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KENYA STATE OF ENVIRONMENT REPORT

2019 - 2021

SUMMARY FOR POLICY MAKERS



THEME: ENVIRONMENT & NATURAL RESOURCES GOVERNANCE
MAY 2021

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THEME

ENVIRONMENT AND NATURAL RESOURCE GOVERNANCE

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Kenya State of Environment Report 2019-2021

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Forward

Kenya's land area of 582,646 Km² is endowed with fascinating environmental landscapes and diverse natural capital assets comprising flora, fauna, water, and minerals. This country's natural assets are critical foundations for sustainable development for the country. For instance, the country's unique geographical features, heritage sites, and diverse wildlife species are essential tourism products that support the country's economic growth. Further, the natural resources are key drivers of Kenya's development policies, such as the big four agenda and the Vision 2030. For example, environmental and natural resources are critical sources of food, raw materials for the manufacturing sector and offer safeguards for managing risks associated with the spread of zoonotic diseases. Recently, it has been estimated that natural resources contribute about 42% of the country's Gross Domestic Product (GDP) and support about 70% of the country's population's livelihoods.

These valuable natural assets, however, face significant conservation challenges. For instance, Kenya has been classified as a water-scarce country. These water resources are reported to be declining (water resources available in 2010 was 586 m³ per capita per year against the global benchmark of 1000m³). More so, wildlife species that once spread across landscapes have declined in numbers, with some Red-listed as threatened by the International Union for the Conservation of Nature (IUCN). The country forest cover remains below the constitutional threshold of 10% tree cover while land degradation remains widespread. Recognizing the value of the environment and natural resources in the economic development of the country and the challenges these resources face, the Government of Kenya, in collaboration with local and international stakeholders' places environment and natural resources governance as a national priority. As a result, over the years, as a sign of commitment to strengthening environmental and natural resources governance for enhancing conservation of these resources, Kenya has developed several relevant policies, enacted a range of relevant legal frameworks, and established institutions meant to advance the conservation of the environment and natural resources in the country.

To monitor the scenarios of environmental and natural resource changes, the Government of Kenya, through the National Environment Management Authority (NEMA), produces the State of Environment Report every two years as provided under EMCA section 9 (2) (P). The State of the Environment, which has been produced since 2003, serves as a vital tool for guiding Kenya's environmental situation. It spells strategies that would provide sustainable management of the environment and natural resources. The strategies mainstreamed through this report form the building blocks for many policy documents and agendas for the country both at the national and County level.

I am informed that this report developed by key experts in environment and natural resources focuses on providing salient governance aspects that require attention to ensure sustainable conservation of our country's environment and natural resources. I want to indicate that my ministry welcomes the report and will strive to mainstream the provisions in the ministry work. I also urge stakeholders to consider familiarizing themselves with the document and incorporating the recommendations into their activities. Lastly, I recommend the team that developed the report for good work.

Keriako Tobiko
Cabinet Secretary,
Ministry of Environment and Forestry

Preface

Kenya is blessed with rich biodiversity and enjoys a unique tropical climate with varying weather patterns due to differing topographical dimensions that support the biodiversity. The country has a wide variety of ecosystems: mountains, forests, arid and semi-arid areas (ASALs), freshwater, wetlands, coastal and marine. In addition to hosting diverse and unique landscapes and natural resources, these offer many opportunities for sustainable human, social and economic development. These ecosystems are natural capitals that provide essential ecosystem goods and services such as soil formation, nutrient cycling, and primary production.

The socio-economic well-being of Kenyans is intertwined with the environment. Therefore, the country's environmental and natural resources contribute directly and indirectly to the local and national economy through revenue generation and wealth creation in critical sectors like agriculture, fisheries, livestock, water, energy, forestry, trade, tourism, and industry. Monitoring and reporting on the trend of these environmental resources is important for sustaining both ecological and economic benefits for present and future generations. In addition, it provides for the alignment of governance systems to ensure a sustainable environment and natural resources conservation.

The environment and natural resources governance comprise one of the most critical environmental and natural resources conservation components. Fortunately, Kenya has rich history of environmental and natural resources governance. Traditionally, many communities provided cultural practices that safeguarded against the wanton destruction of the environment and natural resources. Later the current environment and natural resources governance regimes were rolled by communities building on community-based approaches. Today environment and natural resources governance continue to recognize community involvement. Whereas the country presents a rich history of environment and natural resources governance, several challenges have been witnessed affecting the country's environment and natural resources. This situation prompted the raising of major concerns on the governance of our environment and natural resource assets resulting in a reflection on relevant policies and legal frameworks, and institutional arrangements.

To appreciate the ongoing governance efforts, identify successes and areas for further strengthening, a review of environment and natural resources governance has been ongoing. This report reflects on the review by key lead agencies and stockholders in the environment and natural resources. I am informed that the report presents valuable information covering our environment and natural resources, and governance situation.

Therefore, the report presents an essential tool for enhancing knowledge of Kenya's environment and natural resources and providing valuable insights for strengthening governance. I call upon all stakeholders in the environment and natural resources sector to utilize the provision of the report.

Dr. Chris Kiptoo

Principal Secretary, Ministry of Environment and Forestry

Acknowledgement

The Environment and Natural Resources Governance present one of the most valuable components for advancing sustainable environment and natural resources management and conservation.

It is mainly because of effective and efficient governance systems that offer solutions to many challenges that our environment and natural resources face. In Kenya, environment and natural resources remain the backbone of our economy and supports a substantial part of the Kenya Gross Domestic Product (GDP) and a large part of the community socio-economies.

To provide an effective and efficient environment and natural resources governance, information or data on the environment and natural resources is critical. One approach for providing data for guiding effective and efficient governance is by profiling the environment and natural resources. In Kenya, profiling the environment situation started in 2003 following mainstreaming of the provision for preparing the state of environment report in Environmental Management Coordination Act, 1999. Under EMCA, 1999, NEMA coordinates the profiling of the environmental situation in collaboration with stakeholders.

The development of this report, which presents expanded profiling of the environment and natural resources with emphasis on governance mechanisms, serves as an essential tool for supporting and applying an effective and efficient environment and natural resources conservation in Kenya. The report, which contributes from key relevant lead agencies, provides the best information and data for supporting decision-making for environment and natural resources governance. Therefore, I urge all stakeholders involved in the environment and natural resources to familiarize themselves with this report and consider utilizing it.

I am aware that the report's development in environmental monitoring and reporting involved rigorous work of skilled, relevant experts, resources, and time.

Many experts from lead agencies spend many hours piecing technical information together. I take the opportunity to thank these lead agencies and their experts for the time spent to make this report a success. I also wish to thank the United Nations Development Programme (UNDP) for providing financial support in the development of this report. The technical coordination of the information was done by experts from NEMA and would also like to recognize the diligent coordination provided by NEMA technical team.

Mamo B. Mamo

Director General

National Environment Management Authority

An Overview

In Kenya, the environment and natural resources remain the backbone of our economy. It supports a substantial part of Kenya's Gross Domestic Product (GDP), and a large part of the population relies on natural resources for livelihoods. Environment and Natural Resources Governance is an important component for enhancing the sustainable environment and natural resource management and conservation. As a result, governance in the environment and natural resources remains a top priority in Kenya's development agenda, as reflected in Vision 2030.

To monitor the scenarios of environmental and natural resource changes occasioned by biotic and abiotic factors and impacts of various responses or interventions, the Government, through the National Environment Management Authority (NEMA), produces the State of Environment Report every two years as provided under EMCA, 1999 section 9 (2) (P).

The State of the Environment Report, which has been produced since 2003, serves as a vital tool for understanding Kenya's environmental situation and spells out strategies that would lead to sustainable management of the environment and natural resources. The strategies mainstreamed to the State of the environment report form the building blocks for many policy documents and agendas. They are aligned to national and County policies, particularly those focusing on the environment. In addition, counties play an important role in Kenya's sustainable development trajectory. Therefore, the governance of the country's critical biomes and fragile ecosystems that straddle more than one County is important. Lakes, rivers, fountains, mountains, wildlife, and many others are examples of the country's transcounty natural resources and cannot be apportioned among counties.

Previously, these transcounty resources have elicited arguments among counties indicating that as devolution takes shape, transcounty natural resources governance may require reflection and consideration for building governance frameworks¹ that address these challenges that have been witnessed previously. This summary for policymaker's report presents a snapshot of such and other natural resources governance situations building from analyzing their current status. The situation analysis provides for drawing strategies that enhance environment and natural resources governance in the country. The information for situation analysis was drawn from the State of environment report 2019 – 2021 developed by contributions from key relevant lead agencies. The report presents four distinct and connected parts:

Part I presents the status of the environment and natural resources in various thematic chapters as provided in the State of Environment Report 2019 - 2021. The critical thematic chapters articulated include; environment and people; land tenure and environment; Climate change; Agriculture, Livestock and fisheries; Water Resources and Wetlands; Mining; Energy; Biodiversity and heritage sites; Forests; and Tourism.

Part II is a profile of challenges that the country faces in the environment and natural resources. This section draws important issues and presents an evaluation of gaps in achieving sustainable environment and natural resources management and conservation as advocated in the Vision 2030, African Union (AU) agenda 2063, Sustainable Development Goals, and other national, regional, and international agendas.

Part III outlines the strategies that will enable sound governance of environment and natural resources for promoting sustainable development. This part spells out the key actionable strategies that need to be implemented. The key actors and other supporting actors that will drive these strategies mentioned into implementation.

Part IV puts across the conclusion and recommendation that dictate the issues at hand while providing insights into the country's solution to harness for sustainable use of the environment and natural resources.

State of Environment and Natural Resources in Kenya



On Population, Environment, and Development: the population in Kenya currently stands at 47,564,296 of which 23,548,056 are Males, 24,014,716 are Females, and 1,524 are Intersex. The registered population is an increase from previous years of census. The increase is more pronounced in urban areas where the population has risen rapidly compared to rural areas, to the extent that it is overstressing the current infrastructure and services.

As a result, informal settlements in urban centers have become common, leading to environmental degradation due to increased solid waste, effluents, and changes in environment integrity. The impact of environmental degradation has been higher in more impoverished communities and those in marginalized areas of the country. This situation cuts across the various counties in Kenya, leading to transcounty governance issues as far as natural resources are concerned. Further, transboundary issues on natural resources degradation cannot be forgotten, e.g., The Lake Turkana degradation purported by various human activities on River Omo in Ethiopia.

The patterns of population structure presented by the country's demographics have implications on the environment and natural resources conservation and governance. The youth who comprise a significant part of the population are largely jobless and tend to rely heavily on natural resources. Women who are majority compared to men, owing to their roles in family set-up especially in rural areas, tend to be more connected to the environment in activities like fetching firewood and water, among others. Therefore, strengthening youth and women mainstreaming in environment and natural resources governance is instrumental.

Population issues such as demographics divided among others influence the country's economic growth. For Example, 2019 registered a slow economic growth with the Gross Domestic Product (GDP) of 5.4%, compared to 6.3% in 2018. Therefore, economic status influences the status of the environment and natural resources, with poorly performing economies tending to push people to increased reliance on natural resources. Thus people, the economy, environment, and natural nexus present relationships that require understanding and application for ensuring effective environment and natural resources governance.



Land and Environment Nexus has been experiencing land tenure challenges with implications on sustainable environment and natural resources conservation. Land tenure has remained a major concern in the country, with many unresolved historical issues. From an environment and natural resources conservation perspective, it has been documented that areas witnessing land tenure issues are characterized by environment and natural resources governance concerns.

As a result of governance challenges, environment and natural resources in these areas undergo wanton destruction, suggesting the value of transparent land tenure systems in the environment and natural resources conservation. Despite some land-related issues, several interventions have been undertaken, including the establishment of commissions such as the Njonjo and Ndungu Commission to try to provide for best approaches to resolve land-related issues for the country. More so, relevant policies and legal frameworks have been developed.

For instance, the Constitution of Kenya 2010 Chapter 5 extensively provides for land matters and establishes the National Land Commission, a key institution in the administration of land issues in the country. Further, the adoption of the National land policy in 2009 also provided for addressing land issues, ushering in opportunities for sustainable environment and natural resources management. Whereas major progress has been realized in addressing land-related concerns, it is worth noting that the institutional terrain in land-environment-natural resources nexus involves several actors and institutions informed by specific policies and legal frameworks. It presents a scenario of overlapping roles across actors and institutions hence posing a significant challenge in governance. It may pose issues around tenure security, which is an incentive for sustainably investing in land resources, thereby affecting sustainable environment and natural resources governance.

In view of this, two recommendations are fronted; a) continued implementation of the land policies and legal frameworks, including strengthening relevant institutions such as the National Land Commission. It will enable the attainment of an effective and efficient environment and natural resources governance. b) Investment in establishing a cooperative mechanism among agencies involved in the land, environment, and natural resources governance is also necessary to avoid duplication of roles and address potential conflicts in the environment and natural resources management.



Climate Change plays a critical role in shaping the situation of our environment and natural resources. Data shows that Kenya, like other parts of the world, has experienced an increase in extreme weather events over the last 50 years. Depressed rainfall and, in other cases, highly enhanced rainfall causing flash floods is a common phenomenon in the current

times.

The flash floods increase the destruction of the environment and natural resources through soil erosion, killing animals, and sweeping vegetation while destroying key Greenhouse gas sinks. Of great concern is the rising water scarcity that is likely to attract increased conflicts for these resources across various counties as climate change manifestation happens. In recognizing the emerging issues driven by climate change, the country has developed responsive policies, legal frameworks, including institutions to address climate change mitigation and adaptation matters. Currently, the climate change Act, 2016 drives the climate change agenda for Kenya.

The law establishes or assigns institutions to drive the implementation of the Act. Among the key actor provided for in the law include the Climate Change Council, Climate Change Directorate in the Ministry of Environment and Forestry, County Governments, and National Environment Management Authority. Further the Act, provides for duties of both public and private entities. Given the risks posed by climate change to the environment and natural resources, which support about 42% of the country's GDP, climate change in the environment and natural resources governance should take center stage.

Critical thought is the implementation of the Climate Change Act, 2016 in totality. Currently, regulations to operationalize the provisions of the Act are underway. A notable challenge in the implementation of climate change has been observed in funding gaps which require solutions. Mega-transformative climate change mitigations and adaptation project support as provided in Climate Change Action Plan project are required to complement ongoing initiatives.



Water Resources are critical for supporting the environment and natural resources perpetuation and sustainable development. However, they are limited in Kenya, with the renewable water resources standing at 42.1 Billion of Cubic Meter (BCM)/year distributed as 20.6BCM/year and 21.5BCM per year for surface and groundwater, respectively. The country is classified as a water-scarce country.

There are Six water basins notably; Lake Victoria North Catchment, Lake Victoria South Catchment, Athi Basin, Tana Basin, Rift Valley Catchment, and Ewaso Nyiro Basin. Some of the basins, like the Athi basin, barely meets the current water demand. The water demand for the country is expected to reach 21,468 Million Cubic Meter (MCM) /year in the year 2030 against available 26,634MCM/year based on National Water Master Plan for 2030.

On water quality, the situation varies across the country on physio-chemical characteristics. Athi River, for instance, has been reported to have high E. coli levels, while river Ramisi as previously reported, has pH levels increasing from 7.19 in 2014 to 7.78, 9.53, and 8.40 in 2015, 2016, and 2017 respectively. The alkalinity of the water is beyond the acceptable Kenyan standards of 8.5. It clearly shows the contamination by highly basic material. High pH levels were also noted in Athi river, indicating increased river loading with basic chemical materials. The Lake Victoria North Catchment Area (LVNCA) has high levels of nitrates from domestic sewage, agricultural runoff, and agro-industrial effluents. In lake Turkana, the water abstraction of River Omo in Ethiopia, which supplies the lake with about 80% of the inflowing water, is experiencing unprecedented changes. Following the construction of Gibe dams and Kuraz irrigation schemes, there have been major changes in the lake's water physio-chemical characteristics. The changes have implications on the state of the wetland and the surrounding terrestrial environment. The Lake Turkana issue, which is transboundary in nature, has elicited some bilateral discussions.

On water and sanitation, water supply coverage in the country stands at about 59% in urban or urbanizing areas. It is projected that 200,000 new households will have to be served to reach the universal access threshold by 2030. Sewerage coverage stands at about 17% as of 2019 against a record of 16% in 2018. Therefore, sewerage sanitation is available to 3.9 million people in 26 counties, with Nairobi County taking 61% of the coverage. The Government targets eradication of open defecation by 2030 and improved access to sewerage in urban areas i.e., up to 40% by 2022 and 80% by 2030.

The country hosts many wetlands, from inland lakes through rivers and springs to marine ecosystems. The Key lakes includes Lake Victoria, Lake Turkana, Lake Naivasha, Lake Bogoria, Lake Baringo, Lake Jipe, Lake Kenyatta, and Chala. Key rivers include; Tana River, Athi River, Nzoia River, Nyando, and Ewaso Nyiro. These important ecosystems have been facing conservation challenges over the years. Frequent drought and abstractions of water upstream, either for irrigation or energy, have altered sediment dynamics downstream for rivers. Tana Delta and the Athi-Sabaki estuary are now showing shoreline change resulting from reduced freshwater flow and increased sedimentation. Lake Jipe is currently experiencing lake recession, sedimentation, deteriorating water quality, increased salinity, and accelerated weed invasion. Fish production in Lake Jipe has declined, impacting food security in Taita Taveta County.

Lake Kenyatta in Lamu County has no restriction on resource exploitation, and hence encroachment, selective felling of trees, overgrazing, soil harvesting, excessive extraction of groundwater also threatens to deplete some of these valuable resources completely. In response to the ensuing challenges, several policies on water and wetlands, legal frameworks, and institutions have been strengthened or established recently to advance the governance of these critical resources. The Water Act, 2016 is the principal legal framework on water governance though several other laws such as the EMCA, 1999 also provide for water and wetlands management.



The Agriculture Sector is a major contributor to Kenya's economy, with crop production contributing about 24.9% of the Gross Domestic Product (GDP). In 2019, the agriculture and livestock sector continued to grow with some practices mainstreaming environment and climate concerns through climate SMART agriculture models.

It is important to point out that others have continued the traditional way, affecting the environment and natural resources through overstocking, resulting in soil erosion and vegetation destruction. Vast natural landscapes in settlement schemes continue to be converted to croplands, decreasing land available for conservation of natural resources presented by the area under agriculture. Most livestock are in drylands, and overstocking results in land degradation through soil erosion and vegetation depletion. Agriculture and livestock play a major role in Green House Gas emissions and, thus, impact climate change manifestation.

The fisheries sub-sector in the year 2019 realized a decline in total fish production. The output declined from 154,671 thousand tonnes in 2018 to 146.5 thousand tonnes in 2019. On the other hand, the tonnage of freshwater fish landing decreased from 122.5 thousand tonnes in 2018 to 120.9 thousand tonnes in 2019. However, output from marine sources increased slightly from 24.2 thousand tonnes in 2018 to 25.7 thousand tonnes in 2019. Generally, fish farming accounted for 12.8 percent of the country's fish output in 2019.

Lake Victoria, which remained the highest single source of fish in the country, accounted for 62.5 percent of the total fish landed in 2019. However, this was the lowest output over the last five-year period. Under aquaculture and mariculture, Kenya currently has 3696 cages across the five riparian counties with an estimated production capacity of 3,000 tonnes/year. Suitability mapping indicates that out of 4,100 km² lake scape available, the maximum suitable area for cages is 362 km², or approximately 9 percent of the Kenyan portion of Lake Victoria. The majority of the lake scape, 3,737 km² or 91 percent of the lake, is either unsuitable or highly unsuitable for tilapia cage culture, according to the Kenya Marine Fisheries and Research Institute Report of 2019. From an environment and natural resources perspective, the challenge is to ensure maximum sustainable yields across the fishing scape in the country and avoid overfishing. Fisheries Management and Development Act, 2016 is the principal law, while Kenya Fisheries Services is the leading institutional arrangement for offering key governance in fisheries.



The Minerals Resources exploration surveys present a high potential for mineral treasure across the country. Currently, key minerals include; gold, oil, niobium, copper, zinc, gemstones, and gypsum. These minerals bring huge revenue to our country.

For instance, a total of Ksh 30.4 Billion was collected as revenue in 2018 from the mining sector, and it was a 5.9% growth from the previous year. Some known mineral-rich belts in the country

include Migori for gold and Taita County for gemstones and Turkana County for oil deposits. However, the country lags in minerals research, technology, and financing, making mineral full potential status a dream.

The minerals contribute about 1% to the country's GDP. Kenya's Vision 2030 and the Medium-Term Plan (MTP) III have targeted the mining industry as key to fulfilling the ten percent economic growth per annum promise. The pursuit for mineral exploration in the country has previously raised major environmental concerns which require attention. Key areas of concern are abandoned mine pits, quarries, sand harvesting, landslides, ground subsidence, Mercury in Gold treatment, and explosives in rock blasting.

The National Environment and Management Authority (NEMA), in collaboration with stakeholders, have governance mechanisms like regulations and guidelines to address some of the challenges associated with the mining sector. The Mining Act of 2016 provides a governance framework on mineral resources taking cognizance of environment and natural resources conservation. The EMCA, 1999, and other laws that govern the environment and natural resources provide back-up on specific governance aspects regarding mineral exploration. For example, the Environmental and Social Impact Assessments and Audits play a critical role in guiding the mining sector's environment and natural resources concerns.



The Energy Sector also plays a role in impacting the environment and natural resources negatively. For instance, some forms of energy like fossils contribute to Green House Gas emissions, and patterns of wood fuel consumption contribute to vegetation loss. In Kenya, wood fuel and other biomass account for about 68% of the total primary energy consumption, followed by petroleum at 22% and electricity at 9%, with other fuel sources (including coal) standing at less than 1%.

To address environmental and natural resources concerns associated with patterns of energy utilization in the country, the Government has prioritized the development of renewable energy sources like geothermal and wind energy plants and solar-fed mini-grids for rural electrification. Currently, electricity generated from renewable sources has gradually increased and occupies a significant share of the total energy generation mix. The wind power potential in the country is promising and stands at average wind speeds of over 9m/s at 50 meters for areas in the northwest of the country (Marsabit and Turkana counties) and the edges of the Rift Valley. The coast has lower but promising wind speeds (about 5-7m/s at 50m). The largest wind farm in Africa (310 MW) is in the Turkana area of north-western Kenya, whose connection to the grid was done in 2018. The Ngong hills area close to Nairobi has 5.1 MW.

On the other hand, solar energy in the country is very promising, with high insolation rates at an average of 5-7 peak sunshine hours and average daily insolation of 4-6 KiloWatts Hour (KWh)/m². The total potential for photovoltaic installations is estimated at 23,046-Terawatt Hour (TWh)/year. The Government aims to install an additional 500 MW and 300,000 domestic solar systems by 2030.

The potential for large-scale hydroelectric power development is estimated to be 1,500 MW, of which 1,310Megawatts (MW) is feasible for projects with a capacity of at least 30 MW. Of these, 434 MW has been identified in the Lake Victoria basin, 264 MW in the Rift Valley basin, 109 MW in the Athi River basin, 604 MW on Tana River basin, and 146 MW on Ewaso Ngiro North River basin.

The total estimated potential of small, mini, and micro-hydro systems is 3,000MW. Around 55 river sites suitable for small, mini, and micro-hydro systems for rural electrification have been identified as attractive commercial opportunities. Their maximum mean capacities would range from 50 kW to 700 kW. Most of this potential is situated within the country's five main drainage basins.

Geothermal power resources are mainly in the Rift Valley, and the suggested potential in the rift stands at 2,000 MW, whereas the total national potential is put at between 7,000 and 10,000 MW. Production started in 1981 when a 15 MW plant was commissioned in Olkaria. Currently, the country produces a total of 129 MW from geothermal. The target for 2030 is 5,000 MW of geothermal power. Geothermal accounted for 27% of installed capacity in 2016, following a unit at Olkaria geothermal project.

Other forms of energy in operation include; Co-generation energy which started with Mumias Sugar Company exploiting sugarcane bagasse by initially generating 38MW, out of which 26MW gets exported to the national grid. The Nuclear Power and Energy Agency, formerly Kenya Nuclear Electricity Board (KNEB), is also planning 1 GW (1,000 MW) from Nuclear sources between 2020 and 2022 and 4 GW by 2030. These major milestones in shifting towards renewable energy provide good news for environmental and natural resources. It transits the country towards low carbon emissions, thereby managing Green House Gases and climate change. From the Paris Agreement, Kenya commits to cutting carbon emissions by 30% and promoting green energy to realize this commitment.



Biodiversity Resources: Kenya is rich in biodiversity (plants and animals) treasures. The country has over 260 reptiles (snakes, lizards, geckos, skinks, chameleons, tortoise, turtles, terrapins, crocodile) and amphibians (toads, frogs, salamanders) species; 1,105 bird species; 769 Fish species (362 freshwater), of which five are likely to be extinct.

The country has one of the richest avifauna diversities in Africa, with around 1,100 bird species recorded. Of these, about 800 species are year-round residents, 60 species are afro-tropical migrants moving within the continent, and 170 are palearctic migrants that journey from Eurasia each winter. Some of the known mammals include; about 2 golden moles; 43 even-toed ungulates; 4 odd-toed ungulates; 36 carnivores; 26 whales, 5 dolphins, and porpoises; 105 bats; 39 hedgehogs; 4 hyraxes; and 4 lagomorphs; 5 elephant shrews; 3 pangolins; 20 primates; 1 proboscis; 94 rodents; 1 dugong and 1 aardvark. The country is known for its high biodiversity endemism, some of which are threatened. There are several fish species are listed threatened by the IUCN Red-list of threatened species.

There are over 25 000 species of invertebrates, with some yet to be described. Insects are the most diverse group of animals. Some of the major species listed for Kenya include about 9000 beetles, 900 butterflies, 500 bees, 650 ants, and 60 thrips species. Insects include flies, wasps, bees, beetles, bugs, mantids, crickets, grasshoppers, ants, termites, lice, fleas, moths, and butterflies. Some 900 species of bees are estimated in Kenya.

There are over 7,004 species of plants in addition to 766 species of bryophytes, 511 ferns, and 2,071 species of fungi and lichens in Kenya, according to Kenya's Natural Capital Biodiversity Atlas 2015. Of the 7,004 plant species found in Kenya, 577 (some 8 percent) are endemic. International Union for Conservation (IUCN) has classified 356 vascular plant taxa (species, subspecies, and varieties) in Kenya as threatened or near-threatened. Most wildlife species populations in the Kenyan rangelands declined in 2019 compared with the population recorded in 2018. The decline is attributable to unfavorable weather conditions in the rangelands during the year and habitat conversion or loss resulting from human population expansion.

The species whose populations remained stable during the period include Eland, Elephants, Gerenuk, Hunters Heartbeats, Waterbuck, and Grevy's Zebra. The increased human population coupled with the emergence of irrigation agriculture and the opening up of infrastructure in the ASAL areas has acted as a source of human-wildlife conflict. There is a major challenge in securing connectivity and dispersal areas to allow wildlife to move freely across landscapes while at the same time protecting other key land use activities such as agriculture, settlements, and infrastructure development.

Kenya Wildlife Service conserves biodiversity under the Wildlife Management, and Conservation Act, 2013 through protected area systems which cover 8% of the Kenyan landmass and they include the National Parks (23), National Reserves (28), National Sanctuaries (5), Marine Parks (4) and Marine Reserves (6). The lack of gazetted management plans, a legal requirement for all wildlife conservation areas, has caused a major impediment to development in the reserves, thus posing a challenge to wildlife conservation and management. Wildfire a common phenomenon in the Kenya wildlife's protected areas, especially in National Parks and Reserves has posed a challenge in the conservation of biodiversity.

Key areas that experience wildfires include the Tsavo National park (both Tsavo East and Tsavo West), Chyulu National Park in the Tsavo Conservation Area (TCA), Shimba Hills National Reserve in the Coast Conservation Area, Mt. Kenya National Park and Forest Reserve, Aberdare National Park in the Mountain Conservation Area and Ruma National Park in the Western Conservation Area. Apart from Wildlife Management and Conservation Act, 2013, other legal frameworks such as EMCA, 1999, Forest Conservation and Management Act, 2016, plays a central role in advancing biodiversity governance. The biodiversity challenges witnessed point to the need for understanding of biodiversity governance systems in the country for consideration in instituting reforms or strengthening exiting systems to assure effective and efficient biodiversity management.



Forest Resources in the country were 7.2%, according to the 2018 national projection based on the 2010 forest cover data. Currently, the forest cover is estimated to be at about 7.4%. The forest cover was estimated at 6.99% or 4.18 million Ha in 2013 through a comprehensive forest cover assessment using 2010 satellite imagery, ground-truthing, and sampling for inventory data.

Counties' forest cover in 2018 ranged from the highest which is Nyeri County with about 38% forest cover to the least at Siaya County, estimated at 0.42% forest cover. The key forests are categorized as Montane, Western rainforest, Bamboo, Afro-montane undifferentiated forest, Coastal, and Dryland forests. The montane forest and the coastal forest regions are the most forested areas with 18% and 10% forest cover. According to a 2010 assessment using satellite imagery data, natural forests in Kenya are made up of montane forests, which occupy about 2% of the total land area (1.14 million hectares). A large area of 2.13 million hectares consists of bushland and mangroves. Public and private plantations constitute 220,000 hectares.

The presented patterns of forest cover nationally and at the County level indicate that forests in Kenya have been facing conservation challenges. Previously, the country witnessed rampant deforestation where many forests faced destruction following tree harvesting, with the most notorious destruction attributed to illegal charcoal burning, commercial logging, and wood fuel collection for energy. An estimated 80% of the national energy supply in the country is met from wood fuel. The current wood deficit is projected to increase from 10 million m³ to at least 15 million m³ per year by 2030.

In the 1990s, the forest situation became worrying, with reports around this period indicating that forest cover nearly approached below 5% due to human activities. For the period 1990-2015, the country is estimated to have lost 311,000 Ha of forestland. It is attributed to the conversion of forests to settlements, crop farming, and infrastructure developments.

Other issues that affect forests status include; overgrazing, forest encroachment due to illegal settlement and occupation of some forests by indigenous people, forest fires, soil erosion, landslides, siltation of water bodies, floods, extension of cultivation into riparian reserves, expired participatory forest management plans, concerns over co-management forest by two or more agencies and invasion by invasive species in the forest ecosystem.

This situation alarmed conservation experts and the Government, resulting in a review of governance systems in the forest sector. Therefore, the period that followed from 2000 onwards was characterized by major governance reforms focusing on legal and institutional strengthening. During this period, the Forest Act of 2005 came to strengthen forest governance and created a new institutional arrangement under the Kenya Forest Service.

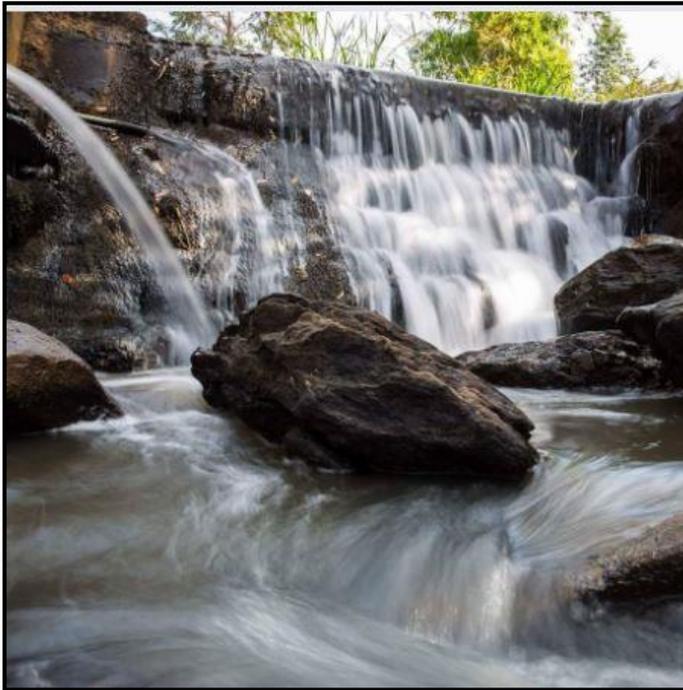
About ten years later, the Forest Act of 2005 was reviewed to become the Forests Conservation and Management Act, 2016, aligning forests governance to the Constitution of Kenya 2010 and other innovations. The Constitution of Kenya 2010 provides some aspects of forest governance under the County Governments as provided in schedule 4 of the constitution. To ensure a smooth transition of the functions of the devolved forest, engagements between the County Governments and national Government agencies, specifically Kenya Forest Service, have been ongoing under the Transition implementation plans (TIPs). However, TIPs remain to be finalized for all counties, with only a bunch of counties that have signed TIPs.

To provide for the good governance of the critical forests resources and ensure their sound conservation to support ecosystems goods and services while ensuring sustainable development, the ongoing engagements under TIPs require to be concluded. It will provide comprehensive forest governance through national, County Governments and levels of cooperation. Realizing effective and efficient forest resources governance will assure the continued contribution of forests to the economy, which is estimated to be 3-3.6% to the GDP, excluding environmental services and contributions to other sectors.



The Heritage Resources are primarily sites spread across the country and governed under the National Museums and Heritage Act, 2006, with the National Museums of Kenya being the main institution overseeing these heritage sites. Some of the heritage sites have entered inscription to the UNESCO World Heritage List.

These include; three natural sites including; Kenya Lake System in the Great Rift Valley (2011), Lake Turkana National Parks (1997,2001), Mount Kenya National Park/Natural Forest (1997,2013). In addition, there are four cultural sites comprising of Fort Jesus, Mombasa (2011), Lamu Old Town (2001), Sacred Mijikenda Kaya Forests (2008) and Thimlich Ohinga Archaeological Site (2018). Several others are heritage sites lined for consideration for inscription to the UNESCO World Heritage List. From an environment and natural resources governance perspective, heritage sites are host to unique biodiversity and landscapes. The heritage resources, tough like other natural resources, face many challenges that point to issues around governance. A reflection of issues on heritage resources is important to allow for mainstreaming governance systems to bring sustainable heritage resource conservation.



Tourism-Environment and Natural Resources present a very close connected nexus.

The pattern of tourism performance affects the environment and natural resources situation. The sector registered improved performance mainly attributed to growth in aviation, investor confidence, and withdrawal of travel advisory. The performance was also boosted by visits from foreign dignitaries and a revitalized marketing effort. The earnings from the sector increased by 31.3 percent to Kshs.157.4 billion in 2018. The number of international arrivals increased by 14.0 percent to 2,027.7 thousand in 2018.

Hotel Bed-night occupancy increased by 20.1 percent to 8,617.9 thousand in 2018, of which 52.1 percent were occupied by residents, indicating the growing importance of domestic tourism. In 2018, Kenya travel and tourism exceeded global and regional levels (WTTC, 2018). The number of international and local conferences grew by 6.8 and 7.9 percent in 2018, respectively. One can partly attribute this to high-profile international conferences and meetings held. The number of visitors to national parks and game reserves rose by 20.3 percent to 2,868.9 thousand, while that of visitors to museums, snake parks, and historical sites grew by 32.3 percent to 1,034.3 thousand in 2018.

The robust performance of tourism in 2018 indicates the sector is poised to achieve the set targets by 2020 as contained in the Third Medium Term Plan (MTP III) 2018-2022. The targets include; number of international arrivals rising to 2.1 million; tourism earnings at Kshs.145.0 billion and; hotel bed-nights occupancy by Kenyans at 5.5 million. The number of international visitor arrivals increased by 14.0 percent to 2,027.7 thousand in 2018, against a target of 2,100 thousand by 2020. Consequently, tourism earnings increased by 31.3 percent from Kshs.119.9 billion in 2017 to Ksh 157.4 billion in 2018. Despite the impressive tourism performance previously, starting 2020, the Covid 19 entry in Kenya saw the sector performance decline drastically with very limited international arrival. Hotels witnessed low bed occupancy, almost bringing the sector to a halt. Nevertheless, the discovery of vaccines, the situation is likely to change bringing back the sector vibrancy.

Solid waste environment and natural resources nexus: Solid waste particularly in urban centers present an ever-increasing environmental pollution challenge. A major part of the solid waste generated is never collected and deposited in designated dumpsites. At the open dumpsites, the waste is mainly burned causing air pollution, some leachate is generated and swept by rain waters to wetlands polluting land and water while piles of waste in illegal dumpsites pollute land and disfigure the natural land aesthetics. The situation however faces data deficiency which is instrumental in planning the waste management. From a governance perspective, the management of solid waste is vested with the county governments as provided by the Constitution of Kenya 2010. Several legal frameworks such as the Waste Management regulation of 2006 under EMCA, 1999 provide for management of solid waste also. A waste management bill and e-waste regulations under EMCA, 1999 are also under development and are expected to strengthen solid waste management in the country. In order to promote effective and efficient solid waste management, research on solid waste require strengthening to support planning, operationalization and review of existing institutional and legal governance systems.



Current Environment and Natural Resource Governance Systems

in the country play a key role in addressing the myriad of challenges witnessed for shaping the environment and natural resources across the country. In Kenya, environment and natural resources governance systems primarily cover institutions, policies, legal

frameworks, and practices applied by the Government, private sector, community, development partners, and civil society to support the environment and natural resources conservation throughout Kenya.

Environment and natural resources governance in Kenya has rich history initially driven by community conservation sensitive cultural practices, taboos, and beliefs before the colonial era. The community conservation sensitive cultural practices, taboos, and beliefs nurtured environment and natural resources conservation for many years, and whereas they were disregarded following entry of colonial regime, they later were appreciated and mainstreamed informal environment and natural resources conversation. This governance system allowed free co-existence of people and natural resources, utilizing them sustainably. For instance, today, the Kaya forests conservation is still embedded on community cultural perspective even though they are recognized as a monument under the National Museums and Heritage Act, 2006.

The Maasai community is also another example where they have carried human and wildlife co-existence to date. Several other community-aligned environment and natural resources governance arrangements exist across Kenya. The other environmental and natural resources governance system witnessed in the country was the protected area system, where areas were created exclusively for the environment, and natural resources conservation which started during the colonial era. The system was formalized by developing legal frameworks and institutions to steer the environment and natural resources governance. It saw the first protected area in 1946 at Nairobi National Park. By the close of the colonial era, many protected areas were delineated across the country. At independence, the Government inherited the protected areas governance system, with the least regarded community involvement.

Over the years, the systems encountered challenges associated with limited involvement of the community in planning and conservation matters. The plans for mainstreaming the community in conservation were introduced to recognize the value of a community-based approach to environment and natural resource governance. By the 1990s, major governance reforms happened largely recognizing community-Based Natural Resource Management (CBNRM) approaches. Currently, key environment and natural resources governance frameworks such as the Wildlife Management and Conservation Act, 2013, Forest Conservation and Management Act, 2016, Environmental Management and Coordination Act, 1999 other legal frameworks blend protected areas and community conservation approaches and has proved to be effective and efficient environment and natural resources governance model. The Constitution of Kenya 2010 article 69 provides for public participation involvement in environmental issues.

The established institutions under various legal frameworks also recognizes public participation in environmental and natural resources governance. For instance, the National Environment Management Authority (NEMA) prioritizes public involvement in the Environmental and Social Impact Assessment.

The key agencies that drive the environment and natural resources governance systems are; Ministry of Environment and Forestry, created by Executive Order No. 1 of 2018. This institutions is mandated to undertake national environment policy and management, forestry development policy and management, development of re-forestation and agro-forestry, restoration of strategic water towers, protection and conservation of natural environment and pollution control; Kenya Wildlife Service(KWS) is charged with the management of all wildlife, both within and outside protected areas; the National Management Authority (NEMA) which is a corporate body that shall exercise general supervision and coordination over all matters relating to the environment and be the principal instrument of Government in the implementation of all policies relating to the environment; The National Environment Complaints Committee (NEEC) mandated in investigation of complaints relating to environmental damage and degradation generally; National Environmental Tribunal that hears appeals from administrative decisions by organs responsible for enforcement of environmental standards; County Environment Committees (CEC) which under EMCA 1999 are supposed to provide protection of environment in the counties they are appointed. So far, 46 Counties have gazetted their CECs and made them functional; Kenya Forest Service (KFS) is in charge of the development and sustainable management, including conservation and rational utilization of all forest resources for the socio-economic development of the country and connected purposes;

The Water Resource Authority (WRA) that regulates the management and use of water resources; The National Land Commission (NLC), which is an independent constitutional commission mandated principally to manage and administer public land on behalf of the County and national Governments;

The Kenya Meteorological Department (KMD) responsible for providing weather and climate information and services; The Ministry of Petroleum and Mining in charge of administering of mineral resources in the country. This Ministry has various institution operating under it; The Energy and Petroleum Regulatory Authority (EPRA) is established as the successor to the Energy Regulatory Commission (ERC) under the Energy Act, 2019 with an expanded mandate of regulation of the Energy and Petroleum Sectors including coal exploitation; The National Museums of Kenya (NMK) provides governance on cultural and natural heritage in Kenya.

Some of the key agencies that collaborate with the Government in promoting environment and natural resources conservation include; United Nations Development Programme (UNDP), Nature Kenya (Formerly, The East African Natural History Society); IUCN- the International Union for Conservation of Nature Act Change Transform (ACT Kenya), former PACT-Kenya; The Worldwide Fund for Nature (WWF)-Kenya among others.

Key legally recognized community institutions involved in environment and natural resources governance include; Community Forest Associations (CFAs) which are established by the Forest Act of 2016 to provide avenues for the local community to partner with Kenya Forest Service (KFS) in the management of forests; Water Resource User Associations (WRUAs) formed under section 29(1) of the Water Act 2016 provides for the community-based association for collaborative management of water resources and resolution of conflicts concerning the use of water resources; Beach Management Units (BMUs) which is composed of fishing communities around lakes, the ocean and along rivers and use traditional institutions to regulate their members fishing activities, thereby conserving fishery resources; Kenya Wildlife Conservancies Association which are wildlife conservancies set aside by an individual landowner, body corporate, group of owners or a community for purposes of wildlife conservation according to the Wildlife Management and Conservation Act, 2013. Several Community Based Organizations (CBOs) and Public Benefits Organizations registered under various statutes also exist to address specific environmental and natural resources management issues.

The country is also part of international community arrangements that address transboundary environment and natural resources issues. As a result, Kenya signed many Multilateral Environmental Agreements, treaties, and protocols, among other arrangements. Among the MEAs Kenya is signatory to include; United Nations Convention on Biological Diversity (UNCBD), Convention on International Trade in Endangered Species of Wild Flora and Fauna (CITES), Ramsar Convention, Bonn Convention, the United Nations Framework Convention for Climate Change (UNFCCC) and the United Nations Convention to Combat Desertification (UNCCD) among others. The MEAs have played a critical role also in strengthening environment and natural resources governance. The counties needs to be educated on Kenya's MEAs, as well as the reporting obligations and how the devolved Governments would strengthen Kenya's performance in the international environmental governance framework.

What are we facing? Synopsis of Key Environment and Natural Resource Governance Challenges



Many environments and natural resources governance challenges exist but the key challenges can be summarized as; Inadequate human and technological capacity to address the issues, limited research data and monitoring, outdated data, data access challenges, gaps in existing policies and legal frameworks

to enhance governance especially transboundary, transcounty governance issues, partial implementation of policies and legal frameworks, limited public participation, institutional framework capacities i.e. laboratories and equipment, inadequate land use and spatial plans leading to competing land uses, inadequate enforcement of existing regulations, Inadequate funding, conflicting laws and regulations between various institutions, inadequate institutional linkages between various institutions, lack of awareness of the various stakeholders, lack grievance resolution mechanism, unresolved land tenure challenges, climate change manifestation (GHG), inadequate investment in framework for public-private partnerships in environment and natural resources, insufficient frameworks for cooperative transboundary natural resources governance, emergence of COVID19, related waste and inadequate benefit sharing of the proceeds of environment and natural resources.

Innovative Responses: Strategies for Enhancing Environment and Natural Resource Governance



As the environmental and natural resources situation and governance issue exists in the country, it calls for strategic interventions to enhance governance for the effective and efficient environment and natural resources conservation. The following strategies have been proposed.

Under the energy-environment and natural resources nexus, a reflection of energy legal frameworks and institutional arrangements is recommended with a view of strengthening environment, natural resources conservation, and climate change mainstreaming. Renewable energy forms a major part in stopping environmental destruction from illegal wood fuel activities that cause wanton destruction of forests while also controlling Green House Gas emissions. Awareness and promotion of renewable energy sources from solar, geothermal, and wind power to transition from traditional wood fuel and other fossil fuel sources are advocated. The climate change action plan 2018 -2022 contains useful provisions for allowing mainstreaming environment and natural resources concerns in the energy sector and require fast-tracking.

The mining sector requires strengthening, mainstreaming environment and natural resources governance in their operations, particularly Environmental and Social Impact Assessments and Audit governance in minerals exploitation. Mineral exploitations can cause wanton environmental and natural resources destruction if relevant governance systems are weak. Therefore, appointing competent official environmental and social impacts assessments officers to provide professional oversight in liaison with NEMA is worthwhile. Implementation of the Mining Act, 2016 in full to operationalize the environmental oversight arm provided for in the law is also worthwhile. Mercury pollution in gold mines is a major environmental concern, and adoption and enforcement of the use of current safe methods in gold mines should be prioritized. Given the huge financial ramification of environmental failures in the mining sector, efforts to strengthen the use of Environmental Performance Deposit Bonds to avail financial security and guarantees needs to be upscaled.

In the climate change sector, implementation of National Climate Change Action Plan (NCCAP) 2018 -2022 is a priority. Further, funding for climate change research and related mitigation and adaptation projects is also important, and finalization of climate change regulations is worthwhile. Implementation of the provision of the Climate Change Act, 2016 such as reporting to the council is required and enforcement of provisions provided

for in section 17 of the Climate Change Act, 2016. Awareness promotion of various technologies for application in combating climate change should continue.

Underwater resource and wetlands, the following strategies are fronted; enforcement of regulations under the Water Act, 2016 and the EMCA, 1999, funding for the Sub-Catchment Management Plans (SCMP) implementation, provision of adequate infrastructure and technology to address water resources monitoring systems, create awareness among lead agencies on relevant regulations under the Water Act, 2016 and the EMCA, 1999, construct adequate wastewater treatment plants, upgrade existing wastewater treatment plants and establish a framework on the operationalization of inter-governmental linkages in the water sector governance. Strengthening relevant institutions such as the Water Resource Authority (WRA), the Water Services and Regulatory Board (wasreb), the Water Resource User Associations (WRUAs), and the County Governments.

For Kenya forests, the following set-out strategies are recommended; develop a benefit-sharing framework with community forest association (CFAs) and review the regulations under Forest Conservation and Management, Act 2016. Finalize the Draft Forest Policy upon which the Forest Conservation and Management Act 2016 is anchored, develop and implement Participatory Forest Management Plans (PFMP), build the capacity of County Governments to take up devolved forest functions (TIPS), and establish linkages between research institutions, universities and the public. The key actors in this sector are Kenya Forest Service (KFS), Community Forest Association (CFA), and County Government.

Under the Heritage sector, key strategies fronted are; Awareness creation on the importance of our heritage and enforcement of legal framework governing heritage sites and provide funding to support heritage conservation and research.

The biodiversity sector requires; support on research on biodiversity, conduct valuation of biodiversity, enhanced information and knowledge sharing, finalization of management plans for protected areas as provided in Wildlife Management and Conservation Act, 2013. Development of required subsidiary legislation under the Wildlife Management and Conservation Act, 2013. Control poaching, forest fire, and increased support on human and financial resources to supporting conservation work. Invasive species control program is also required. Collaboration among agencies involved in the sector is also instrumental under a cooperative framework.

In the Fisheries sub-section, which is under the Agriculture, Livestock, and Fisheries sector, require the following strategies; enhance implementation of legislations on fisheries (Fisheries Management and Development Act, 2016) covering illegal gear and gazettement of BMUs, strengthen enforcement in the provision on fisheries governance, promotion of data gathering and research to guide policy and institutional capacity building for personnel and financial resources for Kenya Fisheries Service.

The strategies required under the **livestock sub-sector** include extension service on livestock carrying capacity and improved livestock rearing approaches to manage overgrazing and build capacity on the inventory of GHG emissions emanating from the sector.

The Agriculture sub-sector requires mainstreaming and promotion through awareness of SMART or Conservation agriculture. Increased research on agriculture and environment conservation approaches and technologies as land-use planning and spatial mapping on patterns of agriculture. Implementation of a climate change action plan on areas under agriculture is also instrumental.

In the Land, sector fronted strategies include; a reflection of legal frameworks related to tenure system and harmonize them to avoid conflicts, develop and implement spatial plans both at County and National level, resolve pending land tenure issues, particularly for conservation areas. Strengthen the National Land Commission and Ministry of Lands.

The Tourism Sector requires the mainstreaming of environment and natural resource governance in the tourism legal and operationalization framework, compliance enforcement of spatial plans in key tourism areas, and a clear framework for benefit sharing, especially transcounty natural tourist value resources.

Conclusion and Recommendation



The status of Kenya's environment and natural resources analysis still presents an enormous wealth of national treasures. However, these treasures that shape Kenya's economic landscape face conservation challenges that may compromise their sustainability. The challenges are primarily due to the status of governance accorded to these treasures and a new governance system that brings counties into this conservation agenda. The country has over the years, instituted many legal and institutional arrangements for strengthening environment and natural resources governance, key of which is the devolved form of governance introduced by the constitution in 2010.

These efforts have yielded some impressive contributions to the environment and natural resources conservation. However, the situation of the environment and natural resources remain a concern. It demonstrates that if the country has to realize effective and efficient conservation of the environment and natural resources, regular governance situation analysis is critical for capturing lapses and identifying areas of investments to strengthen governance.

Effective and efficient governance offers the best opportunity for realizing national environment and natural resources conservation aspirations in line with national, regional, and global agendas. Key to supporting effective and efficient governance lies in quality research data, responsive legal frameworks, and institutions. Therefore, continuous research for supporting various aspects of environment and natural resources governance is critical. More so, continuous reflection on enabling legal frameworks and institutions for strengthening or review is also instrumental. Finally, environment and natural resources governance requires the involvement of stakeholders in this regard. Modalities for stakeholders' active involvement through planning to implementations need to be devised and mainstreamed in the environment and natural resources governance. Further, it will involve all relevant sectors, perhaps customized geographically and in unique situations.

