Coping with **CLIMATE CHANGE** in Kenya

Policy Guide for Ecosystem based Adaptation for National and County Governments

NatureKenya
THE EAST AFRICA NATURAL HISTORY SOCIETY

BirdLife INTERNATIONAL

DARWIN INITIATIVE

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CRITICAL ECOSYSTEM PARTNERSHIP FUND

Dansk Ornitologisk Forening

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ACRONYMS

ASALS	Arid and Semi-Arid Lands
ACTS	African Centre for Technology Studies
CBA	Cost Benefit Analysis
CBD	Convention on Biological Diversity
CBSAP	County Biodiversity Strategy and Action Plan
CEAP	County Environment Action Plan
CEC	County Executive Committee
CFA	Community Forest Association
CITES	Convention on International Trade in Endangered Species of Wild Fauna and Flora
CSoE	County State of Environment
CSR	Corporate Social Responsibility
EbA	Ecosystem based Adaptation
EIA	Environmental Impact Assessment
EMCA	Environment Coordination and Management Act
IBA	Important Bird Areas
IBA-NLC	Important Bird Areas National Liaison Committee
ICIPE	International Centre for Insect Physiology and Ecology
IGAD	Intergovernmental Authority on Development
KALRO	Kenya Agriculture and Livestock Research Organisation
KEFRI	Kenya Forestry Research Institute
KFS	Kenya Forest Service
LPG	Liquid Petroleum Gas
LUP	Land Use Plans
LTS	Lands Trees and Sustainability
MCA	Members of County Assemblies
NCCAP	National Climate Change Action Plan
NCCRS	National Climate Change Response Strategy
NEMA	National Environment Management Authority
NGO	Non-Governmental Organisation
PES	Payment for Ecosystem Services
PFM	Participatory Forest Management
SEA	Strategic Environment Assessment
SSG	Site Support Group
TARDA	Tana and Athi Rivers Development Authority
TESSA	Toolkit for Ecosystem Service Site-based Assessment
UN	United Nations
UNFCC	United Nations Framework Convention on Climate Change
WRUA	Water Resource Users Association

SUMMARY

The global climate is undergoing major changes, including increased mean temperatures and changes in rainfall and wind patterns. These climatic changes are causing a rise in sea level, longer and more frequent droughts and greater floods and storms (IPCC, 2013). Governments all over the world need to invest in mechanisms and strategies to help their citizens adapt to the impacts of climate change.

The Kenyan national government has been working on strategies to help its citizens adapt to climate change. In 2010 it launched the National Climate Change Response Strategy (NCCRS). The strategy singled out agriculture, tourism, infrastructure, health and natural resources as the sectors most affected. The government then launched a National Climate Change Action Plan (2013-2017) to operationalize the 2010 climate change strategy.

At the same time, Kenya has been implementing many large scale projects as it strives to achieve its socio-economic development as outlined in its Vision 2030 strategic plan. Although these projects are needed for the provision of goods and services to the rapidly growing Kenyan population, many could have negative impacts on the ecosystem and may increase the vulnerability of some communities to the impacts of climate change.

In addition, since 2013 the country has adopted a devolved governance structure. There are 47 county governments in addition to the national government. Both levels of government have responsibilities in matters of climate change and environmental conservation. This document is a guide to both levels of government on how to mainstream ecosystem conservation as a key climate change adaptation strategy.

These guidelines are based on the understanding that healthy ecosystems provide key ecosystem services which contribute to human wellbeing. These include the provision of goods, cultural services, regulating services and supporting services (Millennium Ecosystem Assessment, 2005). The use of Ecosystem based Adaptation (EbA) tactics as part of the overall climate change adaptation strategy would result in securing biodiversity and ecosystem services. This would therefore translate to improved capacity of humans to adapt to impacts of climate change which would in turn enable them to secure their livelihoods and have sustainable, secure economies. However, in spite of the many benefits from healthy ecosystems in helping people adapt to climate change, many ecosystems have been degraded due to habitat fragmentation and degradation, pollution, unsustainable extraction of resources, introduction of invasive species and habitat conversion.

To become resilient to climate change, Kenya needs to balance the natural ecosystems that provide critical ecological services with the demands of its growing population and economy.

Recommended Actions for the National Government

1. Mainstream Ecosystem based Adaptation (EbA) in national development, environmental conservation and climate change policies and plans.
2. Promote cross-sectoral collaboration in ecosystem conservation for climate change adaptation.
3. Enhance application of environmental safeguards in development projects.
4. Advocate for the adoption of Ecosystem based Adaptation as a key strategy in helping societies adapt to the impacts of climate change in regional, continental and international arena.
5. Provide technical assistance on Ecosystem based Adaptation to climate change to County Governments.
6. Use economic mechanisms such as tax incentives to encourage climate adaptation actions
7. Improve information sharing on ecosystem conservation and climate change.
8. Promote development of appropriate Payment for Ecosystem Services (PES) mechanisms.

Recommended Actions for the County Governments

1. Develop County Climate Change Adaptation plans.
2. Mainstream ecosystem conservation into the county policy and planning processes.
3. Promote application of environmental safeguards in development projects and programmes to ensure ecosystem health.
4. Enhance county environmental governance.
5. Take into consideration the cumulative impacts of all projects on a County or river basin.
6. Promote innovative mechanisms to finance ecosystem protection and adaptation to climate change.

SECTION 1 INTRODUCTION

The global climate is undergoing major changes in climatic parameters particularly temperature, precipitation and wind patterns (Thompson, 2010). Although some climatic variations can be attributed to natural causes, anthropogenic activities have continuously altered the composition of the global atmosphere in the past 200 years, leading to additional triggers for further climate variability. The impacts of climate change in present times are evident in all sectors of the society and include rising sea level, longer and more frequent droughts that alternate with heightened floods and hurricanes. The National Climate Change Response Strategy (NCCRS) of 2010 recognizes that indeed climate change negatively impacts on most sectors of the Kenyan economy. The strategy singles out agriculture, tourism, infrastructure, health and natural resources as the most affected sectors. Like all other governments, the Kenyan government has a responsibility to help her citizens to adapt to the impacts of climate change. Ecosystem conservation offers one of the best strategies to build resilience at the local and national level.

This guide is based on the understanding that healthy ecosystems provide ecosystem services essential for human wellbeing. These include provision of goods, cultural services, regulating services and supporting services (Millennium Ecosystem Assessment, 2005; Figure 1). Healthy ecosystems are able to provide the human population with goods including food, fuel, timber, natural medicines and fresh water. In addition, healthy ecosystems provide the backbone for cultural services including spiritual, religious and aesthetic values on which recreation and ecotourism are based. Ecotourism is particularly important in Kenya as it offers an alternative livelihood to local communities in the face of climate change. In addition, the national economy and economies of many counties including most coastal counties and counties with national reserves rely heavily on tourism.

Ecosystems play a critical role in climate regulation, water regulation, water purification and waste treatment. These regulating services reduce the impact of climate change including the impacts of flooding through regulation of water flows. The conservation of wetlands is particularly critical because of their contribution to water quality improvement and flood control. Mangrove forests protect coastal communities from the impacts of storms and tsunamis. Provision of goods, cultural and regulating services in a functional ecosystem is supported by natural biogeochemical processes including nutrient cycling, water cycling and pollination.

The use of ecosystem services and associated biodiversity to help humans adapt to climate change is referred to as Ecosystem based Adaptation (EbA). EbA treats environmental conservation and economic development as integral parts of the same process of sustainable development. It recognizes the services provided by the environment in general and biodiversity in particular. Biodiversity is all the plants, animals (including humans) and micro-organisms, the genes they contain and the ecosystems of which they are part. Biodiversity includes diversity between species and variability among ecosystems. Biodiversity and ecosystems provide us with benefits such as:

Provisioning services – the products people get from ecosystems such as food, fibre, fuel, fresh water and genetic resources.

Regulating services, including air quality, climate regulation, the water cycle, water purification, soil erosion control and more.

Cultural services – the non-material benefits people obtain from ecosystems through spiritual enrichment, cognitive development, reflection, recreation, and aesthetic experiences.

Supporting services are those that are necessary for the production of all other ecosystem services such as production of oxygen and soil formation.

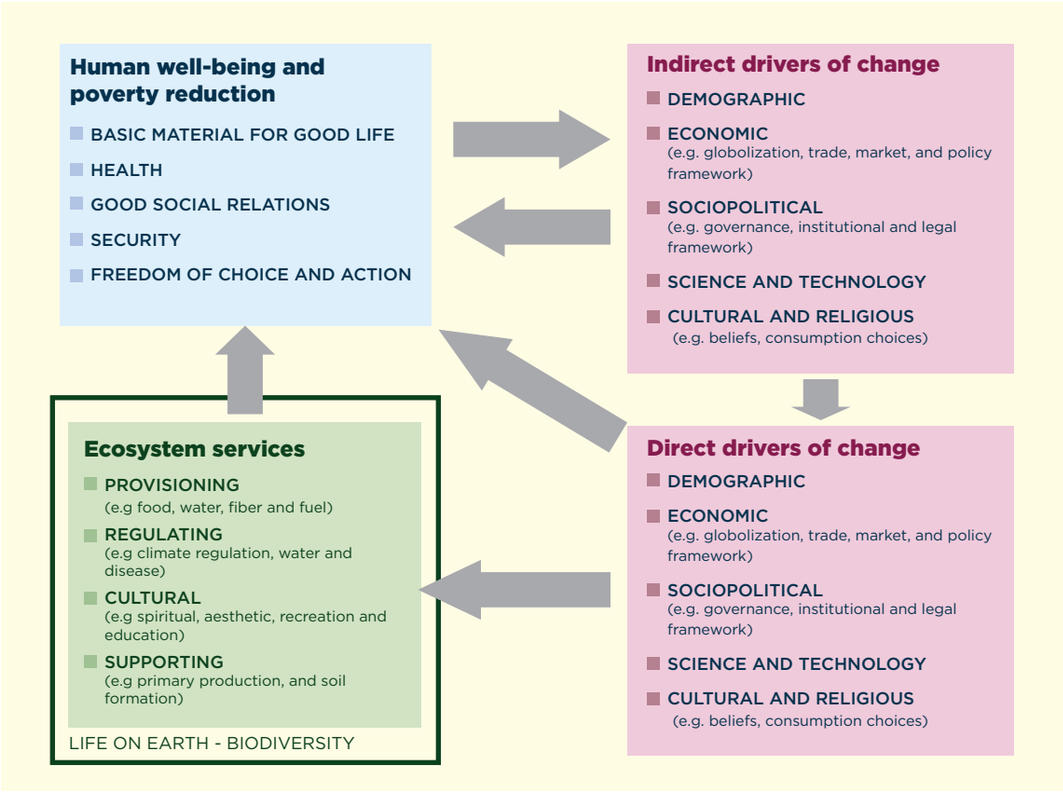
Examples of Ecosystem based Adaptation (EbA) tactics include:

a. Restore fragmented or degraded natural areas to enhance critical ecosystem services such as water recharge and storage.
b. Regulate water flow thus enabling downstream communities cope with impacts of drought and flooding.
c. Connect different ecosystems and habitats
d. Protect and restore natural infrastructure such as mangroves and forests to buffer human communities from natural hazards, erosion and/or flooding.

Integration of ecosystem conservation as part of the overall climate change adaptation strategy would result in securing biodiversity and ecosystem services. This would lead to sustainable development and secure economies. Ecosystem conservation builds resilience and reduces the vulnerability of local communities to climate change.

This document is intended to provide guidance on how the National and County Governments can mainstream ecosystem conservation into their socio-economic development agendas.
At the county level, it is intended to be a resource for County Executive Committee members (CECs), Members of County Assemblies (MCAs) and Governors to inform county based natural resource management policy making processes and debates. The national legislation and policies on protection of the environment and natural resources are implemented by the county government and domesticated into county legislation and policy with respect to the local natural resource base. At the national government level, the guidance can be used by policy makers in various sectors with a responsibility in environmental conservation and also by Members of the National Assembly and by Members of the Senate, for the review and development of legislation and policies that are responsive to the prevailing climatic conditions.

Figure 1: Ecosystems and Human Well-being Approach



Source: http://millenniumassessment.org/documents/document.765.aspx.pdf; Millennium Ecosystem Assessment (2005).

Arabuko-Sokoke Forest. PHOTO: J. STARKEY

Sector Based Issues

Forests: Values, Threats and Responses

Forests are important in many ways. Some of the values of forests that we know about today include:

1. **Water:** Forests catch, store, clean and release water. By trapping and absorbing water, forests reduce flooding. By storing and releasing water, forests reduce the effects of drought.
2. **Energy:** Forests produce wood, which may be used as firewood or charcoal. Water from forests flows to hydro-electric power plants, producing electricity.
3. **Soil conservation and fertility:** Trees enrich the soil and protect it from erosion. This means less silt in rivers, dams and the sea; as well as better soil for farmers.
4. **Air quality and environmental services:** Forests help to moderate the climate. Near forests, hot days are less hot and cold nights less cold than in open areas. By storing carbon, forests help to regulate the gases in the atmosphere around the earth. This helps to slow down climate change.
5. **Timber:** Forest trees produce wood and poles for houses, furniture, fences, electricity lines, paper, tools and works of art. Certain special trees are used to make products for religious or social ceremonies.
6. **Non-timber forest products:** These include medicinal plants, gums and resins, fibres for ropes, seeds for ornaments, fruits and honey from forest flowers.
7. **Biodiversity:** In Kenya forests only cover about 6% of the land area but they are home to 50% of trees, shrubs and woody vines; 40% of large or medium-sized mammals; 35% of butterflies and 30% of bird species. In Kilifi County, for example, forests shelter six bird species that are globally threatened and at the risk of extinction unless the forests are conserved.
8. **Tourism and recreation:** Forests are cool, pleasant places to visit. Local and foreign visitors come to see wildlife, landscapes, birds or butterflies, and young people like to camp, hike or bike in forests.
9. **Sacred spaces:** Many forests are sacred places to local communities. Some forests are the sites of religious or cultural ceremonies, for example the coastal Kaya Forests.

Illegal charcoal production at South Nandi Forest. PHOTO: K. KITSAU

10. **Drought refuge:** Traditionally, pastoralists conserved forests in order to use them for grazing in times of drought. They moved the cattle out of the forest once the drought was over.
11. **Other services:** Activities in forests provide employment to neighbouring communities. In addition, forests are important sites for education and research.

Direct Drivers of change that threaten forests include:

- Encroachment, such as in Mau Forest
- Overharvesting of commercial timber, such as Camphor in Mt Kenya
- Illegal logging, for instance cedar posts in highlands, mangrove poles at the Coast, timber in Forest Reserves such as Arabuko-Sokoke Forest and South Nandi Forest
- Overgrazing, as in the Cherengani Hills and North Nandi Forest
- Human induced forest fires, such as in Mt Kenya and Aberdares
- Poorly managed plantations
- Demand for tropical hardwoods and high timber market prices
- Climate change

Indirect drivers of change that threaten forests include:

- High population increase
- Poverty due to limited livelihood options
- Under-performing plantations
- Insufficient construction timber
- Poor policy implementation
- Weak institutional frameworks
- Poor forestry governance
- Insufficient research or lack of uptake of research findings
- Little appreciation of forest values
- Low capital investment
- Insufficient political will.

Particular threats to Kenya's mangrove forests:

- Overexploitation of wood products and conversion to saltpans, agriculture, hotels and other land uses.
- Increased human population has increased demand for poles for household construction.
- Construction of tourist hotels also uses mangrove poles.
- Mangroves make good poles and while other alternative poles e.g. Casuarina could serve the same purpose, there is a cultural belief that mangrove poles are the best and will always be available.

Responses include:

1. Conserve all remaining indigenous forests. Indigenous forests are "more than the sum of their parts" – a complex interrelationship between trees, undergrowth, wildlife and soil microorganisms. They can't be replaced by simply planting trees. There's need to conserve our remaining forests and then expand and connect them by planting trees.
2. Require mining and oil companies to compensate the local communities, the County and the nation for the resources and natural habitats damaged by extractive industries; such compensation may include setting aside natural areas for conservation and biodiversity offsets.
3. Establish a programme for payment for environmental services, including carbon storage, derived from forests.
4. Promote Participatory Forest Management (PFM) between government, communities and the private sector
5. Raise awareness amongst law enforcers and the judiciary on the importance of forests and wildlife to our lives
6. Promote alternative energy for domestic use such as solar panels, energy-saving stoves and LPG cooking gas
7. Promote the planting of trees on-farm
8. Support the creation of corridors connecting forest fragments
9. Discourage the use of tropical hardwood trees and bush meat
10. Recognize and protect the customary rights of indigenous peoples and communities resident within or adjacent to forests and respect cultural practices that are compatible with agreed principles of sustainable forest management.
11. Encourage and support communities, farmers and landowners to sustainably manage natural and riverine forests on private land, particularly for water, biodiversity and soil conservation.
12. Make use of revamped policies (Forest, Wildlife, Water, Land, Energy, Constitution, Vision 2030, Climate, etc)
13. Work with KFS &CFAs
14. Support enhanced public engagement for tree planting
15. Make use of UN and International Conventions

Marine, Aquatic and Wetland Ecosystems: Values, Threats and Responses

Some of the values of wetlands that we know about today include:

Fresh Water Wetland Environmental Services:

- Wetlands catch, store and release water. They help to control floods, protect the shore, and reduce soil erosion.
- Wetlands purify water. Wetland plants such as sedges trap soil, minerals and waste before they reach the water.
- Wetlands regulate the local climate. Wetland plants store carbon, helping to slow climate change.
- Wetlands are the breeding grounds for fish, birds and other animals.

Wetlands Economic Goods and Services:
- Water for people, livestock and wildlife
- Fish and other foods
- Plant products for thatching, baskets, canoes, mats and crafts
- Dry season grazing grounds
- Clay and other minerals
- Transport.

Wetlands intangible Services:
- Religious and cultural sites
- Places for tourism and recreation
- Sites for outdoor education and scientific study
- Shelter rich diversity of animals and plants.

Seasonal Wetlands: Particular Values and Threats

Seasonal wetlands include floodplains; seasonal marshes, lakes and springs; temporary pools in grassland, woodland and bush; and ephemeral rock pools, flooded rock slabs and seeps. They play a critical role in dryland ecology. Examples of seasonal wetlands include the wet grasslands of the Tana River Delta; seasonal pools in Dakatcha Woodland which are the only known breeding sites for the globally threatened Clarke's Weaver, a bird endemic to Kilifi County; Lake Amboseli; seasonal lakes between lava flows west of the Ngong Hills; and temporary rock pools at the edge of Nairobi city.

Seasonal wetlands are breeding and regeneration sites for animals and plants. During the rainy season, fish, reptiles, amphibians, invertebrates and birds disperse to seasonal wetlands to breed. Mammals such as wildebeest migrate to areas with seasonal rain pools to give birth. Trees such as the Tana River Poplar germinate on silt brought by flooding rivers. Seasonal wetlands are critical feeding grounds for livestock, migratory waterfowl and wildlife.

Despite these important attributes, seasonal wetlands are under particular threat, because they appear dry much of the year. They are thus converted to agriculture, not reserved during land demarcation, and ignored in road construction and other infrastructural development. Aerial photographs are usually taken in the dry season, and seasonal wetlands may be "invisible" to planners and decision makers, leading to ecological and hydrological degradation and habitat loss.

Direct drivers of change that threaten wetlands include:
- Drainage of wetlands for agricultural expansion
- Infrastructural development such as hotels, ports and industries
- Overuse of chemical fertilizers and pesticides leading to heavy nitrogen load and reduced available oxygen
- Invasive plants such as water hyacinth
- Pollution due to urbanization (e.g. Lake Nakuru, Lake Victoria and the Indian Ocean);

Bird watching at the Yala Swamp. PHOTO: J. MWACAHRO

- Over harvesting of products (e.g. papyrus in Yala and Dunga Swamps, mangroves in Lamu and fish in Lake Victoria and Indian Ocean);
- Cattle overstocking and overgrazing (e.g. Tana Delta during dry season);
- Overfishing and poor fishing methods using small mesh netting that traps young fish affecting future recruitment; and
- Increased rural settlements that exert pressure on wetlands, such as over-abstraction, overharvesting, waste disposal
- climate change

Indirect drivers of change include:

- High human population increase and associated demand for food from fisheries and agriculture;
- Poverty driven by limited livelihood options causing unsustainable harvesting and or use of wetlands;
- Low capital investment in sustainable wetland management leads to less than optimal ways of exploiting wetlands resources;
- Over-reliance on irrigation without assessing all risk factors
- Policy and institutional failures, such as lack of spatial land use plans based on strategic environment assessments; seasonal wetlands are at particular risk as they are not seen in surveys or satellite images taken during the dry season.
- Little appreciation for wetland values; and
- Insufficient political will.

Particular Threats to Marine ecosystems:

- The coral reef ecosystem is incredibly rich in species and is a great tourist attraction, but it is fragile and sensitive to human impacts. Coral reefs are threatened by pollution from towns and tourist resorts, siltation from soil erosion and even the hands and feet of tourists
- Nesting sites for endangered species such as marine turtles are found on beaches; they are threatened by driving on the beach and building of sea walls.
- Streams and rivers bring domestic and industrial pollutants from cities and soil from farms upstream. The sewerage system in most coastal towns is poor, and beach hotels often send their waste directly into the ocean. There is occasional accidental spillage of oil and petroleum products. This pollution affects beaches, coral reefs and other marine ecosystems and promotes the growth of algae.
- The animals that build sea shells and corals are threatened by the collection and sale of shells and other marine biodiversity. Fish stocks are threatened by overfishing by non-Kenyan fishing vessels.

Marine protected areas in Kenya are therefore faced by threats of a multiple nature and sources (from inland and sea sources, and urban communities along the beaches). A solution must be multi–faceted, targeting many sources of impacts and involving all the stakeholders.

Wetland Ecosystem Services most Impacted by Mismanagement

The ecosystem services most impacted by wetland mismanagement include:

- Loss of ecological filtering functions performed by Yala Swamp and Naivasha shoreline leads to serious pollution in Lake Victoria and Lake Naivasha.
- Poor sewage disposal in Nakuru town and Kisumu City threaten the survival of fish and other biodiversity in Lake Victoria and flamingos in Lake Nakuru.
- Leasing out of large parcels of land in the Tana River Delta to private developers, leaving less land for livestock, farming and tourism.
- Loss of wetland vegetation, including papyrus in Dunga and Yala Swamp and mangroves in the Tana Delta and Mida Creek mean that less carbon is sequestered.
- There is urgent need to ensure that all wetlands are supported by a sustainable land use plan guided by strategic environmental assessments. Appropriate legislation may be in place, but the establishment of competent and efficient institutions to manage and enforce the laws is yet to be achieved and a major challenge.

Responses include:

1. Regulate, protect, manage and conserve wetlands, including marine habitats
2. Map, delineate and publicize boundaries for wetlands. Seasonal wetlands should be given the same consideration as permanent wetlands.
3. Require standard procedures including Environmental Impact Assessment (EIA), Strategic Environmental Assessment (SEA), Cost Benefit Analysis (CBA), and wide stakeholder consultations for alteration of a wetland for the public interest.
4. Promote sustainable extraction and utilization of goods and services derived from wetlands, for example, using large-mesh fishing nets.
5. Regulate the sinking of boreholes within any one catchment area or municipality.
6. Promote and enforce regulations and laws related to environmental pollution
7. Discourage the planting of trees on seasonal wetlands, as trees may speed the natural conversion of wetland to land.
8. Recognize the cultural and tourism value of wetlands; permit cultural and traditional practices for use of wetland resources subject to regulations at county and national levels.

Mangroves at Mida Creek. PHOTO: M. NZISA

9. Promote the use of constructed wetlands for waste water management in the relevant sectors such as hotels, schools, agriculture and municipalities.
10. Make use of revamped policies (Fisheries, Forest, Wildlife, Water, Land, EMCA, Constitution, Vision 2030, Climate Change, etc)
11. Make use of UN and other International Conventions (e.g. Ramsar, Nairobi Convention).

For marine habitats

1. Take into consideration climate change, changes in currents, and sea level rise when planning new developments along the seashore.
2. Develop and implement an Integrated Coastal Management strategy for Coastal Counties together with relevant stakeholders.
3. Encourage public awareness on proper management of waste including promoting reduction, reuse and recycling.
4. Regulate fishing by non-Kenyan vessels with strict standards, monitoring, and heavy fines for breaking regulations.
5. Require Strategic Environmental Assessments and Environmental Impact Assessments for all policies, projects and programmes on the seashore, including oil and gas exploration, construction of new ports and tourist developments.
6. Regulate infrastructural activities close to the shore such as new ports, roads, bridges, railways and power generation plants (including thermal (coal or oil) and wind turbines). Choose the options that cause the least environmental impact. Require that all wastes are thoroughly treated before being released into the environment.
7. Regulate the number of hotels on any stretch of beach, leaving some land for fishermen access, natural vegetation and turtle nesting sites.
8. Require hotels to follow environmental standards, such as treating all their waste water, burying solid waste away from the shore, and leaving beaches without retaining walls.
9. Promote activities such as beach clean-ups, turtle nesting sites protection, safe coral reef tourism, etc.
10. Prohibit or discourage activities such as driving on beaches, building sea walls, and collecting and selling seashells.

Grasslands, Bushlands, Savannahs, Arid and Semi-Arid Lands: Values, Threats and Responses

Some of the values and ecosystem services of Grasslands, Bushlands, Savannahs, Arid and Semi-Arid lands that we know about today include:

Drylands protect Kenya from desertification:

- Water regulation. The natural vegetation is adapted to dry climate and sandy soil. The vegetation responds rapidly to the onset of rains, making the most of the water available and protecting fragile soils that erode easily.
- Climate regulation. Dryland ecosystems regulate their own local climate to some extent, reflecting back solar radiation. The vegetation minimizes water evaporation rates.

Drylands provide a variety of products and services:

- Meat and leather. Drylands support a large proportion of Kenya's livestock sector, providing the country with meat and leather.
- Food crops. African millets, now grown all over the world, evolved in dryland ecosystems. Other important dryland crops are legumes and fruits such as watermelon.
- Woodfuel. Most woodfuel (the collective term for fuelwood, charcoal, and other wood-derived fuels) is provided by trees or bushes in natural dryland ecosystems that may also be used as pasture.
- Medicinal and aromatic plants. Many species of dryland plants are used for medicinal and cosmetic purposes and as spices.
- Pollination and Seed Dispersal. Dryland birds, insects and even mammals pollinate important crops and wild plants and disperse seeds.

IntangibleValues:

- Drylands support megafauna (elephants, rhinos, lions, etc.) that the rest of the world has lost and a rich diversity of birds and other creatures.
- Drylands provide attractive holiday destinations for local and international tourists
- Drylands have preserved the ancient heritage of human beings, such as rock art

Direct drivers of change for grasslands, bushlands, savannahs, arid and semi arid lands in Kenya include:

- Agricultural expansion to produce food for a growing population;
- Inappropriate use of marginal land, such as planting inappropriate crops (e.g. maize or jatropha) in arid and semi arid lands (e.g. Machakos, Makueni and Kitui Counties);
- Increased rural settlements and infrastructure (roads, railways, etc.) in areas that have traditionally been wildlife migration corridors (e.g. Athi-Kapiti Plains);
- Urbanisation (e.g. Nairobi City has now engulfed Nairobi National Park; and the elephant corridor between Mt Kenya and Aberdares has been completely blocked);
- Over harvesting of fuel wood, charcoal and timber, leaving drylands denuded;
- Overharvesting of medicinal plants without replanting
- Overstocking and overgrazing (e.g. group ranches in Maasai land and Laikipia and all the pastoralist areas);

Wooded grassland in Dodori Nature Reserve. PHOTO: J. MUSINA

- Lack of agricultural extension services causing poor production methods leading to land degradation and soil erosion.
- Demand for land to grow Bio-energy crops (e.g. jatropha in Tana Delta).

Indirect drivers of change include:
- High population increase leading to migration into marginal land areas
- Poverty mainly driven by limited livelihood options;
- Low capital investment in sustainable land management;
- Lack of spatial land use plan leading to inappropriate or unsustainable land uses;
- Poor policy implementation or weak institutional frameworks that are either not guided by research or their capacity to uptake research findings is limited.
- Little appreciation of the values of nature and biodiversity beyond tourism, mainly due to insufficient political will to prioritise investments in nature services and sustainable production systems.

The impacts arising from the degradation of grasslands, savannahs, arid and semi arid lands include:
- Unsustainable wood fuel supply for the over 90% of rural households who depend on wood fuel for lighting, heating and cooking. Large areas of drylands have been cleared of trees, leaving only bushes to hold the soil.
- Reduced pasture availability, resulting in food scarcity and sometime conflicts.
- Loss of water catchment on hills denuded of vegetation.
- Shortage of indigenous medicinal plants because of overharvesting and loss of indigenous knowledge that formed part of coping and adapting to arid and semi-arid lands.
- Loss of biodiversity and wildlife habitats as they are replaced with farms. This has endangered wildlife in protected areas including Masai Mara, Amboseli, Tsavo and Samburu, and rare plants on Mwangea Hill in Kilifi, among others.

Responses include:
1. Ensure that pastoralists, farmers and wildlife all have access to water sources
2. Consider improving traditional land uses instead of changing to new land uses
3. Provide incentives for the use of solar panels, wind turbines, solar cookers, other renewable energy and LPG cooking gas, both within and outside drylands, to reduce the rate of charcoal production.
4. Consider the impact on the level of the water table when drilling boreholes
5. Require mining and oil companies to clean their wastes and dispose of them in a way that will not harm the environment
6. Require mining and oil companies to compensate the local communities, the County and the nation for the resources and natural habitats damaged by extractive industries; this may include setting aside natural areas for conservation
7. Promote the planting and sustainable harvesting of medicinal plants and plants used for cosmetics and spices
8. Promote eco-tourism for local and international visitors
9. Set aside large enough areas of each type of natural habitat for the protection of biodiversity and their genes for our future
10. Provide extension services to herders to improve their herds and slaughterhouses to reduce herd size
11. Require Strategic Environmental Assessments for all large-scale projects such as mining, oil and gas exploration and exploitation, irrigation schemes and major tourist developments

Agricultural Landscapes

Kenya's increasing population exerts considerable pressure on land. The rate of conversion of natural ecosystems to agricultural land is very high, in line with the rate of population increase. While it makes sense to increase food production to meet the needs of the growing population, there has been serious land degradation from the food production systems in use in Kenya. Food production lowers the value of most of the other ecosystem services from agricultural landscapes and associated ecosystems including aquatic ecosystems. This limits alternative livelihood options particularly when climatic climate change impacts including frequent droughts or floods result in famine. This increases the vulnerability of local communities to the impacts of climate change.

Values of agricultural landscapes that we know about today include:
- Production of food, fibres and cash crops
- Unique land races of domestic animals and varieties of cultivated crops, adapted to Kenya's climatic and ecological conditions
- Indigenous knowledge on habitat management, such as reserving forests and wetlands as drought refuge
- Mini-habitats such as hedgerows and farm ponds
- Long-term ecological balance between the natural environment, livestock and crops, such as resistance to fire.

Direct drivers of change on agricultural landscapes include:
- Poor farming methods that lead to soil erosion and lower crop yields, sedimentation in rivers, lakes and the Indian ocean
- Inappropriate crops, especially in the drylands, resulting in large areas of natural

A tea plantation in Nandi. PHOTO: K. KITSAU

habitat being converted to crop fields with low harvests or crop failure
- Poor livestock husbandry, with overstocking and overgrazing exacerbating soil erosion
- Agro-chemical overload, especially in high potential areas, causing disastrous loss of pollinators (e.g. bees) and other biodiversity including soil enriching microbes
- Plantations of bio-energy crops which take up large areas of natural habitat and have so far NOT proved beneficial
- Poorly planned irrigation in drylands, at times leading to salt water intrusion, soil salinization, and rapid evaporation of the little water available

Among these, loss of natural habitat due to poor agricultural planning is the most serious problem. If not urgently checked, Kenya's ability to produce food and adapt to climate change will be put into jeopardy.

Indirect drivers of change on agricultural landscapes include:
- High population increase that surpasses the land's food production capacity;
- Lack of agricultural spatial land use plan leading to land uses not based on agricultural capability;
- Low capital investment in sustainable production technologies;
- Poor policy implementation resulting from weak institutions caused by insufficient political will to prioritise resources allocation to sustainable food production.

The impacts arising from this insufficient recognition of sustainable production systems include:
- Loss of wildlife habitat and associated economic gains;
- Food insecurity causing hunger and famines
- Soil infertility that leads to low farm yields for food and pasture
- Loss of biodiversity including soil micro-organisms that increase fertility and pollinators that boost production, due to over use of chemicals.
- Eutrophication in the lakes and pollution in the Indian ocean, from soil erosion and agricultural chemicals which affect fresh water and marine biodiversity.

Lake Naivasha is a case in point where flower farming and agricultural activities are slowly poisoning the lake. There must be a major policy shift, institutional capacity building, agricultural extension services and sound water use and planning for irrigation if the objective of meeting the needs of people in the time of climate change is to be achieved.

Responses for Agricultural Landscapes
1. Require Strategic Environmental Assessment (SEA) for all large-scale projects such as plantations, irrigation schemes, cross-basin water transfers, etc.
2. Include environmental sustainability in all large-scale agricultural policies, projects and programmes, such as new types of production and pest management

3. Get advice from Kenya Agricultural and Livestock Research Orginizatiob (KALRO) and other scientific research organizations regarding crops suited to particular landscapes
4. Reserve areas of natural habitat, with advice from scientific institutions such as ICIPE and KEFRI, to provide pollinators, pest control, climate moderation and other environmental services
5. Provide extension services to farmers, herders and fisher folk
6. Promote innovative agricultural methods such as Conservation Agriculture
7. Promote Integrated Pest Management with limited use of pesticides, in consultation with institutions such as ICIPE
8. Promote the use of manure, compost and mulch to reduce dependency on chemical fertilizers and pesticides
9. Fund research into improved crops and crop diseases
10. Improve methods of crop storage and transport
11. Provide slaughterhouses and meat processing for off-take from livestock herds
12. Pay farmers and herders on time for products delivered, in order to boost food security
13. Work with stakeholders and scientific institutions to tackle the menace of invasive species, including the House Crow.

For irrigation schemes:

1. **Water.** Recognize that availability of fresh water is critical. Take into consideration all the water uses and projects in the river basin, upstream and downstream. Call for a Strategic Environment Assessment for river basins.
2. **Land.** Recognize that land that is currently not under crop production supports other livelihoods initiatives, such as livestock production or natural biodiversity areas. Regard livestock production as an important agricultural development that needs substantial investment.
3. **Soils.** Require a study of the soils and hydrology before starting any irrigation scheme to avoid salt-water intrusion or later salinisation and/or compaction of the soils.
4. **Wetlands and deltas.** Do not target wetlands or deltas for irrigation unless there are clear land use plans. The plans need to consider the current environmental services provided by the wetland or delta and the impacts of floods.
5. **Technological advancement in irrigation.** Require best practice irrigation techniques that minimize impacts on the environment. Consider promoting small scale/small holder irrigation schemes by harvesting rainwater.
6. **Integrated Natural Resources Management.** For best results, irrigation schemes need to protect water catchment areas, ensure soil conservation, and leave enough natural wildlife habitats for birds that eat rodents and insects that pollinate crops.

SECTION 2

ENVIRONMENTAL CONSERVATION FOR ADAPTATION TO CLIMATE CHANGE: RECOMMENDATIONS TO THE NATIONAL GOVERNMENT

To become resilient to climate change, Kenya needs to balance the natural ecosystems that provide critical ecological services with the demands of its growing population and economy. The Kenyan Constitution 2010, assigns the responsibility for policy formulation in all sectors of the economy including on biodiversity, environmental conservation and climate change to the national government. In addition, the national government has the overall responsibility of developing policies in sectors that are vulnerable to climate change including agriculture and livestock production, transport infrastructure, health, tourism and energy production among others. Ecosystem conservation would greatly reduce the vulnerability of these sectors to the impacts of climate change.

At the same time, the national government is currently implementing major infrastructural projects in many parts of the country. Many of these projects could negatively impact on biodiversity and weaken ecosystem integrity, thus reducing the value of the associated ecosystem services and increasing vulnerability of communities to climate change. The government therefore needs to find a balance between development and environmental conservation in order to maintain ecological integrity and sustainable economies.

Specific actions that the national government needs to undertake to ensure ecosystem conservation for climate change adaptation are discussed below, and include:

1. Leading on mainstreaming ecosystem conservation in national development, environmental conservation and climate change policies and plans
2. Promoting cross-sectoral collaboration in ecosystem conservation for climate change adaptation.
3. Enhancing application of environmental safeguards in development projects and in implementation of national plans and policies
4. Advocating for the adoption of Ecosystem based Adaptation as a key strategy in helping societies adapt to the impacts of climate change in regional, continental and international arena
5. Providing technical assistance on ecosystem conservation for adaptation to climate change to the County Governments
6. Using economic mechanisms such as tax incentives to encourage climate adaptation actions
7. Improving information sharing on EbA.
8. Promoting development of appropriate Payment for Ecosystem Services (PES) mechanisms

1.Mainstreaming Ecosystem based Adaptation (EbA) in national development, environmental conservation and climate change policies and plans

The national government has developed the relevant policies and plans to mainstream climate change into the national development agenda. These include the 2010 National Climate Change Response Strategy and the 2013 National Climate Change Action Plan. Currently, the National Climate Change Policy is being reviewed by the National Assembly. There are other environmental bills in parliament. However, it is important to ensure that the value of ecosystem conservation as a strategy to build resilience to climate variability is recognized and budgetary support given for implementation of the relevant sectoral policies. The government, working with stakeholders, needs to conduct a review of existing policies and plans to ensure that they mainstream EbA principles.

2. Promoting cross-sectoral collaboration in ecosystem conservation for climate change adaptation

Climate change impacts on nearly all sectors of the Kenyan economy. In addition, many government ministries, departments and agencies have mandates on water and environmental conservation. It is therefore important that the national government invests in cross-sectoral collaboration among the various institutions and other stakeholders involved in climate change and environmental conservation.

3. Enhancing the application of environmental safeguards in development projects and in implementations of national plans and policies

Kenya is currently implementing many large scale infrastructural projects in all parts of the country. In addition, many policies and plans are also being implemented. The government needs to mainstream Environmental Impact Assessment (EIA) and Strategic Environmental Assessment (SEA) in project, programme or policy implementation framework.

4. Advocating for the adoption of Ecosystem based Adaptation as a key strategy in helping societies adapt to the impacts of climate change in regional, continental and international arena

Kenya is an influential member of regional bodies including the East African Community, Inter-Governmental Agency for Development (IGAD) and African Union. Kenya is therefore uniquely positioned to influence the adoption of EbA in the East African region, the Horn of Africa and the whole continent through the African Union. In addition, Kenya is a popular international tourist destination and a leader in wildlife conservation particularly in CITES where Kenya leads campaigns to stop trade in ivory. Kenya can also become a champion for EbA, given its membership in at least 16 international environmental conventions/ treaties including UNFCC, Convention on Biological Biodiversity (CBD) and Ramsar Convention among others.

5. Provide technical assistance on Ecosystem based Adaptation to climate change to county governments

The national government is tasked by the constitution to build the capacity of counties and provide technical assistance to counties as required. The national government, through its various line ministries and agencies, will be able work closely with the county governments to domesticate national policy processes, strategies and plans in the various counties. Emphasis should be on ensuring that the role of ecosystems in helping local communities adapt to the impacts of climate change is mainstreamed in county plans, policies and processes.

6. Use economic mechanisms such as tax incentives to encourage climate adaptation actions

Tax incentives and other economic mechanisms can encourage people to use energy-saving methods and equipment and to set aside some portions of their land in a natural state for pest control and pollinators.

7. Improve information sharing on ecosystem conservation and climate change

The national government needs to promote information sharing on climate change and ecosystem conservation between various government institutions, county governments, private sector and the local communities. In particular, the national government needs to improve its capacity to monitor metrological variables and early warning systems and invest more in mechanisms for information flow by working closely with the media and other stakeholders.

8. Promoting development of appropriate Payment for Ecosystem Services (PES) mechanisms

For sustainability, funding for ecosystem conservation activities needs to be tapped from the private sector through the development of appropriate Payment for Ecosystem Services mechanisms. For example, industries that rely on water should pay conservation fees to be invested in safeguarding water catchment areas. The government can also work with certification and marketing agencies to promote environmental conservation among farming communities through value addition.

SECTION 3

ENVIRONMENTAL CONSERVATION AND ADAPTATION TO CLIMATE CHANGE: RECOMMENDATIONS FOR COUNTY GOVERNMENTS

The Kenyan Constitution 2010 stipulates that county governments will be responsible for implementing the national policies on natural resource and environmental conservation. In addition, county governments are responsible for health, agriculture, disaster management and transport at the county level. All these sectors are vulnerable to the impacts of climate change. County governments are also charged with the responsibility to develop County Development Plans. Since independence, there has been marginalisation of some areas of the country in socio-economic development but now the current constitution has devolved development funds equitably across all the 47 counties in the country. As such, counties can independently plan for their resources and follow their own development agenda based on their priorities. County governments are encouraged to mainstream adaptation to climate change in their county integrated development plans in order to build resilient economies which will enable local communities adapt to the impacts of climate change.

In order to comprehensively tackle the challenge of climate change, county governments need to domesticate the National Climate Change Response Strategy (NCCRS) of 2010 and the National Climate Change Action Plan 2013-2017 (NCCAP). As part of the domestication, each county needs to conduct vulnerability assessments to objectively inform the design of appropriate adaptation strategies based on the respective reality in each county. Each county can also produce a State of Environment Report that will contain the baseline information on climate, water sources, biodiversity, land use, and other resources, the threats facing the resources and current conservation efforts.

County governments will then be able to develop and implement policies to help ensure sustainable development. This guide serves as a resource base for County Executive Committee members (CECs), Members of County Assemblies (MCAs) and Governors to inform county based natural resource management policy making processes and debates towards the implementation of national policies on the protection of the environment and natural resources.

To achieve resilient economies and communities, each county can:

A. Develop a County Climate Change Adaptation Plan
B. Mainstream ecosystem conservation into the county policy and planning processes
C. Promote application of environmental safeguards in development projects
D. Enhance county environmental governance
E. Take into consideration the cumulative impacts of different projects on a county or river basin.
F. Promote innovative mechanisms to finance ecosystem protection and adaptation to climate change.

A. Development of County Climate Change Adaptation Plans

Each county will be able to develop its own plan or strategy to help its local communities, and the ecosystems on which they depend, to adapt to the impacts of climate change. For the process to be sustainable, it has to be conducted in a very participatory manner, with the involvement of the local communities, county governments and other stakeholders. The county government will take the lead, in consultation with national government line ministries responsible for environment, water and natural resources, together with national conservation agencies, planning and national treasury, in addition to relevant national agencies. Steps in the process include:

1. Stakeholder analysis

All stakeholders in climate change and ecosystem and biodiversity conservation need to be identified. This will include decision makers at the county and national government levels, local community based organisations, providers of information and civil society representatives. Care needs to be taken to ensure that the vulnerable segments of the society are involved in the process.

2. Identification of vulnerable habitats, ecosystems and ecosystem services

Identify the main habitats and land uses in the county and the ecosystem services they provide, with emphasis on the ones that are key in helping local communities overcome their vulnerability to climate change impacts. These ecosystem services will include

a. Regulating services including climate regulation, water flow regulation, soil erosion control, water purification services
b. Provision of goods including food (agriculture, fisheries, livestock), firewood, timber, natural medicines

c. Cultural services – recreation and ecotourism, aesthetic and religious services
d. Supporting services including primary production, soil creation.

Depending on the County, the following are the likely habitats:

- Forests
- Grasslands
- Bushlands
- Savannas
- Mosaics of the above, with different habitats closely interspersed
- Arid and Semi-arid lands (ASALS)
- Fresh water wetlands and rivers
- Marine and coastal habitats (for Coastal Counties – Lamu, Tana River, Kilifi, Mombasa and Kwale)
- Human settlements – cities and other urban settlements
- Agricultural landscapes. Food production activities (livestock, crop production and fisheries) are indeed the foundation of the economies of most counties in Kenya. Agricultural activities rely on natural resources and natural ecological processes including pollination, nutrient and water cycling. As counties expand agricultural production systems, there is need to ensure that the process is sustainable, and that ecosystem conservation is mainstreamed as a strategy to increase food production.

3. Hazard mapping. Identify the hazards, including climate change, that may impact on ecosystems or economic activity, and their severity. This will involve identification of social and economic sectors that are vulnerable to the hazard – for instance, land cleared of vegetation for agriculture is vulnerable to flooding and soil erosion. At this stage emphasis will be placed on the economic sectors (e.g. agriculture, health, environmental conservation, transport) that are vulnerable to impacts of climate change. Special emphasis will also be placed on the impacts of the hazards on vulnerable members of the society including women and the youth.

4. Prioritizing adaptation tactics. Based on the key resources identified in step 2 above, the hazards that resources are exposed to and the socio-economic sectors that are most vulnerable, each county will choose a suite of adaptation tactics to enable their communities and their economies adapt to the impacts of climate change. These tactics can form the backbone of the County Integrated Development Plan, which is a requirement for each county every 5 years. Some of the ecosystem based strategies that county governments may take up to enable their communities adapt to climate change include:

- **Protecting and restoring water catchment areas:** By protecting water catchment areas and replanting native vegetation, local communities can reduce the risk of water shortages, floods and landslides, and reduce sedimentation impacts on coastal and marine ecosystems, and on dams and wetlands.
- **Protecting and restoring mangroves:** Local communities can reduce their vulnerability to coastal erosion, cyclones and storm surges, while maintaining or improving populations of mangrove-dependent fish stocks, by conserving and restoring mangrove forests.
- **Protection and restoration of river banks:** Vegetation on riverbanks will help in water and soil conservation, act as corridors for migratory species, as well as habitat for pollinators. This will ensure sustainable agricultural production and serve as a way of controlling flooding.
- **Taking into consideration the cumulative impacts of all projects on a County or river basin:** Each project may have small impacts, but taken together they may become disastrous.
- **Development and implementation of Natural Resource Management Plans including Land Use Plans accompanied by Strategic Environmental Assessments.**
- **Eco-tourism development:** This includes working with the private sector to develop ecotourism facilities with a low ecological "footprint", training local tour guides, and investment in tourism marketing strategies.
- **Protecting key corridors for migratory species to support the tourism industry.**
- **Destocking degraded pastures, coupled with adoption of high quality livestock breeds to control overgrazing.**
- **Working with the private sector to develop insurance products to protect farmers against the impacts of climate change on their crops, livestock and fisheries.**
- **Investment in Early Warning Systems**
- **Water conservation and rainwater storage**
- Use of crop varieties that are water resistant (in areas prone to flooding) and drought resistant crops in case the problem is drought.
- **Awareness creation**

5. Development of Implementation Action Plan

This will entail development of an implementation structure to guide the implementation of the adaptation plan.

For each of the prioritized adaptation tactics, all activities to actualize it will be identified, budgeted for (time and financial resources),

responsibility assigned to stakeholders and a monitoring framework agreed upon. The adaptation plan may be reviewed annually in line with the county budgeting process.

B. Mainstreaming Environmental Conservation into the County Policy Formulation Process

Each county will need to develop policies, strategies and action plans to mainstream adaptation to climate change in the County development agenda. This will largely entail the domestication of the national policies and plans to the county level. This process needs to be as participatory as possible. The process may involve:

- Definition of policy goal and objectives for county forest, wetland, dryland and agriculture landscape management and conservation.
- Identification of relevant constitutional, national, regional and international policies and laws in order to incorporate them in the county policies and strategies.
- Identification of stakeholders and partners that include county government, national government, NGOs, CBOs, private sector and local communities to be consulted to give their views and consents for the policies, strategies and action plans.
- Consultations with Kenyan and international scientific institutions and NEMA to ensure that best practices are embedded in county policies.
- Subject any alteration of a wetland or forest for the public interest to approved standard procedures including Environmental Impact Assessment (EIA), Strategic Environmental Assessment (SEA), Cost Benefit Analysis (CBA), and wide stakeholder consultations

Forestry sector specific policy recommendations

- Develop a county strategy to: increase and maintain forest and tree cover to at least 10% of the total land area; rehabilitate and restore degraded forest ecosystems; and establish a county forest resource monitoring system. A State of the Forest Report maybe published on a regular basis as part of the County State of the Environment Report.
- Provide adequate resources for forest management and conservation and tree planting through the annual county government budgetary allocation to the sector.
- Establish county programmes to support community forest management; afforestation/reforestation on community and private land; and community support for existing gazetted forests
- Develop policies to provide incentives to increase and maintain tree and forest cover through the recognition of forestry as a viable land use option. Support forestry on community and private land; encourage public-private partnerships for commercial plantations on public land; support forest-based industrial development and recognize and support private landowners' efforts to manage forest and tree resources.
- Strengthen the capacity of the County governments to expedite the delivery of forest extension services to community and private land users.
- Establish mechanisms for building partnerships as well as cross and inter-sectoral coordination between county government and national agencies, communities, the private sector and non-state organizations, for improved forest sector planning, implementation and oversight.
- Undertake to conserve and manage all reserved forests and forest resources on public land in accordance with management plans prepared in collaboration with lead national and county government agencies, forest communities and civil society.
- Promote participatory community co-management of forests on public land, and encourage investment and public-private partnerships through concessions.
- Recognize and protect the customary rights of indigenous peoples and communities residing within or adjacent to forests. Respect cultural practices that are compatible with agreed principles of sustainable forest management.
- Encourage the preparation of participatory forest management plans with community forestry associations on public land, and determine the user rights specific to the availability of forest resources.
- Recognize the right of communities to manage forests and forest resources on community land and introduce benefit-sharing arrangements in forest management agreements and forest licenses.
- Establish a programme for the payment of environmental services, including carbon derived from forests.
- Support the establishment of small and medium-sized forest-based enterprises, and ensure competitive markets for processing, pricing and marketing of farm forestry products and the provision of planting materials.
- Encourage and support communities, farmers and landowners to sustainably manage natural and riverine forests in the farmlands, particularly for water, biodiversity and soil conservation.
- Support the rehabilitation of degraded and over-exploited dry forest areas, and

encourage tree planting in the Arid and Semi-Arid Lands (ASALS).
- Support the production of charcoal on a sustainable basis.
- Intensify efforts to support an efficient forest-based industrial development, promote value addition in production of timber and wood products, and encourage forest-based industries to manufacture diverse range of finished products for local and export markets.
- Establish and maintain arboreta, county urban forests or recreational parks in urban areas for aesthetic and recreational uses.
- Establish and equip community and schools' resource centres to carry out environmental education and awareness for sustainable forests management.
- Establish a system for monitoring, reporting and verification of land use change and for continuous forest resource assessments

Marine and wetland sector specific policy recommendations
- Develop county wetland, marine and coastal management strategy involving all appropriate stakeholders. The strategy should recognize all values and ecosystem services provided by wetlands including biodiversity.
- Develop policies for the protection of seasonal and permanent wetlands at the county level.
- Map, delineate and publicize boundaries for all wetlands. Seasonal wetlands should be given the same consideration as permanent wetlands.
- Regulate, protect, manage and conserve all wetlands including those within public, private and community land in line with the Constitution.
- Prohibit reclamation and conversion of wetlands.
- Promote sustainable extraction and utilization of goods and services derived from wetlands and promote environmentally-friendly alternative livelihood activities in line with the wise use principle.
- Regulate the sinking of boreholes within any one catchment area or municipality.
- Support and promote enforcement of relevant regulations and laws related to environmental pollution and enhance public awareness on proper management of waste including promoting reduction, reuse and recycling.
- Recognize and permit cultural and traditional practices for use of wetland resources subject to developed guidelines, policies, laws and legislation at county and national levels.
- Identify and protect unique wetlands through gazettement as protected areas
- Develop management plans for managing deltas sustainably through participatory and integrated planning and co-management. Land Use Plans guided by Strategic Environment Assessments (SEA) should be developed for all deltas and major estuaries. These include Sabaki River Mouth, Tana River Delta, Yala Swamp, Omo River on Lake Turkana, Nyando River ,etc.
- Work with the national government to identify and list wetland sites that fulfil Ramsar criteria and ensure effective management and conservation of all Ramsar sites.
- Develop and implement measures to support restoration, rehabilitation and management of wetlands. In doing this, give priority to indigenous vegetation and other biodiversity in restoring degraded areas, and allow natural regeneration of degraded wetlands where feasible.

Grassland sector specific policy recommendations

County governments can make laws and regulations to promote the conservation of grasslands and savannah ecosystems in their jurisdiction. This can be achieved through:
- Promoting preparation and gazettement of grassland and savannah ecosystem land use plans.
- Promoting mechanisms and strategies to maximize income from livestock.
- Promoting nature based enterprises that provide income and conserve grassland at the same time, including apiculture, sheep rearing and wool weaving, and ecotourism.
- Gazetting Key Biodiversity Areas within grasslands as Community Sanctuaries; for example Nyandarua County can gazette the Kinangop Grasslands Important Bird Area (IBA) as a Community Bird Sanctuary for the threatened bird Sharpe's Longclaw, endemic to Kenya.
- Partner with research institutions to conduct biodiversity assessments and ecosystem valuation of grasslands.
- Promote restoration of degraded grasslands and savannah ecosystems.
- Don't plant trees on protected grassland or seasonal wetlands; trees will hasten their natural conversion to other land types.

Agricultural and livestock sector specific policy recommendations

County Assemblies can make laws and regulations to guide sustainable agricultural practices. Such laws and regulations will aim to:
- Promote agroforestry practices to increase tree cover and provide domestic energy.

- Avoid any agricultural expansion in "High Value Ecosystems" including forests (primary or secondary, government, county government or private), National Parks, Reserves and other protected areas, cultural areas (gazetted and other national monuments), wetlands and riparian zones (around lakes, rivers, streams, springs) and habitats hosting endangered plants and animals.
- Protect aquatic ecosystems from erosion, agrochemical drift and runoff by establishing protected zones on the banks of rivers, permanent or temporary streams, creeks, springs, lakes, wetlands and around the edges of other natural water bodies.
- Encourage landowners to maintain or restore the connectivity of natural ecosystems within their boundaries; and consider the connectivity of habitats at the landscape level by promoting maintenance of native vegetation on roadsides and along water courses or river banks.
- Ensure that farms and associated enterprises do not discharge or deposit industrial or domestic waste water into natural water bodies without demonstrating that the discharged water complies with the respective legal requirements and that the waste water's physical and biochemical characteristics do not degrade the receiving water body.
- Ensure that farms and associated enterprises that discharge waste water continuously or periodically into the environment establish a water-quality monitoring and analysis program that takes into account the potential contaminants and applicable laws.
- Promote conservation agriculture including organic farming.
- Develop innovative mechanisms to fund sustainable agriculture, including working with the private sector to ensure Payment for Ecosystem Services (PES) to reward deserving farmers.
- Promote working with certification schemes to enhance the value of products of conservation agriculture.
- Promote the use of appropriate crop and livestock varieties.
- Promote the use of Integrated Pest Management to reduce the use of pesticides that poison the pollinators

C. County Planning Processes for Ecosystem Conservation

County Governments can develop the following strategies and action plans to promote ecological sustainability as a strategy to adapt to climate change:

- Land Use Plans that take into account all ecosystem services
- Site and habitat management plans for specific conservation areas
- Species Action Plans for globally threatened species
- County State of Environment (CSoE) Report and County Climate Change Vulnerability Assessment Report. The first CSoE Report will form the baseline against which the impacts of development on the ability of ecosystems to help people adapt to climate change will be assessed. County Integrated Development Plans can then be based on the County SoE and Vulnerability reports.
- County Biodiversity Strategy and Action Plan (CBSAP)
- County Environmental Action Plan (CEAP)

D. Promote Application of Environmental Safeguards in Development Projects to ensure Ecosystem based Adaptations

Counties have the opportunity to choose the development policies or laws or strategies and action plans that provide for sufficient ecosystem services safeguards. Actions include:

- Develop County Integrated Development Plans, with extensive consultations. These should take into account Vision 2030 provisions and ecological sustainability principles. Development and biodiversity conservation are inseparable for maintaining ecosystem services.
- Follow global safeguard mechanisms as adopted by the World Bank and the African Development Bank. Consult IBAT (https://www.ibatforbusiness.org/)to check that development projects do not damage Key Biodiversity Areas.
- Develop Strategic Environmental Assessments (SEAs) – with extensive consultations – for development policies, projects and programmes. SEA takes into consideration a wider picture, to avoid ecosystem collapse when implementing development programmes to meet the needs of humans. This is good for nature conservation and crucial in avoiding economic pitfalls. (For example, the Tana Delta Rice Irrigation scheme by TARDA collapsed largely because environmental factors, such as flooding, were not taken into account in the design process). Also, the Galana-Kulalu Irrigation Scheme is likely to fail due to lack of water if a SEA is not done prior to implementation, and its recommendations followed. At Yala Swamp in Siaya County, Dominion Farms Limited is trying to "develop" the wetland by converting it into rice fields in spite of the many other ecosystem services that the wetland provides.)

- Develop Land Use Plans (LUPs) – with extensive consultations –and Strategic Environmental Assessments (SEA) for ecosystems that are targeted for major developments. For example:
  * Galana-Kulalu Irrigation Scheme in Kilifi County
  * LAPSSET corridor that affects multiple counties including Lamu, Tana River, Meru, Isiolo, Samburu, Turkana, Marsabit and Moyale
  * Standard Gauge Railway from Mombasa to Uganda, Rwanda
- Demand Environmental Impact Assessments (EIAs) that are consultatively developed with active participation of stakeholders. In particular, project proponents should submit their EIAs to the County government as well as NEMA.
- Improve the capacity of the County government to review EIAs and provide professional, non-politically-motivated advice to NEMA before EIAs are approved.
- Allocate County financial and personnel resources to ensure that the EIAs' management plans and recommendations are monitored and fully implemented once EIAs are approved.

E. County Environmental Governance

County Governments need to be able to provide county and local leadership on environment and biodiversity conservation matters in order to ensure ecological sustainability in the face of rapid socio-economic transformation and climate change. Some strategies to achieve this include:

- Set up and operationalize County Sustainable Development Committees. These could include: Wildlife, Forests and Biodiversity Committee; Sustainable Agriculture Committee; Energy Committee; Sustainable Land Management Committee, etc. Each of the Committees should have representation from civil society, the private sector and national government agencies. The Committees would advise the County government on the best policies and practices in their areas of expertise.
- Counties can make use of the local environmental governance structures that are provided for in the national legislation. These include: Land Committees, Community Forest Associations (CFAs) and Water Resource Users Associations (WRUAs).

F. Take into Consideration the Cumulative Impacts of Different Projects on a County or River Basin.

Many new projects look balanced and sustainable when examined individually. But when their individual impacts are summed up, they impose an intolerable pressure on the environment. For example, the following projects seek to make use of the water of the River Tana: High Grand Falls Dam and associated irrigation; irrigation schemes to be renovated at Hola and Bura; TARDA and other projects in the Tana Delta; and water supply for a busy Lamu Port and projected associated city of a million people. Yet the current flow of the River Tana in the dry season is just enough to maintain the small scale farming, extensive livestock and astonishing wetland diversity of the Tana River Delta.

G. Financial Support for Ecosystem Protection and Adaptation to Climate Change

Ecosystem Conservation has costs. For example, CFAs and WRUAs will only be effective if they have resources to engage in forestry and water resources management. There is need for county governments to:

- Develop policies that provide for at least 10% of the county budget to be spent on sustenance of ecosystem services. This includes budgets for forestry, wetland management and avoiding land degradation in production landscapes, among others.
- Develop policies and programmes that provide financial resources to non-governmental and local community environmental governance structures including CBOs and NGOs, to assist them to take direct actions in sustainable land, forestry, wetland and wildlife management.
- Develop policies that promote private sector investment in conservation activities either through private sector Corporate Social Responsibility (CSR) or through development of appropriate Payment for Ecosystem Services (PES) systems.

H. Cross-cutting Recommendations

- Promote alternative energy sources such as wind, solar, biogas and LPG cooking gas in order to reduce dependence on wood fuel.
- Promote capacity building and policy reform to integrate climate change in sectoral development plans.
- Liaise with national and international institutions to improve the early warning system against climate induced disasters and hazards.
- Promote water harvesting and water conservation technologies.
- Stabilize community livelihoods which are adversely affected by climate change through improvement of small-scale industries and promotion of micro-finance institutions.
- Develop species action plan for globally threatened species.

SECTION 4 CONCLUSIONS

Kenya is undergoing rapid transformation in her socio-political and economic spheres. Many mega-projects are being implemented towards the realisation of the Vision 2030 strategic plan. The country's population is growing rapidly putting an ever-increasing demand on natural resources that are the raw materials for most development programmes. Climate change is a reality and its negative impacts on many sectors of the economy are becoming more visible and better understood. At the same time, the country's governance system has been devolved, hence increasing pressure on natural resources exploitation for local development. Ecosystem conservation can contribute greatly to enabling people to adapt to the negative impacts of climate change by ensuring sustained provision of ecosystem services. However, ecosystem services can be compromised if ongoing developments, policies and plans, both at national and county levels, do not mainstream ecosystem conservation. We hope that this guide will be an important resource to policy makers at all levels of the government as they develop and implement development and environmental plans and policies. We believe that the document will be particularly important to county governments as their county assemblies domesticate various national policies and plans at the county level.

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