and improving inter-agency collaboration will enhance the effectiveness of EEA implementation.

The SEEA-Energy Account for Kenya's tourism sector highlights significant energy consumption patterns and sources. The reliance on natural energy sources, primarily biomass, underscores the need for diversifying energy sources. The tourism sector's substantial electricity consumption and reliance on imported energy products like motor spirit petroleum and light diesel indicate areas for improvement. The findings highlight the potential for transitioning to renewable energy sources and improving energy efficiency. Adopting sustainable energy practices can reduce the sector's carbon footprint, aligning it with global sustainability goals and ensuring long-term resilience in an eco-conscious market.

From the SEEA-GHG Emission Account, the report concludes that while the tourism sector is a relatively low GHG emitter compared to other industries and households, there is significant room for improvement. The predominant sources of emissions include passenger transport and accommodation services. The findings emphasize the need for climate change mitigation strategies within the tourism sector. Reducing CO2 emissions not only supports global environmental goals but also enhances the sector's appeal to eco-conscious travellers. Proactively adopting sustainable practices can help tourism enterprises stay ahead of regulatory changes, avoid potential fines, and achieve long-term cost savings through energy-efficient technologies.

Findings from the SEEA-Water Account for Kenya's tourism sector highlight a heavy reliance on surface and groundwater sources by tourism enterprises, particularly accommodation services, underscoring the need for sustainable water management practices. The minimal treatment and reuse of sewage indicate an area for improvement. Enhanced reporting and management of wastewater are critical for future SEEA water accounts. Adopting efficient water usage practices and improving sewage treatment can help the tourism sector contribute to sustainable water management, ensuring the long-term availability of this vital resource.

The pilot Solid Waste Accounts reveal that the tourism sector generates a substantial amount of solid waste, predominantly organic. However, the low level of waste treatment and recycling is a significant concern. The majority of the waste generated is either disposed of in landfills or remains uncollected, posing environmental risks. Improving solid waste management practices is crucial for reducing the sector's environmental impact. Enhancing recycling and composting efforts, coupled with better waste collection and treatment infrastructure, can significantly mitigate the adverse effects of waste on the environment. The findings highlight the need for comprehensive waste management strategies to promote sustainable tourism practices in Kenya.

5.2 Recommendations

5.2.1 Policy Recommendations

Based on the results of the situational analysis for environmental-economic accounting and compilation of pilot SEEA-Accounts for tourism, the study makes the following policy recommendations to promote environmental-economic accounting (EEA) by tourism enterprises and the periodic development of SEEA-Accounts for tourism:

i. Establish Data Collection Mechanisms for EEA for the Tourism Sector: By implementing measures to improve data collection on solid waste management, water distribution, and energy consumption by tourism enterprises. Establishing standardized reporting frameworks and enhancing collaboration between county government departments, water service providers, and tourism enterprises to ensure accurate and comprehensive data collection.

ii. Monitor and Maintain a System for Economic Accounting for the Tourism Sector: By establishing a centralized data management system that allows for the efficient collection, storage, and analysis of environmental data from tourism enterprises. This system should be user-friendly and provide real-time data access to relevant stakeholders, including government agencies and tourism operators.

iii. Implement Capacity Building and Training: Provide training and capacity-building programs to enhance the technical expertise of tourism enterprises in environmental accounting practices. Offer workshops, seminars, and certification programs to improve knowledge and skills in data collection, management, and reporting related to SEEA-Accounts.

iv. Develop and Implement an Incentive Mechanism: Develop incentive mechanisms to encourage tourism enterprises to adopt EEA practices and participate in SEEA-Account development. Offer financial incentives, tax breaks, and recognition programs for enterprises demonstrating commitment to environmental sustainability and effective data reporting.

v. Enhance Policy Integration and Coordination: Integrate EEA principles and SEEA Accounting requirements into existing tourism policies, regulations, and strategies. Foster coordination between relevant government agencies, sector associations, and tourism stakeholders to ensure coherence in policy implementation and promote the mainstreaming of EEA practices within the tourism sector.

5.2.2 Recommendation for Tourism Sector Practitioners

The study makes the following recommendation for the tourism enterprises to enhance adoption of practices for environmental-economic accounting and support periodic development of national tourism SEEA-Account:

1. Data Collection and Reporting: Enhance internal data collection mechanisms to accurately monitor and report on environmental indicators. Invest in systems to track energy consumption, water usage, GHG emissions, and waste generation across operations. Regularly update records and ensure transparency in reporting practices to facilitate SEEA account compilation.
2. Adoption of Sustainable Practices: Implement sustainable practices to reduce environmental impact and improve resource efficiency. Embrace renewable energy sources, such as solar power and biomass, to reduce reliance on fossil fuels. Implement water-saving measures and invest in wastewater treatment systems to minimize water consumption and pollution. Adopt waste reduction strategies, such as recycling and composting, to minimize landfill waste and promote circular economy principles.

3. Partnerships and Collaboration: Collaborate with sector stakeholders, government agencies, and NGOs to promote EEA and SEEA initiatives. Participate in sector-wide forums and working groups to share best practices, exchange knowledge, and address common challenges. Form partnerships with local communities to support sustainable development initiatives and ensure community engagement in environmental management efforts.
4. Capacity Building and Training: Invest in employee training and capacity-building programs to enhance awareness and understanding of EEA concepts and methodologies. Provide training on data collection techniques, environmental accounting principles, and SEEA reporting requirements. Empower staff to become champions of sustainability within the organization and encourage active participation in environmental management initiatives.

5.2.3 Recommendation for Future Research

The study makes the following recommendation for future research to contribute to enhancing the adoption of environmental-economic accounting by tourism enterprises and promote the periodic development of SEEA accounts for tourism:

1. Assessment of Knowledge and Skill requirement for data providers and users in Environmental Economic Accounting: Future research should assess the knowledge and skill requirements of data providers and users in Environmental Economic Accounting (EEA) to develop SEEA for tourism in Kenya. This will identify training needs, ensure accurate data collection, and enhance the capacity of stakeholders to effectively implement and utilize EEA practices, thereby supporting sustainable tourism development.
2. Assessment of Policy and Regulatory Frameworks: Conduct a comprehensive analysis of existing policy and regulatory frameworks related to environmental management and economic accounting within the tourism sector. This will identify gaps and areas for improvement to enhance policy coherence and support the implementation of SEEA initiatives.
3. Exploration of Innovative Technologies and Methodologies: Future research should explore innovative technologies and methodologies to advance SEEA development for tourism in Kenya. This includes leveraging advanced data analytics, remote sensing, and digital tools to improve data accuracy, efficiency, and comprehensiveness, ultimately enhancing the effectiveness of environmental economic accounting practices.

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Appendix I: Data Collection Tool - Supply and Use of Surface and Ground Water

DATA COLLECTION TOOL 08

DEVELOPMENT OF SEEA-WATER ACCOUNT – KENYA'S TOURISM INDUSTRY

SUPPLY AND USE OF SURFACE AND GROUND WATER BY WSB & WSP

Data Sheet

County:	.....	WSB:	.....
Town:	.....	WSP:	.....
		Date (day/month/year):	.....

	Variable	Description		Units ($10^6 m^3$/year) 2022
1	Distribution of abstracted water	Amount of water abstracted distributed to industries and household by Water collection, treatment and supply industries		.....
			Industry/Sector	**Percentage of total (%)**
2	Distribution of abstracted water industries and sectors	Proportion of water distributed to industries and household by Water collection, treatment and supply industries	Accommodation for visitors	.....
			Food & Beverage Serving activities	.....
			Cultural Activities	.....
			Road passenger transport	.....
			Rail passenger transport	.....
			Air passenger transport	.....
			Water passenger transport	.....
			Transport equipment rental	.....
			Travel agency & other reservation services	.....
			Sports & recreation activities	.....
			Retail trade of country specific tourism goods	.....
			Other country specific tourism characteristic goods	.....
			Water collection, treatment and supply	.....
			Other industries	.....
			Households	.....
3	Loses in Distribution of abstracted water	Percentage of water lost in distribution of water by Water collection, treatment and supply industries		**% of Total** .....

Name/ Designation .....

Stamp

Appendix II: Data Collection Tool – County Solid Waste Management

DATA COLLECTION TOOL 03

DEVELOPMENT OF SEEA-SOLID WASTE ACCOUNT – KENYA'S TOURISM INDUSTRY

COUNTY SOLID WASTE MANAGEMENT

DATA SHEET

Source **COUNTY GOVERNMENT DEPARTMENT** **Date** .....

County: .....

Solid Waste Generation

1. Please estimate the quantity of industrial solid waste generated by industries in the county and collected for the period 2020-2022, in tons per year

Category of Industrial Waste	**Amount generated (tons/year)** 2022	**Proportion collected (% per year)** 2022
Industrial organic solid waste (Includes food waste, kitchen scraps, paper, leather, and other biodegradable materials that can be decomposed)	.....	.....
Industrial inorganic solid waste (Includes non-biodegradable materials such as plastics, glass, metals, paper, and other recyclable or non-recyclable materials)	.....	.....
Other industrial waste (Includes discarded equipment, vehicles and electronic waste)	.....	.....

2. Please estimate the quantity of domestic solid waste generated by households in the county and collected for the period 2020-2022, in tons per year

Category of Domestic Waste	**Amount generated (tons/year) 2022**	**Proportion collected (% per year) 2022**
Domestic inorganic solid waste	.....	.....
Domestic inorganic solid waste	.....	.....
Other domestic waste	.....	.....
Total	.....	.....

3. Please estimate the proportion of the collected industrial and domestic organic, inorganic and other solid waste recovered/recycled from landfills in the county for the period 2020-202, in percentage of total amount of waste collected

Source & type of waste	**Proportion recovered/recycled (% per year) 2022**
Industrial organic, inorganic and other solid waste	.....
Domestic organic, inorganic and other solid waste	.....
Total	**.....**

4. Please estimate the proportion of the total industrial and domestic organic, inorganic and other solid waste incinerated in landfills in the county for the period 2020-202, in percentage of total amount of waste collected

Source & type of waste	**Proportion incinerated (% per year) 2022**
Industrial organic, inorganic and other solid waste	.....
Domestic organic, inorganic and other solid waste	.....
Total	**.....**

5.

6. Please estimate the proportion of the total industrial and domestic organic, inorganic and other solid waste treated in landfills in the county for the period 2020-202, in percentage of total amount of waste collected

Source & type of waste	**Proportion treated (% per year) 2022**
Industrial organic, inorganic and other solid waste	.....
Domestic organic, inorganic and other solid waste	.....
Total	**.....**

7. **Solid Waste Disposal and Management**

Solid Waste Disposal by Landfills

Name of Landfill/Location	**Year Opened**	**Size (Area) KM²**	**Water Acceptance rate Tons/year**	**Operational Status (Open/closed)**
.....	.....	.....	.....	.....
.....	.....	.....	.....	.....
.....	.....	.....	.....	.....
.....	.....	.....	.....	.....
.....	.....	.....	.....	.....

Compiled by (Name) ..... **Stamp**

Designation .....

Signature: .....

Appendix III Data Sources

Energy Account

ITEM	DESCRIPTION	SOURCE
Energy Supply data	Energy from natural inputs – renewable and from the environment	Secondary Data: National SEEA- Energy Account (KNBS, 2023)
	Energy from natural inputs – non-renewable and from the R.O.W (Imports)	
	Total production of energy products - electricity and gas supply	
	Households' production of energy products (firewood and charcoal)	
	Own production of energy by tourism enterprises e.g., park lodges	Primary Data: Survey of sampled tourism establishments
Energy Use data	Consumption of energy products by tourism industries, other industries, and households	Secondary Data: National SEEA- Energy Account (KNBS, 2023)
	Export of energy products to the R.O.W.	
	Consumption of natural energy inputs by industries, and households	
	Residuals – flows to the environment	
	Energy product consumption (Electricity and gas) by tourism industries	Administrative data- KPLC on tourism business energy use.
	Energy use for passenger transport - volume of passenger transport (road, railway and air)	Administrative data from the National Transport and Safety Authority (NTSA), Kenya Railways (KR), and the Kenya Civil Aviation Authority (KCAA)
Intermediate consumption ratio	To compute tourism intermediate consumption ratio from tourism, share in value and total intermediate consumption	Kenya's TSA -2019 (TRI, 2020)

Greenhouse Gas Account

ITEM	DESCRIPTION	SOURCE
KNBS 2023	Economic Survey 2023 -Kenya Physical Energy Use Tables	https://www.knbs.or.ke/economic-survey-2023/
World Bank 2023	Total GHG emission (kt of CO_2 equivalent) – Kenya	https://data.worldbank.orgindicator/EN.ATM.GHGT.KT.CE?locations=KE
International Energy Agency (IEA)	Emission factors specific to different energy sources and activities	https://www.iea.org/data-and-statistics/data-product/emissions-factors-2022
County Governments	Administrative Records- Waste collection and disposal at landfills	Count Government Departments for Environment
Tourism Research Institute	Kenya's Tourism Satellite Account 2019	https://www.tourism.go.ke/wp-content/uploads/2022/10/KTSA-Popular-Vesion-March-2022_.pdf

Water Account

Item	Variable Description (M^3/year)	Data Source
1.	The volume of inland abstracted water	• Administrative data – County water utility companies; • Administrative data – National Water Harvesting & Storage Authority • Secondary Data- FAO Database - AQUASTA (https://www.fao.org/aquastat/en/databases/maindatabase/) • Secondary Data – Economic Survey 2022 (KNBS,2023)
2.	The volume of abstracted water – other sources	
3.	Distribution of abstracted water	• Administrative data – water utility companies
4.	Wastewater to treatment	• Survey data- tourism industries,
5.	Own treatment of wastewater	• Survey data- tourism industries
6.	Return flows of water	• Survey data- tourism industries
7.	Use of distributed water	• Administrative data – water utility companies
8.	Own-use abstracted water	• Survey data- tourism industries
9.	Return flows to the environment	• Survey data- tourism industries • Administrative data – water utility companies
10.	Evaporation of abstracted water, transpiration	• Secondary Data- Kenya Water Situation Report -2019-2020 (Water Resource Authority [WRA], 2020) available at https://wra.go.ke/publications/

Solid Waste Account

Physical Supply Table		
Waste Category	**Description**	**Source**
Generation of solid waste • Inorganic wastes • Organic waste • Other wastes	The volume of average daily/person waste generated (kg)	Survey of main tourism industries. • Accommodation for visitors; • Food and beverage serving; • Passenger transport; • Culture/Sport & Recreation; • Other tourism;
	Annual volume of waste generated	Administrative data: • County government departments
	Annual volume of waste generated per household	Secondary Data: • Estimates from National Housing Survey (KNBS)
Physical Use Table		
Waste Category	**Description**	**Source**
Collection and disposal of solid waste • Inorganic wastes • Organic waste • Other wastes	Annual volume of waste (kg) collected/disposed through: • Landfill	Administrative data: • County Government • Service providers
	Annual volume of waste (kg) collected/disposed through: • Incineration • Recycling and reuse; • Other treatments	Survey of main tourism industries. • Accommodation for visitors; • Food and beverage serving; • Passenger transport; • Culture/Sport & Recreation; • Other tourism;
	Total volume of solid waste disposed to the environment/ annual	Secondary Data: • Estimates from the National Housing Survey (KNBS)

Appendix IV - Macro Table Seea Accounts

1. Energy Physical

PHYSICAL ENERGY SUPPLY TABLES

	Tourism Industries												Other Industries						
	Accommodation for Visitors		Food and Beverage Serving Services		Passenger Transport		Travel Agencies & Reservations		Others Tourism Industries		Total Tourism industries		Gas, Steam, and Air Conditioning Supply Industries	Other Industries	HHolds	Accum.	ROW	Environment	Total
	TSM	Total	TSM	Total	TSM	Total	TSM	Total	TSM	Total	TSM	Total							
Energy from Natural																		Table 4.1: Natural Energy Inputs Flows - 2022	
Solar																			
Wind																			
Hydro																			
Thermal																			
Biomass																			
Energy Products																			
Electricity													Table 4.3				Table 4.2 Products Imports in 2022		
Coal and Coke																			
Motor Spirit Petroleum (petrol)																			
Aviation gasoline																			
Jet fuel																			
Kerosene																			
Light Diesel																			
Fuel oils n.e.c.																			
Lubricating oils																			
Lubricating greases																			
Liquefied Petroleum Gas (LPG)																			
Firewood	Table 4.3 Generation of Energy Product by Industries and Households in 2022																		
Others																			
Energy Residuals																			
Energy from Solid Waste)																			
TOTAL SUPPLY																			

2. Energy Physical Use Table

PHYSICAL USE TABLES

	Intermediate Consumption; Use of Energy preoducts and Receipt of Energy Losses														Final Consumption				
	Tourism Industries												Other Industries						
	Accommodation for visitors		Food and Beverage Serving Services		Passenger Transp		Travel Agencies & Reservations		Others Tourism Industries		Total Tourism industrie		Electricity and Gas Supply	Other Industries	H/holds	Accumulation .	ROW	Envi	Total
									Tourism Industries										
	TSM	Total	TSM	Total	TSM	Total	TSM	Total	TSM	Total	TSM	Total							
Energy from Natural Inputs																			
Solar													Table 4.4: Natural Energy Inputs Usage in Kenya, 2022						
Wind																			
Hydro																			
Thermal																			
Biomass																			
Co-generation																			
Energy Products																			
Electricity	Table 4.5: Intermediate and Final Energy Products Consumption -2022; Table 4.7: Tourism Share of Intermediate Energy Products Consumption by Tourism Industries in 2022																		
Coal and Coke																			
Motor Spirit Petroleum (petrol)																			
Aviation gasoline																			
Jet fuel																			
Kerosene																			
Light Diesel																			
Fuel oils n.e.c.																			
Lubricating oils &greases																			
Liquefied Petroleum Gas (LP(																			
Charcoal & Woodfuel																			
Others																			
Energy Residuals																			
Extraction																			
Transformation																			
Losses																			
TOTAL USE																			

3. GHG – Physical Supply and Use Table

Physical Supply Table for GHG emissions (Mt)

	Generation of GHG emission														Accumulations	Flow from the environment	Total Supply of emissions
	Tourism Industries												Other Ind.	H/holds	Emission from landfills		
	Accommodation for visitors		Food & beverage Serving visitors		Passenger Transport		Travel Agency & Reservations		Other Tourism Industries		Total Tourism Industries						
	TSM	Total	TSM	Total	TSM	Total	TSM	Total	TSM	Total	TSM	Total	Total		Total		
Type of emissions																	
Carbon dioxide (CO2)	Table 4.15: GHG Emission by Tourism Industries Due to Final Consumption of Energy Products; Table 4.16 Tourism Share of GHG Emission by Tourism Industries Due to Final Consumption of Energy Products												Table 4.13: GHG emission by Industries due to intermediate Energy Products consumption	Table 4.14: GHG Emission by Households Due to Final Consumption of Energy Products			
Methane (CH4)																	
Nitrous Oxide (N2O)																	
Nitorgen dioxide (NO2)																	
Total CO_2 equivalent																	

Physical Use Table for GHG emission

										Flow to the environment	Total use of emissions
Emissions released to the environment										Table 4.17: Use of GHG Emissions	

4. Water - Physical Supply Table

Physical Supply Table for water (MCM)																					
		Abstraction of water, production of water, and generation of return flows																			
		Tourism Industries												Water collection, treatment and supply	Sewerage	Other industries		H/holds	Flow from R.O.W	Flows from the environment	Total Supply
		Accommodation for visitors		Food & beverage Serving visitors		Passenger Transport		Travel Agency & Reservations		Other Tourism Industries		Total Tourism Industries									
		TSM	Total	TSM	Total	TSM	Total	TSM	Total	TSM	Total	TSM	Total			TSM	Total		Imports		
1. Sources of abstracted water																					
	Total Supply abstracted																				
	Ground Water																			Table 4.19: Summary of Water Abstraction in Kenya-2017 -2022	
	Surface Water																				
	Total																				
2. Water																					
	Distribution of abstracted water													Table 4.20: Distributed Abstracted Water by Water Collection, Treatment and							
	Own-use abstracted	Table 4.21: Quantity of Ground and Surface Water Abstracted by Tourism Industry Enterprises																			
3. Waste water and reuse water																					
	Waste water to treatment																				
	Own treatment of waste water	Incomplete/Missing Data																			
	Total waste water and																				
4. Return flows of water																					
	Total return flows																				
5. Evaporation of abstracted water, transpiration and water incorporated into products																					
	Total																				
TOTAL SUPPLY																					

5. Water -Physical Use Table

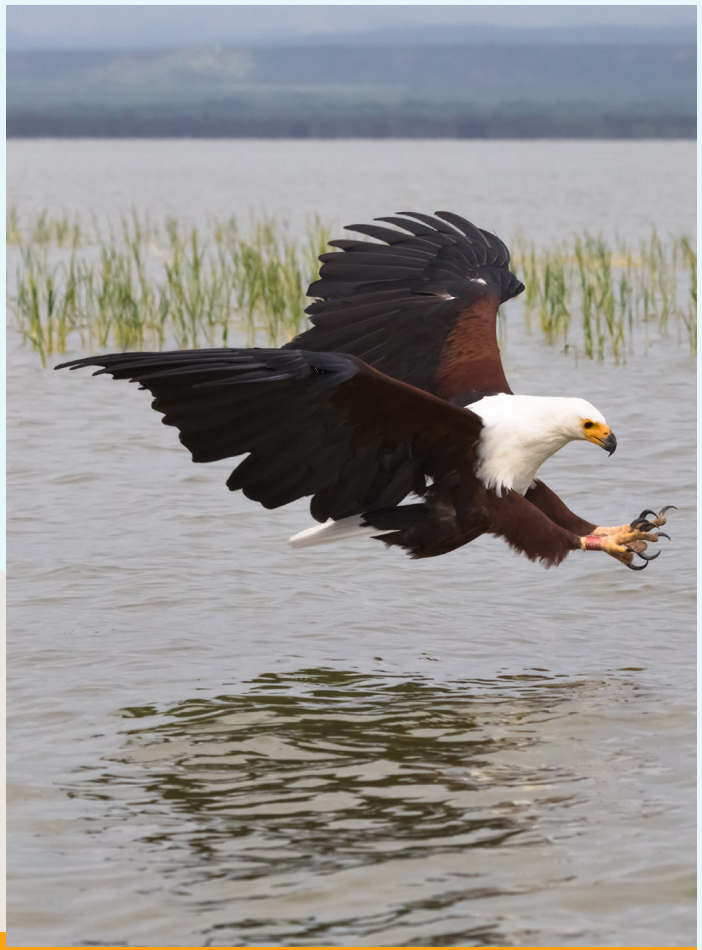
Physical Use Table for water																			
		Abstraction of water, intermediate consumption, and Return flows																	
		Tourism Industries												Water collection, treatment and supply	Sewerage	Other industries	H/holds	Flow from R.O.W	Flows to the environment	Total Supply
		Accommodation for visitors		Food & beverage Serving visitors		Passenger Transport		Travel Agency & Reservations		Other Tourism Industries		Total Tourism Industries						Imports		
		TSM	Total	TSM	Total	TSM	Total	TSM	Total	TSM	Total	TSM	Total			Total				
1. Sources of abstracted water																				
	Inland water	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00							
	Other water resources	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00							
	Total use abstracted water	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00							
2. Water (use)																				
	Use of distributed water	Table 4.24 Annual water consumption by tourism enterprises														Table 4.20 Distributed Abstracted Water by Water Collection, Treatment and Supply Industries				
	Own-use abstracted water	Table 4.21: Quantity of Ground and Surface Water Abstracted by Tourism Industry Enterprises																		
3. Waste water and reuse water																				
	Total waste water and reused water	Missing/incomplete Data																		
4. Return flows of water																				
	Total return flows																		Balance	
5. Evaporation of abstracted water, transpiration and water incorporated into products																				
	Total																			
TOTAL USE																				

6. Solid Waste -Physical Supply Table

	Physical Supply Table for Solid Waste (tonnes)																	
		Generation of Solid Waste														Flow from the R.O.W	Flow from the environment	Total Supply
		Tourism Industries												Other Ind.	H/ holds	Import of Solid waste	Recovered residuals	
		Accommodation for visitors		Food & beverage Serving visitors		Passenger Transport		Travel Agency and Reservations		Other Tourism Industries		Total Tourism Industries						
A. Generation of solid waste residuals		TSM	Total	TSM	Total	TSM	Total	TSM	Total	TSM	Total	TSM	Total					
	Organic waste	Table 4.30 Volumes of Solid Waste Generated by the Tourism Sector (tonnes) -2022												Table 4.28 Supply of Solid Waste -2022				
	Inorganic waste																	
	Other waste																	
	Total Solid Waste																	
B. Generation of solid wastes Products																		
	Total Solid Waste																	-

7. Solid Waste -Physical Use Table

	Physical Use Table for Solid Waste										
		Intermediate Consumption , Collection or residuals							Flow from the R.O.W	Flow from the environment	Total Supply
		Waste Collection, treatment and disposal industries						Final Consumption			
		Landfill	Incineration	Recycling and reuse	Other treatment	Total	Tourism Ind.	Other Ind.	H/holds	Export of Solid Waste		
A. Collection and disposal of solid waste											
	Organic waste	Table 4.34 Quantity of Solid Waste Treated by Tourism Enterprises in 2022						NEMA (2023)		Balances	
	Inorganic waste										
	Other waste										
	Total Solid Waste										
B. Use of solid waste products											
	Total Solid Waste										



Ministry of Tourism and Wildlife

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