



Environment and Natural Resources as a Core Asset in the IGAD Region for Wealth Creation, Poverty Reduction, and Sustainable Development: Kenya National Situation Report

Reuben Sinange
September 2007



EXECUTIVE SUMMARY:	3
Environment and Natural Resources as a Core Asset in the IGAD Region for Wealth Creation, Poverty Reduction, and Sustainable Development: Kenya National Situation Report	11
1. Introduction	11
2. Livelihoods - wealth creation and poverty reduction	12
Natural Resources As Core Component Of People’s Livelihoods.....	12
Contribution of environmental assets to the achievement of the MDGs and PRSP.....	20
6. Natural resource governance (rights, equity including gender, devolution)	22
Devolution of natural resource governance to people and communities.....	22
How improved governance improves rural people’s livelihoods and reduces risks.....	23
Extent to which policy and laws are being put into practice on the ground	23
Equitable distribution of costs and benefits of devolved natural resource governance	24
Information, awareness and preparedness of communities on their rights and responsibilities for devolved NR governance	24
4. Market chains and value adding on Natural Resources:	25
How communities can better engage in the market to trap more income locally	25
How communities can sustainably process and value-add on NR based products	29
Market chains for NR products – their equity and efficient	29
5. Natural resource economics and national accounting:	30
Reflection of NR in national accounting and other measures of national growth	30
Indicators that reflect the value of the NR in the PRSPs and the performance of MDGs.....	31
Extent to which NR assets are reflected in national and regional marketing and trade	31
Use of SEA for integration of environmental aspects into the sector activities.....	31
6. Emerging issues	32
Key emerging issues and how they impact or are impacted by environment and NR base.....	32
Strategies and actions that can be used to better integrate emerging issues into national development and environmental planning processes	34
7. Conclusions and Recommendations	34
References	38

EXECUTIVE SUMMARY:

Environment and Natural Resources as Core Assets in the IGAD Region for Wealth Creation, Poverty Reduction, and Sustainable Development: Kenya National Situation Report Summary

Introduction

Kenya is a land of contrasts. It has a range of physical and geological formations. The Great Rift Valley splits the country into two regions. It has expansive plains and a range of mountains with the peak on Mt. Kenya 5200m above sea level. In addition its position astride the equator, position in relation to the Indian Ocean and Lake Victoria, make the country experience a wide range of climatic conditions and a large number of ecosystems. Ecological zones range from very arid to very humid. This is further manifested in the very rich biodiversity and agricultural systems that the country is endowed with. The country is listed as one of the ten mega-diverse countries in the tropics.

The ecosystems provide different services for the livelihoods of the communities that live within and outside them and therefore all face different human pressures that are leading to environmental degradation. To ensure the ecosystems withstand the current human pressure, sustainable land management (SLM) must be encouraged. SLM is management that reverses land degradation, maintains or enhances the supply of ecosystem goods and services, alleviates poverty, and promotes development.

Development is about enhancing the livelihood of people, particularly the poor. A livelihood is the means of living that people in a household build for their well-being through access to and use of the assets they need for this purpose. These livelihoods assets include: human capital; social capital; natural capital; physical capital; and financial capital.

Land degradation is a threat to rural livelihoods. It is a hazard to the natural capital (the land, water, wildlife, biodiversity, grazing etc) of local communities and the nation because it depresses the capital locally but ripples through the whole economy.

Therefore sustainable rural development should be about the enhancement of rural livelihoods through the protection and enhancement of livelihood assets, promoting and securing access to these assets, and promoting diversification of the use of these assets. It includes the creation of new livelihood opportunities off the land. In particular, SLM should address sustainable development through the protection, enhancement and use of natural assets, thus breaking the vicious cycle of land degradation and poverty. This paper explores how Kenya is trying to break this cycle through various strategies.

1. Livelihoods - wealth creation and poverty reduction

a. Natural resources as core component of people's livelihoods

Although an ecosystem performs four major services (provisioning, regulating, cultural and supporting) for maintaining the ecosystem and survival of man, two are directly linked to livelihood system:

- Provisioning services:** These are services that support production of goods that are basic human needs such as food, livestock, water, fibers, timber, biomass fuel, medicines for health.
- Cultural services:** These services include cultural and spiritual enrichment, recreational, tourism.

The critical natural resources of an ecosystem that perform the provisioning services for a household are: (i) land (landscape, soils, rock, minerals, agricultural, range, conservation areas etc); (ii) flora (micro & higher plants - terrestrial and aquatic, vegetation communities); (iii) fauna (micro-organisms, wildlife, terrestrial and aquatic); (iv) Atmosphere (air, weather, climate); and (v) water (in

soils, atmosphere, flora, fauna, natural reservoirs like aquifers, rivers, lakes, seas and oceans). These are essentially ingredients to the livelihoods for every household.

They are all being degraded through unsustainable utilization by the ever increasing populations. The per capita availability of resources like water and biomass fuels is now critical. This is exacerbated by lack of or inappropriate use of technology in the conservation and production and changing consumption patterns. This just spells gloom and doom to the communities concerned.

Because of high population demands, hunting/ gathering systems are replaced by higher scientific and technological systems to conserve or efficiently produce more in sectors like agriculture and manufacturing industries, as well as in preservation of products for longer shelf life. They are all for the provisioning of the following man's basic needs: food, clothing, water, energy, shelter, health, cultural fulfillment and security.

People's livelihood systems, wealth creation and fight against poverty and disease revolve around basic needs that are in turn the provisioning and cultural services of ecosystems. Below is a summary on how the natural resources are core components of people's livelihoods in Kenya's socio-economic fabrics:

Agriculture for poverty and food insecurity eradication: Poverty and hunger (food insecurity) and diseases have been the 3 big challenges in Kenya since independence. Agriculture is key to Kenya's overall national economic and social development. It contributes about 26% of GDP and a further 27% through linkages with other sectors. It contributes about 60% of national export earnings. It is the main source of livelihoods for the majority (80%) of Kenyans who live in the rural areas. The ASALs alone host about 70% of the national livestock population with an estimated value of about Kshs 70 billion. Pastoralism provides direct employment and livelihood to over three million Kenyans.

However due to population pressures and use of poor or inappropriate production technologies and marketing, >57% of the population live below the poverty line due to land degradation and declining productivity. This has resulted in over 50% of Kenyans being food insecure. These are indications that the ecosystems' natural resources are being overstretched and degraded leading to food insecurity, poor health and poverty intensification.

Sustainable and high productivity in the agriculture sector will depend on investments, technologies applied, seeds quality, marketing infrastructure, soil and water conservation. SLM is therefore the key to breaking the land degradation and poverty vicious cycle.

Production of fibers for clothing: The production of fibres is part of the agricultural production systems. Industrial processing and value addition of the cotton, wool and hides contribute significantly to the livelihood systems of Kenyans. The industry has declined over the last 10-15 years due to the structure of world market. This decline has contributed to poverty intensification in the affected areas. *New production and protection policies are needed to address the unfair trading regimes in the world market.*

Water for life, agriculture and industry: Water is for domestic use, agriculture and livestock productions and hydropower production. It is the most limiting factor in the provision of other services in the 80% of Kenya (ASALs) that host ~35% of Kenya's population. Rainfall is seasonal, low and erratic with uneven temporal and spatial distribution, resulting in uneven distribution of watering points. Therefore nomadic pastoralism is practiced as a production strategy by the nomads that follow water and forage. In contrast, the humid and marginal dry sub humid zones receive enough rainfall for sustaining rain fed agriculture for a range of crops for each sub zone and

livestock keeping. In urban areas water is needed for domestic and industries which provide livelihoods to many families. Inter-basin transfers for Nairobi, Mombasa, Nakuru have become necessary because of local shortages. Per capita freshwater availability is 930m³, below the internationally accepted 1000m³. This makes Kenya a water scarce area. Because of the climatic factors, rapid population growth and industrialization, per capita water availability will decline to only 235m³ per capita per annum by the year 2025.

In all ecosystems frequent drought and/or flood hazards threaten lives, property, infrastructure and cause food shortages and hunger, all of which affect the livelihoods of the communities.

Water harvesting and conservation measures including recycling must be put in place in order for this resource to continue sustaining livelihoods and industrialization of the country.

Energy for domestic and industrial services: Energy is needed for cooking, heating, lighting, industry and transport. Kenya's total national energy demand relies on biomass (80.5%), petroleum (18.0%) and electricity (1.4%). Petroleum is imported and the rest is sourced from local ecosystems. This underscores the contribution of biomass fuels to livelihoods in the country. In the rural areas biomass energy accounts for 98% of energy needs.

In 2000, it was estimated that the country experienced a deficit of 20million tones of biomass fuel which will rise to ~31.2 million tones in 2015. This demand is leading to over-harvesting and severe degradation of the forests. The business of selling firewood and charcoal making is a livelihood to a large number of farmers and traders. Woodlots for fuel are now a source of livelihood due to demand. The charcoal making and marketing chains employs ~500,000 persons with 2 million dependants. It is estimated that the industry's annual gross revenue is up to Khs.32 billion.

Production of hydropower demands a good and constant supply of water to hydro reservoirs from the catchments areas. The reservoirs often have other uses including domestic water supplies, irrigation, fisheries and recreation. This means a number of livelihood systems revolve around hydro dams.

A strategy is needed to either increase fuel wood population, use of energy efficient technologies or switch use to electricity and fossil fuel.

Shelter (housing) and forestry: The materials for shelter (housing) include timber, poles, thatching and walling and roofing blocks. Good housing is a function of availability of cheap materials. The timber industries has traditionally relied on protective and productive forest stocks, which, with pressure have declined to 1.7% of the country's land area against the recommended cover of at least 10%. Currently the forest / timber industry employs a large number of people and contributes about 8% GDP. The construction industries including electrical and telephone lines, depend on productive forestry for timber and poles.

With the high demand for timber, farmers are already responding by planting woodlots especially in the high potential areas where acute shortages are biting. They need national support.

Health - against diseases; peace of the mind: Many livelihood systems revolve around provision of health services especially pharmaceuticals (herbal and industrial), gums and incense products and production of adequate nutritious foods. Recreation and tourism for peaceful minds are gotten from well conserved and healthy environment.

Herbal medicine still plays a significant role in the health care of communities. About 80% of rural Kenyan populations rely on traditional/herbal medicinal where poor infrastructure and few doctors

and few are found. Some herbal products have already started appearing in supermarkets. The world market value of natural medicinal products is on the rise indications that they have great economic and social development potentials. *The government can help develop this market further.*

Livelihood systems revolving around **security for community and race and cultural fulfillments** (apart from tourism) have received little analysis on livelihood systems around them.

b. Contribution of environmental assets to the achievement of the MDGs and PRSP

PRSPs and MDGs are national vehicles for achieving Agenda 21 where sustainable development emphasizes the environmental, social and economic development as the pillars. The Government has carried out a needs assessment for a number of the 8 MDGs and 12 targets. Because some of the MDG and targets are directly or indirectly linked to environmental provisioning services, they form part of the recommended interventions. By establishing an MDG coordination office to integrate MDGs into the main development frameworks, the Government has indicated its determination to achieve the MDGs.

2. Natural resource governance (rights, equity including gender, devolution)

a. Devolution of natural resource governance to people and communities

Environmental governance in Kenya is through various legislations, standards, and regulations together with institutions that implement them. Before the enactment of EMCA in 1999 as an overarching framework law, environmental laws were scattered and many and some were out-dated. EMCA devolves administration of a number of environmental and natural resources management issues to communities. The devolvement includes the structures that oversee the issues at various levels. EMCA requires NEAPC, PECs and DEC's to prepare environment action plans and integrate environmental concerns into policies, plans, programs and projects at all levels. Further EMCA empowers organized communities to formulate environmental actions and /or conservation and management plans of areas of particular interest to them, which to be legal, must be vetted at various levels before approval and registration by NEMA. New and draft sectoral policies and laws are strengthening EMCA in these respects.

Greatest challenges include land and tenure systems, education and awareness of communities, the applicable laws and politics at all levels. Despite these challenges community conservancy areas continue to grow in numbers.

b. How improved governance improves rural people's livelihoods and reduces risks

The finalization of the national land policy and anticipated act are critical to Kenyans. The draft policy proposes consolidation of the many land acts and tenure systems into one coded system. It will address the tenure issues of public land, community land, land rights of minorities, freeholds, leaseholds, informal settlements, resource tenure, community interests and benefit sharing, pastoral land tenure, and equitable and sustainable access to land.

Further, the draft land policy addresses land use management issues including sustainable land use, land use planning, environmental management and ecosystems protection and management. Therefore when adopted the land policy and act will have far reaching implications on community ownership, access, rights, use, management, and sharing of benefits accruing from the land and natural resources thereon. This land policy will strengthen the other existing and proposed sectoral policies and acts. Communities will realize and value the resources and have a sense of security to create livelihoods around them.

c. Extent to which policy and laws are being put into practice on the ground

Policy and legal reforms on land and natural resources are very sensitive issues in Kenya. This is what led to the struggle for independence and the debate continues up to now and especially

intensified in the last ten years. The political leaders have been calling for reforms starting with the constitution. But it has taken nearly two decades to finalize reforms in only three sectors (environment, water and forest), several draft sectoral policies and a rejected draft constitution. On the ground however some communities are ahead of policy and laws. For example community conservancies are in place and some working well ahead of wildlife policy review; water user associations were formed ahead of the water policy and act; and individual and community forestry is ahead of the forest policy and act which will promote the activity.

Success in implementation of existing policies and laws is always mixed because it depends on resources, capacity, determination and political will. Successes include community conservancies, Water Trust Fund, community forestry and failures include loss of state forests and biodiversity.

d. Equitable distribution of costs and benefits of devolved natural resource governance

All new policy and legal reforms consider equity including gender equity. There is now a general sense that all governance structures should include at least 30% women to influence their own course. The draft land policy recognizes women among the vulnerable groups whose land rights have to be recognized and resolved. The governance structures will include gender balance while respecting community traditions as far as possible. The rejected draft constitution would have affirmed this in all sectoral reforms.

e. Information, awareness and preparedness of communities on their rights and responsibilities for devolved NR governance

General awareness of the people's rights and responsibilities to a clean environment as enunciated by EMCA is inadequate. This implies that they cannot demand for equitable sharing of benefits from natural resources services like genetic resources, of which they are the custodians. Communities are therefore not ready for devolved NR governance. The challenges for information and awareness raising are many.

A population that is aware of its rights and obligation will participate and contribute towards the management of the environment for its own benefits.

3. Market chains and value adding on Natural Resources

a. How communities can better engage in the market to trap more income locally

Over 57% of Kenya's rural population lives below the poverty line of \$1.00 a day and yet they live in ecosystems that fetch substantial national income through ecosystem services eg biodiversity (ecotourism, harvesting timber, fuel-wood, harvesting of genetic resources, livestock grazing). It is because of poverty and low pricing that they tend to over-exploit the resources, which lead to unsustainable land use and biodiversity resources. The loss is particularly severe where expansion of crop cultivation is possible.

One way of tackling the two issues of poverty and unsustainable use of environmental resources is through organized entrepreneurial community-based natural resources management (CBNRM). The CBNRMs groups can take advantage of the growing global natural products industry that is currently valued at US\$65 billion per annum. These products represent key sub-sectors of food and beverages, cosmetics, herbal medicines, pharmaceutical, gums and resins and biofuels. The ecotourism industry is even larger. The benefits that trickle down to the community are meager when the value of the whole industry is examined because of various factors including complex and costly market chains with very many players. This erodes the proportion of gate price to the producer to less than half of the consumer price. The difference goes to various actors along the chains.

This situation prevails in most of the products from local communities and ecosystems including natural products that the communities offer in the market. These include the tourism industry, natural products industry, livestock industry, fisheries industry, the wood-fuel industry and many others.

Strategies for successful commercialization of natural resources include: supply chains development; trade services to the communities; products research and development; market development; long-term investments; negotiating for favourable market regulatory mechanisms; use new approaches and instruments carbon trade; shortening the market chains and control marketing cost elements; provision of market information to all players; and evolve governance structures that ensure active participation of all players – producers, businessmen (investors) and consumers.

b. Policy, institutional and structural impediments for such engagements and the solutions

There are four main challenges for the development of markets in order for communities to gain meaningful livelihoods from their natural resources and products:

- Weak policy, legal and institutional frameworks in support of local communities and their products;
- Poorly developed markets for natural resources products;
- Low productivity and lack of standards and quality control mechanisms;
- Inadequate market information to all players; and the unfair global trade regimes.

c. How communities can sustainably process and value-add on NR based products

Lose of quality of rural produce during transportation to markets; the unnecessary take by middlemen, traders; and the excessive marketing costs leave the producer with very little reward for his labor. These can be avoided if processing were to be done close to production sites. This will, in addition, create employment to community members. However there should be in place several incentives for the investors, including tax breaks, assurance of a minimum production volume and quality, existence and access to the market and returns in shortest period.

d. Market chains for NR products – their equity and efficient

The market chains for the natural products have three layers with several players: (i) raw material layer - the producers, technical support from government departments and NGOs, raw material buyers/businessmen, transporters, and processing investors; (ii) finished product layer – product promoters, distributors, transporters and outlet traders; and (iii) consumers layer – traders and the products consumers.

Without a demand for a product its value is zero. This demand or market can be developed through long term strategies by government, businessmen and other stakeholders. With such a market chain equity and efficiency can be created only if the government promotes the industry and avail information to all players so that pricing can find its optimal position for each player.

4. Natural resource economics and national accounting

a. Reflection of NR in national accounting and other measures of national growth

Only part of environmental service provisions are accounted for in the national accounting system directly or indirectly in the GDP. Natural resources that are formally marketed as goods and services appear in the national accounting systems. Non-market environmental services and products are not reflected in GDP. For example, marketed timber is aggregated and given a value. The sector players are many and spread from the production sites to urban settlements where timber is needed for various industries like construction, furniture, and paper. The contribution of the timber industry in terms of employment and export earnings are also reflected in the national accounts. However the contributions of ecosystems to enable that timber grow to harvestable stage by various ecosystems is not reflected. The same complexity applies to others like tourism, water and biodiversity.

There is therefore a need to map out services provided by various ecosystems to enable land use zoning as proposed in the draft land policy. The non-marketed services can be approximated and each ecosystem will have its importance and particular services that it offers and therefore be conserved appropriately.

b. Extent to which NR assets are reflected in national and regional marketing and trade

A number of natural resources are traded and reflected in national trade including timber, fuel-wood and charcoal, non-timber forest products, mining, fish industry; hydropower, piped water and tourism. At the regional level little trade goes on in natural resources products. The main reason why there is little trade between the states is because the products are the same and there is no value addition to most of them. Cross-border can be improved by putting in place value addition processing plants in any of the countries to encourage export of the raw material and may be importation of the finished product.

5. Emerging issues

a. Key emerging issues and how they impact or are impacted by environment and NR base

Key emerging issues in Kenya are HIV/AIDS and other pandemic, conflict and insecurity, effects of globalization, invasive species, climate change and adaptation, GMOs, and carbon trade. Each is impacted or impacts the environment differently.

HIV/AIDS and other pandemic: Since 1986 more than 75% of all AIDS cases occur in adults between the ages of 20-45, the most productive age bracket in society in every aspect. They are the main bread winners, field producers or workers in all sectors including agriculture. It therefore means that food production declines and the nutritional status of the affected family members deteriorate. Land and environmental care become secondary. Poverty becomes further entrenched and acute. Any opportunity to over-exploit natural resource just to survive becomes instinctive. This leads to further degradation of the environment including loss of biological diversity.

Conflicts and insecurity: Conflicts in Kenya are mainly over land and natural resource use. They affect all levels and are exacerbated failed governance mechanisms; acute poverty; frequent droughts and loss of animals leading to raids to restock, rampant circulation of small arms. They result in internally displaced persons. Conflicts lead to refugees concentrating in areas, points or centers with combined elements of security, grazing resources, watering resources, and sometimes at food aid centers. This strain the natural resources base to the extreme in terms of water, fuel-wood, grazing and herbal medicine and general degradation of the land.

Effects of globalization: Information and communication technology (ICT) has enhanced global economic integration and has turned the world into a global village. Globalization has also come to mean 'liberalized or free market'. The rich with technological advantages and stringent regulatory barriers, subsidies for their farmers, tax holidays for investors are enforcing 'free trade' on the poor developing countries. The result is uncompetitive pricing of commodities from poor countries. The poor farmer therefore has to cultivate large fields or over-harvest to produce enough to meet his needs. This contributes significantly to desertification in sub-Saharan countries, Kenya included.

Invasive alien plant species: Kenya has been adversely affected by invasive plant specie including the aquatic water hyacinth and the range plant *Prosopis spp.* These plants establish and colonize new environment rapidly causing fundamental changes to ecosystems structurally and services they

provide to man and thus affecting the traditional socio-economic fabrics of the communities. Because of rapid of proliferation, eradication is difficulty and very costly.

Their economic usefulness has become controversial especially that of the water hyacinth whose weight is ~98% water. Although good as livestock fodder, the *Prosopis* forms dense impenetrable thickets that bars livestock from effectively utilizing it apart from inconveniencing travel by people. However, some parties claim that *Prosopis* can be put into so many uses that there would be no need to attempt to eradicate it. These uses include fodder for livestock, honey from its flower, charcoal and fuel wood, is a shade tree, hard wood timber, may produce commercial gums.

b. Strategies and actions to better integrate emerging issues into national development and environmental planning processes

Intensive and integrated research and development on various emerging issues is one way of facing the emerging challenges. For invasive species phytosanitary regulations must be enforced at the international entry

Environment and Natural Resources as a Core Asset in the IGAD Region for Wealth Creation, Poverty Reduction, and Sustainable Development: Kenya National Situation Report

1. Introduction

Kenya is a land of contrasts. It has a range of physical and geological formations. Its position astride the equator, its altitude range (0-2000m), with the influence of its land mass position in relation to the Indian Ocean and Lake Victoria, make the country experience a wide range of climatic conditions and a large number of ecosystems. This is further manifested in the very rich biodiversity and agricultural systems that the country is endowed with. The country is listed as one of the ten mega-diverse countries in the tropics.

However, the country can conveniently be classified into three major ecological zones. These are the humid and sub-humid zones (agriculturally high potential lands (HPL), the dry sub-humid zones (marginal lands (ML), and the arid and semi-arid zones (ASALs) (the rangelands). These zones have functional ecosystems that face different pressures that are leading to environmental degradation. These zones/ ecosystems provide different services to the livelihoods of the communities that live within them.

Ecosystem services include the supply of grazing, crops, water, wood, and medicinal plants, protection of water resources and biodiversity, as well as less tangible things such as aesthetic and spiritual qualities of landscapes. To ensure the ecosystems withstand the current human pressure, sustainable land management (SLM) must be encouraged. SLM is management that reverses land degradation, maintains or enhances the supply of ecosystem goods and services, alleviates poverty, and promotes development.

SLM combats land degradation and it means the integrated process of improving land management while alleviating poverty, promoting local development, and sustaining the flow of ecosystem goods and services from the land.

Development is about enhancing the livelihood of people, particularly the poor. A livelihood is the means of living that people in a household build through access to and use of the assets they need for this purpose. These livelihoods assets include (MA 2003):

- Human capital: skills, knowledge, ability to work, good health;
- Social capital: networks, formal groups, relationships of trust, access to the wider institutions;
- Natural capital: natural resources stocks – the land, water, wildlife, biodiversity, grazing etc
- Physical capital: basic infrastructure – transport, shelter, water services, energy, communications
- Financial capital: savings, credit, remittances, pensions.

Land degradation is a threat especially to rural livelihoods. It sets up a vicious cycle that affects all the other livelihood assets. Land degradation is a hazard to the natural capital of the local communities (as well as to the larger nationwide communities) in that the natural resources available to the household are degraded. It has costs to the nation at large because it depresses national capital regionally, but ripples through the whole economy.

Therefore sustainable rural development should be about the enhancement of rural livelihoods through the protection and enhancement of livelihood assets, promoting and securing access to these assets, and promoting diversification of the use of these assets. It includes the creation of new livelihood opportunities off the land. In particular, SLM addresses sustainable development through the protection, enhancement and use of natural assets, thus breaking the vicious cycle of land degradation and poverty.

This paper explores how Kenya is trying to break this cycle through various strategies.

2. Livelihoods - wealth creation and poverty reduction

Natural resources as core component of people's livelihoods

An ecosystem provides four major services to man (MA (2005) and Kenya's ecosystems are not exceptional:

Provisioning services: These are services that support production of goods that are basic human needs – food and cash crops, livestock, water, fibers, timber, biomass fuel, medicines.

Regulating services: Services that enable ecosystems regulate their health in perpetuity – regulating micro and macro-climates that ensure survival of the ecosystem's biodiversity, air quality, water quality, waste sinks, and flood protection, and control of disease vectors.

Cultural services: Services that provide cultural and spiritual enrichment, recreational, tourism and scientific education.

Supporting services: These are services that maintain the character, structure, nature, and stability of an ecosystem. They include air circulation, nutrient cycling, soil formation, biomass production, water circulation. These services enable ecosystems provide the other three services – provisioning, regulating and cultural services.

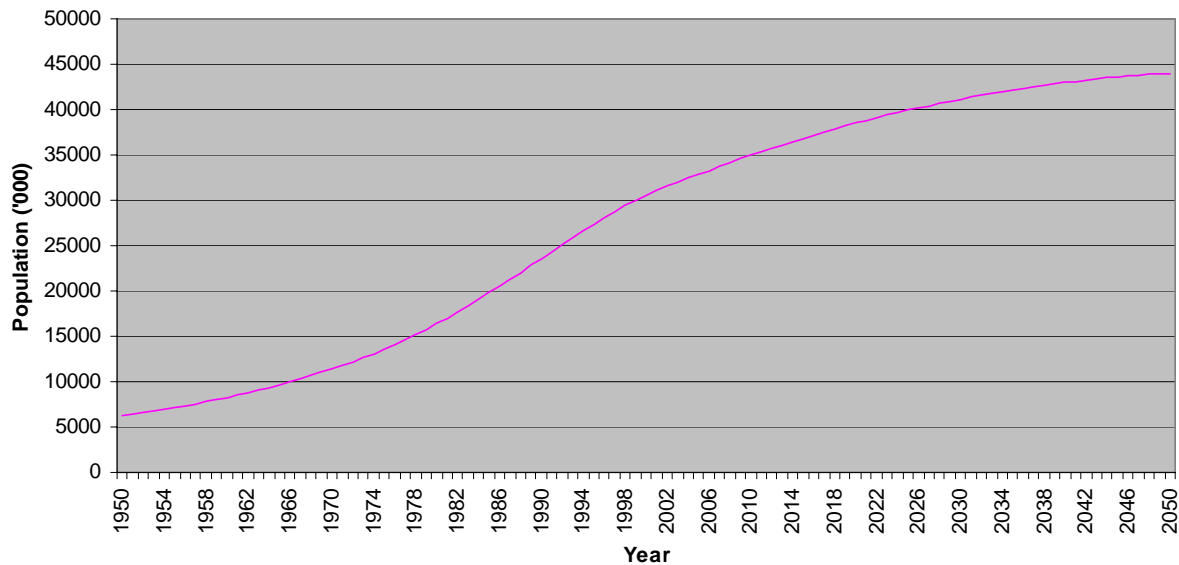
The critical resources of an ecosystem for a household are land and natural resources thereon:

Land	- landscape, soils, fertility, rock, minerals, agricultural, range, conservation areas etc;
Flora	- micro & higher plants both terrestrial and aquatic, vegetation communities;
Fauna	- micro- and macro-organisms, wildlife, terrestrial and aquatic;
Atmosphere	- air, weather, climate; and
Water	- in soils, atmosphere, flora, fauna, natural reservoirs (aquifers, rivers, lakes, seas, oceans

The status of an ecosystem (the environment and natural resources) of any community can be an indication of risks (or insecurity) of the community to their livelihoods, development and survival. The natural resources which are basic to the livelihoods of the majority of the Kenyan populations are on the decline, being degraded or decimated or are unsustainably being utilized. In many ecosystems, the current rate of demand for the provisioning services from the ever increasing populations (Figure 1) is above production rate of the renewable resources. The per capita availability of certain finite resources are increasingly becoming critical. This is leading to the un-sustainability of their utilization and is exacerbated by changing consumption patterns and attitudes. This just spells gloom and doom to the communities concerned.

Different ecosystems are endowed differently with the above resources. Thus some of the natural resources are renewable but limited in quantity or are non-renewable and fixed in quantity. The resources continue to diminish and degraded with the population increase (which would have doubled between 1990 and 20050) especially where appropriate technology is not applied in the production system. Thus the sustainable utilization of the natural resources has become an important issue.

Figure 1. Kenya's Population trends and projections 1950-2050



Source: adopted from UN-ESA 2003

Individuals, households, communities and states use/ exploit these as the basic goods and services for their livelihoods. The resources can be accessed and used directly from the environment – hunter gatherer system. The ecosystems can also be manipulated to produce more using various knowledge systems (traditional knowledge, science, technology, know-how and cultures) to produce primary and secondary goods and services for individual or society's welfare and survival. This is done through primary and tertiary production systems (agricultural and industrial) for the provisioning of the following man's basic need that ensure his survival:

1. **Food** for growth, energy, maintenance and health. This is gotten through hunting, gathering, fishing, agriculture and food manufacturing;
2. **Clothing** for individual protection against environmental elements and for cultural satisfaction. These are gotten from fibers (cotton, wool), skins and leather, and synthetics;
3. **Water** for drinking, agriculture, livestock and for sustenance of all living things in an ecosystem. This is available from rain, rivers, lakes, aquifers and ingested foods.
4. **Energy** for cooking, heating, lighting, industry and transport. These are gotten from biomass (charcoal and fuel wood), hydro, fossil fuels, nuclear reactors, wind, and solar;
5. **Shelter** for individual and family protection against environmental elements like extreme temperatures, rain, and sun's rays. The services and goods for shelter (housing) are extracted from the environment – biomass (e.g. timber, poles, thatching and walling materials), rocks, minerals and clay and soils, synthetic tents;
6. **Health** against diseases and injuries; peace of mind and soul. These services are gotten through healthcare, pharmaceuticals (herbal and industrial) and recreational, general environmental health and integrity;

7. **Cultural** fulfillments of individual and community inner souls. These are cultural, religious and recreational facilities, sites, paraphernalia and other tools and equipment. These are gotten from sacred animals, trees, sites like special forest sites, caves, mountains etc;
8. **Security** for the community and race against human and environmental threats or risks. This is gotten through weaponry (offensive and defensive that are constructed from environmental goods) and fortressing (forts, dykes and levees, dams, bunkers, - all constructed out of local or imported natural resources.

People's livelihood systems are directly linked to or revolve around the provisioning and cultural services of an ecosystem as outlined above. Livelihoods, wealth creation and fight against poverty are built around these basic needs.

Below is a summary of how the natural resources are core component of people's livelihoods in Kenya's socio-economic fabrics of communities during which course they depend on the provisioning services of their ecosystem. This will mainly be a national level analysis nevertheless it must be kept in mind that these are services from the different ecological zones (ecosystems) of Kenya combined – ranging from the very arid to very humid zones.

Agriculture for poverty and food insecurity eradication:

Poverty and food insecurity (hunger) are closely linked. The two have been the greatest challenges of Kenya Governments since independence. They form the core priority areas addressed by the Poverty Reduction Strategy Plan (PRSP) of (RoK 2001). Sustainable and high productivity in the agriculture sector depend on investments, technologies applied, seeds quality, soil and water conservation and marketing infrastructure.

Agriculture (food and cash crops, and livestock production) is key to Kenya's overall national economic and social development. It contributes about 26% of GDP and a further 27% through linkages with other sectors. It contributes about 60% of national export earnings. It is the main source of livelihoods for the majority of Kenyans (RoK 2006a, MoA and MoLDF 2004, OoP 2006). The ASALs alone host about 70% of the national livestock population with an estimated value of about Kshs 70 billion. They are also home to over 90% of wild game that supports our tourist industry. Pastoralism provides direct employment and livelihood to over three million Kenyans.

Hunter-gatherer communities still exist in the country and depend on direct harvest from the environment such products as game meat, honey, fruits and fishing. These are worthy million of shillings.

Further, about 80% of Kenya's population lives in the rural areas and derive their livelihoods from agriculture directly or eke a living indirectly from agriculture related activities. However due to the usage of poor production technologies, poor marketing and population pressures, the majority (over 57%) of the population live below the poverty line (RoK 2006a).

This low agricultural productivity, increasing population and high poverty levels have resulted in over 50% of Kenyans being food insecure. Although total food production continues to increase through agricultural area expansion and intensification, the per capita food production continues to deteriorate, Figure 2. Similar trends are noted for food and livestock production in Eastern Africa sub-region as a whole (UNEP 2002). The incidences of food insecurity are most severe in the arid and semi-arid lands, where frequent droughts and lower resource endowments exacerbate the situation. With the arable land also getting scarcer and scarcer, the hunger incidences are also on the increase in the higher potential areas. These are indications that the ecosystems' natural resources are being overstretched, degraded or even being inefficiently utilized in the provision of

food production services. Land degradation and desertification are of great concern to Kenya. They lead to food insecurity, frequent famines and poor health of the people and poverty intensification.

SLM is therefore the key to breaking the land degradation and poverty vicious cycle.

Production of fibers for clothing

The production of fibers (cotton, wool), skins and leather are part of the agricultural production systems. Industrial processing of the primary agricultural products (cotton, wool and hides) lead to finished products that we ordinarily wear for protection from the vagaries of the environment and as cultural attire. These primary and secondary activities contribute significantly to the livelihood systems in the rural and urban areas of Kenya. However the production of cotton and wool in the country has significantly declined over the last 10-15 years due to the structure of world market for these commodities rather than because of environmental degradation. This decline contributes greatly to poverty intensification to the production areas due to lack of alternative livelihoods.

The Government has to carefully craft a policy on the production and protection of fibers vis a vis the unfair trading regimes on the same commodities.

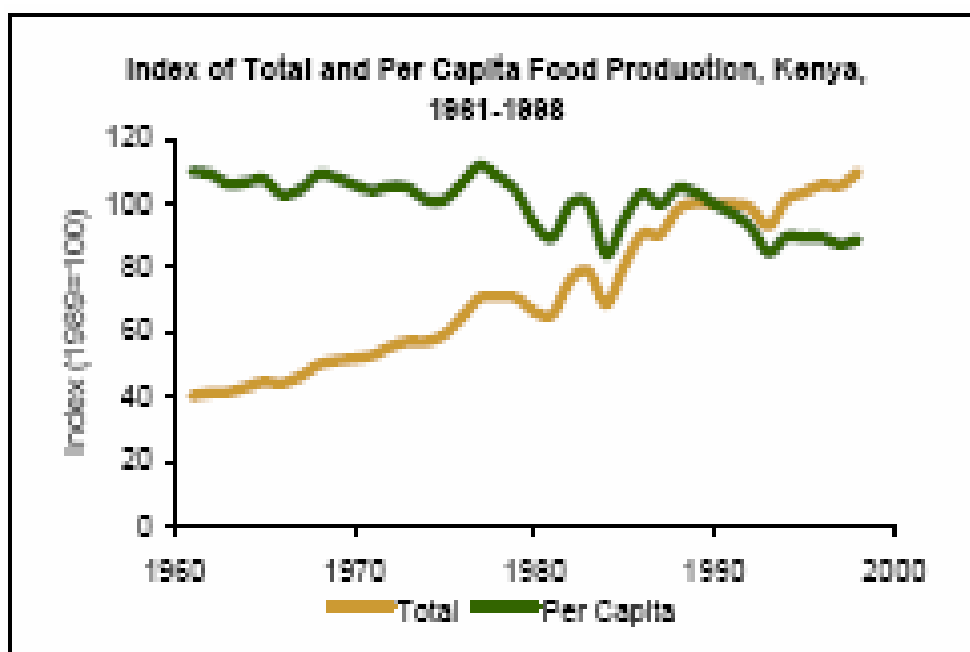


Figure 2: Index of total and per capita food production in Kenya 1961-1988 (Source: WRI website, 2005 <http://earthtrends.wri.org>)

Water for life, agriculture and industry

Communities use water for drinking and domestic uses, agriculture and livestock productions. This is normally available from rain, rivers, lakes, aquifers and ingested foods. Water might be the most critical limiting factor in the provision of other services in the greater part of Kenya than any other natural resources in the ecosystems.

About 12% of Kenya comprises of the hyper and humid zones. These are in the high rainfall areas of the country, which also contain the country's 'water towers'. They receive over 1,200mm of rainfall annually. Water is not the most limiting factor here.

About 8% of the land mass is the marginal dry sub humid zone. It receives 800-1200mm of annual rainfall. Seasonal shortage of water can be experienced here.

The arid and semi-arid lands (ASALs) occupy about 80% of the country and host over 10 million people. They receive less than 800mm annual rainfall. Water is the most limiting factor here because of the low and erratic rainfall patterns in these zones. Most of the waters of the towers traverse through these areas through seasonal surface drainage systems or aquifers. Thus the ASALs greatly depend on ground water most of the year (WRI et al 2007).

The linkages between rain water resources and livelihood systems in Kenya are striking. The humid and marginal dry sub humid zones receive enough rain for sustaining rain fed agriculture for a range of crops for each sub zone. These zones also sustain livestock keeping. However, the ASALs receive low erratic and unreliable rainfalls that lead to pastoralism as the main livelihood systems that is viable here. Irrigated agriculture is only possible where there is enough water and good soils in the ASALs. Frequent droughts in these zones make the area vulnerable to famines.

In all zones frequent too much rain (El Nino rains) are hazards that cause havoc in terms of floods that kill animals and destroy crops and infrastructure, all of which affect the livelihoods of the communities.

In major urban centers like Nairobi, Mombasa, Kisumu, Eldoret, Nakuru and Nyeri water is needed for domestic and industrial use. Inter-basin transfers for Nairobi, Mombasa, Nakuru have become necessary because of local shortages. Water as a resource for energy services is treated elsewhere below.

Annual per capita availability of less than 1000m³ is designated as a water scarcity situation. Kenya's current population is about 33 million. Kenya's total annual renewable water resource, which is a finite commodity, estimated at 30.7million m³. Therefore the per capita water availability is 930m³, making Kenya be designated as a water scarce area. Because of the above climatic factors in the various zones, rapid population growth and industrialization, per capita water availability will continue to decline, Figure 3, (RoK 2006c), and by the year 2025 Kenya is projected to have a renewable freshwater supply of only 235m³per capita per annum (MoWI-NWRMS 2007).

Water harvesting and conservation measures including recycling must be put in place in order for this resource to continue sustaining livelihoods and industrialization of the country.

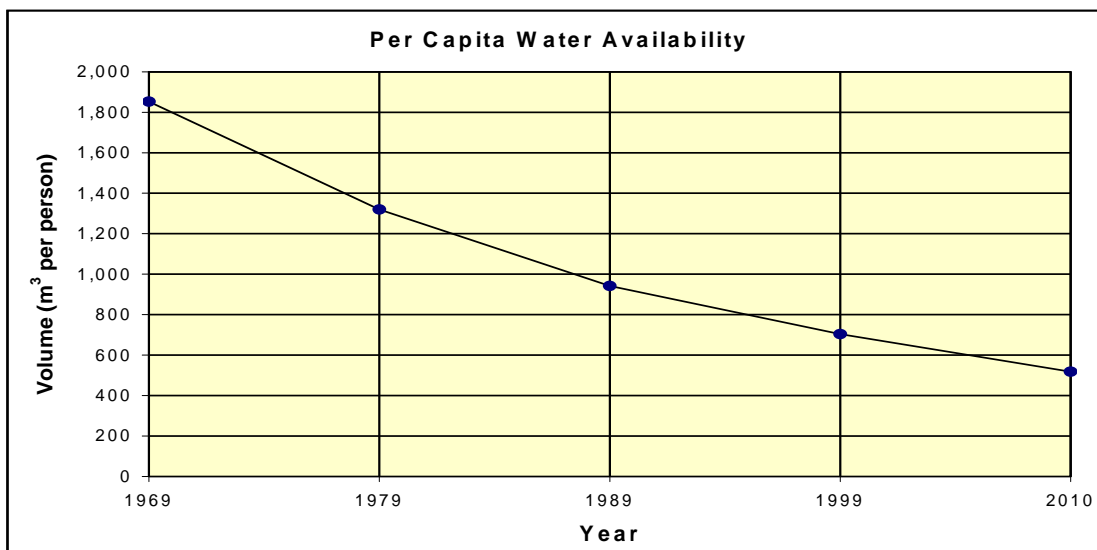


Figure 3: Per capita water availability trends in Kenya (Source: RoK 2006c)

Energy for domestic and industrial services

Energy is needed for cooking, heating, lighting, industry and transport. These are gotten from biomass (charcoal and fuel wood), hydro, fossil fuels, nuclear reactors, wind, and solar. However, Kenya relies on three major types of energy, namely: biomass energy, fossil fuel (petroleum) and electricity (hydro and geothermal). Petroleum is imported and the rest is sourced from local ecosystems.

Biomass energy is sourced mainly from firewood, charcoal, biogas, biomass (wood) wastes and farm residues. According to studies by Ministry of energy (MoE) in 2000, it accounts for about 80.5% per cent of the total national primary energy demand (MoE 2004). Its production impacts on other competing land uses such as agriculture, forestry, human settlements and infrastructure, but equally contributes to the social and economic well being of Kenyans. In the rural setting biomass energy comprises about 98% of the energy needs.

The MoE 2000 study gives an indication of the current levels of demand of different energy sources (biomass, petroleum and electricity) by different end user sectors (rural and urban household, cottage industry (including brick making, milk processing, restaurants, tea industry bakeries etc), agriculture, transport and commerce) (RoK 2006b). Despite earlier studies the 2000 study showed that the biomass energy contribution to total energy demands in the country to all sectors is 80.5%, Table 1. This underscores the contribution of biomass fuels to livelihoods in the country.

Nationally, it is estimated that total biomass annual demand in 20000 was about 35.1 million tones with an observed deficit of 20 million tones. The demand is projected to reach 49.2 million tones in 2015 resulting in a deficit of about 31.2 million tones. This demand is not sustainable – it will lead to over-harvesting and severe degradation of the forests.

A strategy is needed to either increase fuel wood population, use of efficient technologies or switch use to electricity and fossil fuel.

Currently the business of selling firewood and charcoal making are becoming more and more attractive because of demand. Areas that supply the urban centers are already severely degraded. The business is a livelihood to a large number of farmers and traders. Growing of wood fuel is also becoming attractive source of livelihood due to market demand. Thus a comprehensive biomass study undertaken in 2000 revealed that the principal sources of fuelwood in Kenya were (1) agro-forestry 84 per cent, (2) trust land 8 per cent and (3) gazetted forests 8 per cent (NEMA 2004).

The charcoal making and marketing chain alone is an industry that employs about 500,000 persons and support approximately two million dependants. It is estimated that the industry's annual gross revenue is up to Khs.32 billion. It surpasses the coffee, sugarcane and maize production systems (WRI et al 2007).

Electricity from hydro and geothermal sources contributes 1.4% of the national energy demand with some contribution from fossil thermal power stations. Production of hydropower demands a good and constant supply of water resources to hydro reservoirs from the catchments areas.

The hydro reservoir waters often have multiple uses including domestic water supplies, irrigation, fisheries and recreation apart from the primary purpose of production of electricity. This means a number of livelihood systems can revolve around a hydro dam. Geothermal power resource is an important future source of energy under development mainly in potential sites in the Rift Valley. This implies the need to undertake comprehensive impact analysis in order to ensure a balanced resources development and thereby address any potential inherent conflicts.

Figure 4: National energy supply by source (Source: SOE 2004)

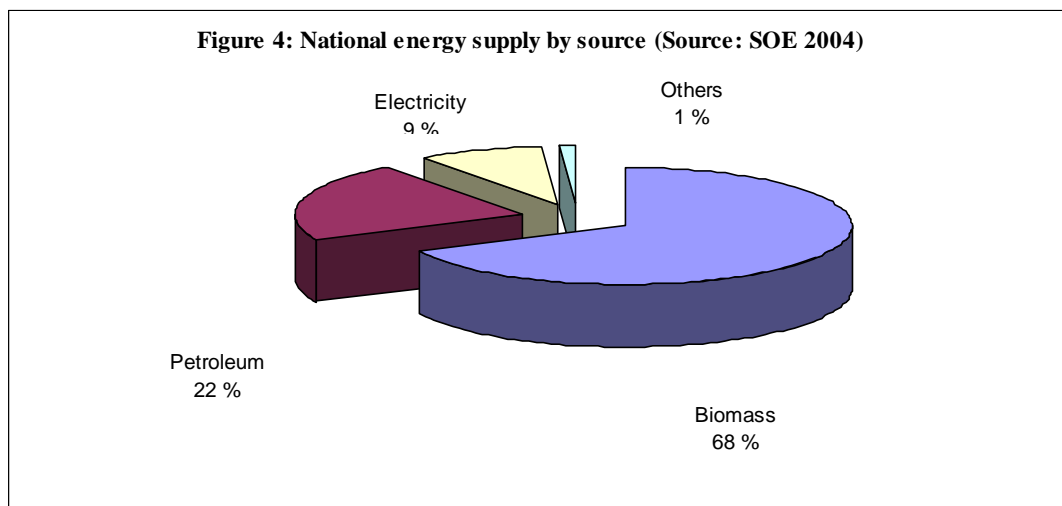


Table 1: Total energy consumption by type and for all sectors in '000' gigajoules in the year 2000 in Kenya

Fuel Sector	Firewood	Charcoal	Industrial Wood	Wood waste	Farm residue	Petroleum	Electricity	Total	% share
H0useholds	230779	218330	-	2183	36835	13475	2939	506061	73.1
Cottage	20900	45774	-	1342	178	401	1273	68349	9.9
Agriculture	-	-	-	-	-	4496	-	4496	0.6
Transport	-	-	-	-	-	45678	-	45678	6.6
Commerce	-	-	1747	-	-	60910	5622	68280	9.9
Total	251680	264104	1747	3525	37013	124960	9834	692863	100
% share	36.3	38.1	0.3	0.5	5.3	18.0	1.4	100	

Source: RoK 2006b

Shelter – housing and settlements – Timber and forestry

Shelter is for individual and family protection against environmental elements like extreme temperatures, rain, and sun rays. The goods for shelter (housing) are extracted from the environment – biomass (e.g. timber, poles, thatching and walling materials), rocks, clay soils, bricks, as well as roofing and walling tiles. Synthetic tents also are increasingly playing a role in shelter making. Good housing and human settlements is a function of availability of cheap materials especially timber.

The timber industries on the other hand rely on protective and productive forestry. However the forest cover of the country has continued to experience pressure and now stands at 1.7% of the country's land area while the internationally recommended cover should be a minimum of 10%.

The majority of wood harvested from the plantations is for timber and poles. Of the 120,000ha designated as forest plantations only 78,000ha were sufficiently stocked with trees in 1999. Thus the new forest policy gives more protection to the remaining indigenous forests (RoK 2007). But in the long run it targets plantations, private and community forestry including agroforestry to meet the ever increasing demand for timber and poles. Farmers are already responding to the high demand for wood by planting woodlots in their land parcels especially in the high potential areas where the acute shortages are biting.

Currently the forest / timber industry employs a large number of people and contributes about 8% GDP. The construction industries depend on productive forestry for poles, timber, rafts, and shatter poles. Poles are also needed in the distribution of electrical and telephone lines.

A part from supplying timber, forests provide other services to communities and the environment. Good forest cover mitigates the effects of droughts, floods and soil erosion. They trap, store and regulate flow of rain water through the systems. The remaining forest cover protects parts of Kenya's water towers. These forests directly or indirectly support agriculture, fisheries, hydropower production, paper and construction industry, medicine, among other non-timber products and benefits. Some have religious and cultural significance. Because of the high demand for timber and other wood products, Kenya's remaining forests continue to be under pressure, over-exploited and uncontrolled and unplanned developments and excisions (NEMA 2004).

Due to demand pressure, most of Kenya's forests are lost through excisions, illegal logging, charcoal production, illegal cultivation, encroachment for settlements and farming, livestock grazing. In addition, landslides, quarries/mining, forest health problems (like fires, pests and diseases, and game damage), and settlements in trust lands have had a contribution to the forest losses. Further, weak political and institutional frameworks contributed to loss of the forest cover (NEMA 2004)

Health - against diseases and injuries; recreational and health of the mind

Health can be considered to have two components: (i) body health that takes care of diseases and injuries; and (ii) mind and inner soul health that takes care of peace of the mind and appreciation of nature.

Body health services are gotten through two ways: provision of medical services that include healthcare, pharmaceuticals (herbal and industrial), gums and incense products; and provision of adequate and nutritious foods. Mind and soul health are gotten from just living in a generally healthy environment, through recreational activities and the pleasure and appreciation of an ecosystems' architecture and aesthetics that can be termed as tourism. This section will briefly examine livelihood systems that have evolved around only two aspects: herbal medicine and tourism.

Herbal medicine still plays a very significant role in the health care of communities. Before the advent of modern medicine, communities treated different ailments using indigenous knowledge and herbal medicines. Medicine men were well known for complicated cases, but common medicinal plants were well known by the communities for day to day usage whenever needed. Kenya is blessed with a rich cultural diversity which is reflected in the formal and informal systems of medicine practice. In many of the Kenyan communities, the informal oral-traditional medical systems have not yet been systemized; they are passed on by word of mouth from one generation to another. Knowledge on these herbal, animal and mineral medicinal materials may be as old as the community. Each system of medicine is the art and science of diagnosis of the cause of diseases, treating disease, and maintaining health. Each culture has solutions to the preventive, promoting and curative aspects of health.

Approximately about 80% of Kenyan population rely on traditional medicinal mainly the rural population where poor infrastructure, few doctors and few laboratories are found. Conventional medicine is more expensive, thus there is increased demand for natural drugs and products which are easily accessible. Marketing of natural medicinal products is not easily quantified because both internal and external traders are informal and most of the products are raw or semi-processed with a range of prices. Some herbal products have already started appearing in supermarkets. Some natural products from plants like the *Aloe spp*, *Prunus Africana*, *Osyris lanceolata* (sandalwood), *Commiphora spp* are already recognized by communities as important economic assets in the dryland of Kenya. UNDP estimates that the annual world Aloe market value alone is US\$20 billion (UNDP 2007). This has motivated some Kenyan communities start domesticating indigenous Aloe spp for the world market.

It is estimated that 33% of drugs produced in the developed countries are derivatives of compounds originally isolated from higher plants. Twenty five (25%) of these owe their origins to the tropical rain forests of Africa, Asia and South America. These products are estimated to

have an annual retail value worldwide of about \$65 billion where microbes, fungi and others comprise 80% and 20% from higher plants (Mwangi 2007). These are just indicators that demand for health products from natural products are on the rise and have great economic and social development potentials.

The traditional medicine practitioners have formed associations and practice openly. Some are well recognized

Cultural fulfillments

The environment and some natural resources play an important role in maintaining and fulfilling certain cultural requirements of individual and communities so that they remain in peace with nature. These are cultural, religious and recreational facilities, sites, paraphernalia and other tools and equipment. These are gotten from sacred animals, trees, sites like special forest sites, caves, and mountains. Special culture forests in Kenya include the Kaya sacred forest of the Mijikenda people at the coast; the Njuri Njeke sites of the Ameru people, Mukurwe wa Nyagathanga in Muranga for the Agikuyu people. Other sacred sites include the caves of Mt Elgon and Chyulu hills (NEMA 2004).

Although they are cultural sites, there are individuals and households that make a living out of these sites through their maintenance and use, and more recently through tourism. It is difficult to place monetary value to this activity that revolves around cultural sites.

Security for the community and race

Security for the community and race against human and environmental threats or risks is a collective responsibility of a society. The security is gotten through weaponry (offensive and defensive that are constructed from environmental goods) and fortressing (forts, dykes and levees, dams, bunkers, - all constructed out of local or imported natural resources.

As in the case for cultural fulfillment, there is little analysis on the subject and therefore the number of people, households or monetary value of this livelihood system is scanty.

Contribution of environmental assets to the achievement of the MDGs and PRSP

National poverty reduction strategy plans (PRSPs) and Millennium development goals (MDGs) have evolved out of the Agenda 21 that was adopted in Rio in 1992 by UNCED. Agenda 21 established the inter-linkages between environment and social and economic development. Thus the poverty–environment nexus has come to be accepted. PRSPs are internationally now accepted as the national strategies alleviate poverty. Most PRSPs were developed between mid 1990s and 2005. MDGs were adopted by the UN General Assembly in 2000. The MDGs are a set of quantified and time-bound goals and targets for dramatically improving the human condition by 2015. DFID et al (2002) have further shown clear linkages between poverty reduction and environmental management and therefore linkages with PRSPs and MDGs as means of effective interventions.

The Kenya Government with the support of UNDP has carried out a needs assessment for a number of the 8 MDGs and 12 targets. The reports assessed the challenges to meet each goal and target, identified necessary interventions including policy interventions, and finally defined the needed resources to implement the interventions. All were done with intention of realigning and ensuring that the interventions also address the PRSP's main issue of poverty reduction as the overarching goal. Because some of the MDG and targets are directly or indirectly linked to some of the environmental provisioning services, they are a target or part of most of the recommended interventions. A sample of the major interventions and recommendations are as follows (RoK 2006a, b, c, d, e):

Goal 1: Eradication of extreme poverty and hunger

- Prioritize agriculture and rural investments through increased budgetary support
- Review and harmonize the legal, regulatory and institutional framework and ensure stable and fair macroeconomic and trade policies that level playing field

- Raise the productivity of smallholder farmers and to encourage private sector participation/ investments in food security;
- Improve small scale irrigation, soil and water conservation and environmental management;
- Improve delivery of research, extension and advisory services;
- Increase access to quality farm inputs, financial services and credit;
- Take measures to improve access to markets, value addition and rationalization of taxation in agricultural sector;
- Comprehensively address nutritional issues;
- Establish and improve rural infrastructure
- Address cross cutting issues

Goal 7, target 10: Providing sustainable water and sanitation services

- Promote water supply access through: household connections, public stand posts, boreholes with hand pumps, rainwater collection, protected dug wells;
- Promote sanitation access through: conventional sewerage, septic tanks, pour flush toilets, ventilated improved pit latrines;
- Ensure the synergies between the following:
 - access to safe water supply and sanitation with health of the people,
 - assured water supply and land use and settlements;
 - improved access to safe water supply and sensitivity to gender issues;
 - water supply and safe environmental sanitation;
 - access to safe water and sanitation with education of the children;
 - Time saved through supply of water and the fight against hunger.
- Development of water resources for food production through irrigation by:
 - Addressing the critical challenges facing irrigation and drainage development
 - Development of a national irrigation and drainage policy;
 - Development of legal framework
 - Irrigation and drainage development
 - Rehabilitation/ modernization of irrigation and drainage infrastructure in schemes;
 - Establishment of capacity building of critical government institutions
 - Establishment and capacity building of farmers' organizations

Goal 7, target 9: Ensuring environmental sustainability. Interventions will focus on:

- Formulation of a national environmental and natural resources policy framework especially covering environmental accounting and management and enforcement of environmental actions;
- Fisheries and other aquatic ecosystems conservation and restocking
- Land degradation to include on-farm tree cropping and market based development to include value addition and marketing
- Forests and other terrestrial ecosystems to include up scaled management and conservation of natural forests, establishment and managements of industrial forests by public and private sector, wildlife management and conservation.
- Climate change and pollution to include information gathering and dissemination.

Further, linkages for synergy were made between goal 7, target 9 with various other goals and targets eg:

- MDG 1, target 1: Halve, by 2015 the proportion of people whose income is less than \$1.00 a day
- MDG 2 target 3: Ensure that, by 2015, children everywhere, boys and girls alike, will be able to complete a full course of primary schooling;

- MDG 3, target 4: Eliminate gender disparity in primary and secondary education, preferably by 2005, and to all levels of education by 2015.
- MDG 4, 5, 6 as far as health is concerned
- MDG 7, target 10: Halve by 2015 the proportion of people without sustainable access to safe drinking water;
- Energy as having been recognized as an important target area in Kenya.

Having established a coordination office at the Ministry of Planning and National Development for integrating MDGs into the main development frameworks, the Government of Kenya has indicated its determination to achieve the MDGs. The needs assessments were carried out by the coordination office.

6. Natural resource governance (rights, equity including gender, devolution)

Devolution of natural resource governance to people and communities

Environmental governance in Kenya consists of various legislations, standards, regulations, and institutions that implement them. Before the enactment of the Environmental Management and Coordination Act (EMCA 1999) as an overarching framework law, environmental laws in Kenya were scattered and many. Some were out-dated and working at cross-purposes with each other (NEMA 2003). The National Environment Management Authority (NEMA) and subsidiary bodies implements EMCA.

EMCA devolves administration of a number of environmental and natural resources management issues to communities. The devolvement includes the structures that oversee the issues at various levels.

For example, at the national level there is the National Environment Action Plan Committee (NEAP) which facilitates the integration of environmental considerations into policies, plans, programs and projects. It is supposed to prepares a national environment action plan every five years.

EMCA also created the Provincial and District Environmental Committees (PECs and DEC)s. They are responsible for the proper management of the environment within their jurisdictions (provinces and districts).

Further EMCA gives power to organized and registered communities to formulate environmental actions and /or conservation and management plans of areas of particular interest to them. However these environmental actions and management plans must be vetted and approved at various levels before approval and registration by NEMA. They have proved to be rigorous, time consume, expensive and sometimes politically charged. Thus many communities have not been able to reap benefits from their resources.

The mushrooming of community conservancy areas is a case in point. There are many success stories and many failures and disappointments. The success or failure in many cases come about because of the land and tenure system in application, level of education and awareness of community leaders, the applicable laws and politics.

The EMCA also provides for devolution of management responsibilities to lower levels sectorally, which allows for the lead agencies and departments to integrate environmental issues in all policies, programs, plans, and projects at the various levels.

Since the enactment of EMCA in 1999, the main sectoral policies and laws have undergone or are in the process of reviews so that they are responsive to the current time issue and in tandem with EMCA's requirements. Some of these requirements are that they need to devolve management of the environment and natural resources up to community levels. Those that have successfully gone through include the Water policy and act (2002) and the Forest policy

and Act (2005). Under review are the constitution, national land policy and acts, the wildlife management policy and act, the mines and geology policy and act, biotechnology and bio-prospecting policy and act among others.

In all these review the participation of communities in the formulation and eventual participation in implementing the legislations is emphasized.

Other than being accorded the powers to manage their resources, the thorny issues are always in the arena of tenure (ownership, rights and access), equity, and gender sensitivity and considerations at all levels. It is hoped that the constitutional debates will come to an end so that all the acts and those under review will be anchored in the Constitution.

Traditional and customary institutions in the governance of natural resources are however strong in many communities and are often used alongside the official structures.

How improved governance improves rural people's livelihoods and reduces risks

Of critical importance to Kenyans is the formulation of the national land policy and anticipated act. The policy is intended to consolidate the many different types of acts and tenure systems into one coded system. It will address the tenure issues of public land, community land, land rights of minority communities, freehold tenure, leasehold tenures, informal settlements, resource tenure policy, community interests and benefit sharing, pastoral land tenure, and equitable and sustainable access to land (MoL 2006).

Further, the land policy will examine complicated issues of land use management: sustainable land use issues, land use planning issues, environmental management issues, ecosystems protection and management issues.

When adopted the land policy will have far reaching implications on ownership, access, rights, use, management, and sharing of benefits accruing from the land and natural resources thereon.

This policy will operate side by side with others already enacted or under debate currently at various levels including that of Convention on Biological Diversity (CBD) on Access and Benefit Sharing (ABS) of genetic resources. Currently the national and international legal regimes on ABS are unclear and uncoordinated. This has led to bio-piracy of genetic resources for various commercial uses with the indigenous populations not benefiting although they are the main custodians of the genetic resources.

Therefore ownership to resources by the communities will give them rights to demand for a equitable share of the market value of various products from their land or ecosystems. They will therefore realize the value of the resources and form livelihoods around the resources. This will reduce the risk of environmental and natural resources degradation.

Extent to which policy and laws are being put into practice on the ground

Policy and legal reforms on land and natural resources are political mines in Kenya. Ownership of land and resources evokes emotions. This is what led to the struggle for independence and the debate continues up o now and especially intensified in the last ten years. The political leaders have been calling for reforms starting with the constitution. But it has taken this long to come to three sector reforms (environment, water and forest) and draft constitution and draft land policy. On the ground however some communities go ahead of policy and laws. For example community conservancies are in place and some working well ahead of wildlife policy review; water user associations were formed ahead of the water policy and act; and individual and community forestry is ahead of the forest policy and act which will promote the activity.

However, implementation of official policy and legal pronouncements and rhetoric is always mixed. This is because implementation depends on resources, capacity, determination and

will. The loss of forests is a case in point where the policy is to stop invasion, loss and degradation of forests in Kenya but this continued unabated for a very long time.

For example the rhetoric and EMCA requirement that a NEAP be formulated every five years and facilitate communities formulate own environmental and natural resources management and action plans are often heard but on the ground communities are still ignorant or find difficulties in going through the process because of various reasons including legal hurdles and knowledge on how to do it as well as appreciation of the benefits that could accrue from such an activity.

Positive examples include the setting up of the Water Trust Fund. The operations have started and communities are already benefiting from its support. This is an example where communities see benefits seize the opportunities and create demand for the services. The demand for seedlings of the high yielding cloned *Eucalyptus spp* for most ecological zones is another example where the communities are seizing the opportunity to have their own forests or woodlots to take advantage of the high demand for wood-fuel, timber and poles. The law now facilitates this and good prices and income are an incentive.

Equitable distribution of costs and benefits of devolved natural resource governance

As indicated above, all policy and legal reforms undertaken or being undertaken must consider equity including gender equity. There is now a general requirement written or unwritten that all governance structure should include women (at least 30%). In most Kenyan communities women have little or no access to land ownership especially in matters of inheritance. The draft land policy recognizes women among the vulnerable groups whose land rights have to be recognized and resolved. The governance structures will include gender balance while respecting community traditions as far as possible.

The governance structures proposed in EMCA, the water and forest acts also emphasize issue of regional and gender balance. The failed draft constitution in particular was going to place the issue of regional and gender sensitivity as well as equitable sharing of costs and benefits accruing from environmental services at the centre. This would have validated what is getting into common practice and sometimes loosely placed in specific laws. The hope is that with time, the inclusion of women in the governance structures will change the traditional practices and attitudes that were unfavorable to women. Equity would have been achieved; otherwise currently in many communities women are still discriminated in terms of ownership of land and natural resources.

Information, awareness and preparedness of communities on their rights and responsibilities for devolved NR governance

General awareness of the people's rights and responsibilities to a clean environment as enunciated by EMCA is inadequate. This implies that they cannot demand for equitable sharing of environmental and natural resources services like genetic resources, of which they are the day to day custodians.

NEMA has the responsibility of raising this awareness and has drafted an environmental education strategy (NEMA 2003). It is in the same breathe that NGOs are always given the responsibility of awareness raising and advocacy on environmental issues.

The challenges are however many and strategies must equally be varied to suit different communities and layers of society. Different media have to be used – barazas, radio and pictures for those with little formal education especial the rural fork. Print, electronic, workshops and seminars media can be for the educated and decision and policy makers. The outreach can be costly considering the disparity and distribution of the different layers and ethnic groups in different parts of the country in which different communication languages and materials must be used.

A population that is aware of its rights, benefits and obligation will participate and contribute towards the management of the environment. Adequate resources have to be allocated for this activity.

4. Market chains and value adding on Natural Resources:

How communities can better engage in the market to trap more income locally

Over 57% of Kenya's rural population lives below the poverty line of \$1.00 and yet they live in ecosystems that fetch substantial national income through ecosystem services eg biodiversity (ecotourism, harvesting timber, fuel-wood, harvesting of genetic resources, livestock grazing). However because of poverty they tend to over-exploit these resources, which lead to unsustainable use of biodiversity resources. The loss is particularly severe where expansion of crop cultivation is possible. One way of tackling the two issues of poverty and unsustainable use of environmental resources and economic development for poverty reduction is through organized community-based natural resources management (CBNRM) especially in the drylands where vast common resources still abound. Examples in Kenya and elsewhere are many (Awimbo, Barrow and Karaba 2004). The essential message is that CBNRM projects provide opportunities and economic incentives to rural communities, with the hope to reduce pressure on natural resources and therefore deliver more desirable outcomes.

The global natural products industry is currently valued at US\$65 billion per annum and is growing fast (Collins and Welford 2007). These products represent key sub-sectors of food and beverages, cosmetics, herbal medicines, pharmaceutical, gums and resins and biofuels. The ecotourism industry is even larger. However the benefits that trickle down to the community and its members are often meagre when the value of the whole industry is examined. This state of affairs is not unique to the drylands products only but to various other agricultural produce from the developing countries.

To demonstrate the complexity of market chains of any product the example of the livestock and livestock products market chain in Kenya can be used.

Currently the livestock sector in Kenya accounts for approximately 10% of the national GDP and 30% of the agricultural GDP. It employs about 50% of the agricultural workforce and about 90% of the ASAL workforce. Further, about 95% of ASAL households' income is generated from this sub-sector. The national stock base on which this sub-sector depends comprises of about 13 million cattle; 19 million sheep and goats; and 1 million camels.

The main market chains that this economy relies on are in local, national and international marketing of live livestock, meat, dairy, by-products (hides and skin). Pastoralists provide most of the beef stock while the high potential areas provide dairy products. Local market exists while most products end up in the urban centers and the rest are exported (EU 2003).

There are four main livestock and livestock product chains - live livestock, meat, dairy and by-products:

Live livestock layer chain: This chain commences at the farm production/gate level and end in either primary, secondary markets or in local abattoirs. It comprises of the following components: producers, traders and middlemen, primary and secondary markets, stock routes established by Ministry of Livestock Development (MoLD), holding grounds, transporters – trekking and trucking, animal health controls, and terminal markets.

Meat layer chain: Components of this layer include: slaughterhouses in the cities, health controls, traders and middlemen, transporters, butchers and other retailers, and processors.

Dairy products layer chain: Components of this layer include: milk collection centres, dairy processing health controls, traders and middlemen, transporters, retailers, and processors

By-Products Layer chain: The main by-products are hides and skins. Components of this layer include: hides and skins shades, dealers, processors, and exporters.

Players in these market chains are also many:

Players in the live livestock marketing chains include: producers, traders and middlemen including brokers; businessmen including slaughterhouse operators, butchers and exporters; community based livestock development groups; security service providers for trekkers and truckers; transporters especially truckers and trekkers; local Authorities who are owners of marketing facilities and charge cesses; Ministry of Livestock Departments who are veterinary regulators and service providers; NGOs who sometimes support producers to improve productivity and fight poverty.

Players in the meat chains include: slaughterhouse operators; wholesale marketing depots; retail butcheries, shops and owners; meat transporters; large Cold storage and owners; traders; veterinarian and public health workers; local councils; slaughter-men; hides and skins merchants; government departments; meat traders association; meat processors; labourers; exporters; and consumers.

Players in the dairy and by-products chains are equally many as for the live animals and meat chains.

At the end of each chain layer there are various expected products:

- Products of the livestock marketing chain are: health live animals for slaughter and export markets.
- Products of the meat marketing chain include: Fresh, healthy and clean red meat at table for the consumers and processed meat products like sausages, burgers and corn beef.
- Dairy products: Fresh milk and quality processed dairy products.
- Products of the by-products marketing chains include: Quality hides and skins and leather products.

What are the profit margins for each player? With so many chains and players the share of the producer is bound to server especially where powerful middle men and traders collude. There are too many players in each of the various chains. The players keep information to themselves and do not formerly and widely disseminate it. The poor, and most likely illiterate, producer, without information and who is very far removed from the market often suffers at the expense of the rest of the chain players. Figure 5 represents the contribution of gate price, marketing costs and profits to the total consumer price. It shows that the producer prices contribute 45-60%, while the marketing costs range from about 15-25% and profits contribute 20-35%. Figure 6 further shows that the main marketing costs are due to transport, brokers and cess/taxes. This means that if profits, transport costs, cesses/taxes are reduced significantly and brokers eliminated, then the producer prices can be raised.

This is case for the live animals/producer chain. For the other chains (meat, dairy and by-products) where there is value addition through processing, the income totally circulates outside the producer community. Therefore, if the industry is looked at in totality, then the % producer price contribution will fall further from the 45-60% to very low levels. Except for the producer income most of the other moneys in the trade is circulated outside the producer community.

This situation prevails in most of the products from local communities and ecosystems including natural products that the poor communities offer in the market. These include the tourism industry, natural products industry, livestock industry, fisheries industry, the wood-fuel industry and many others.

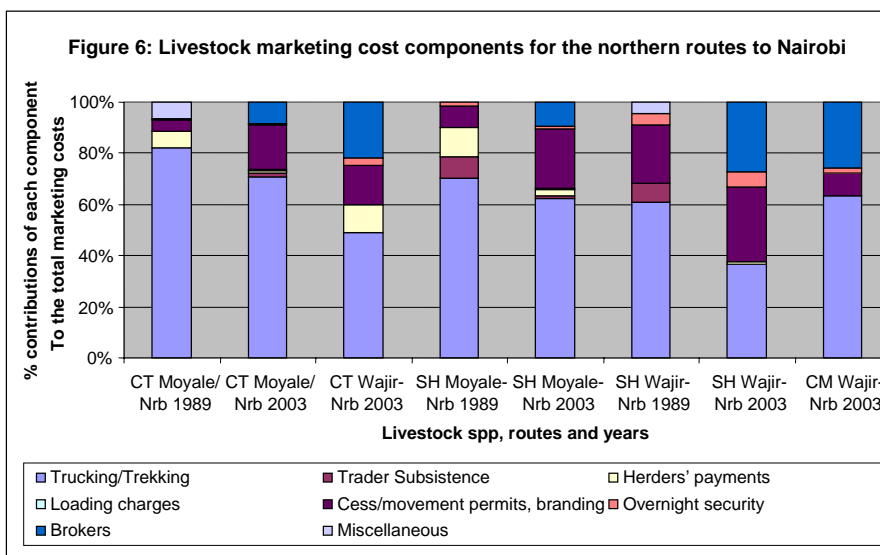
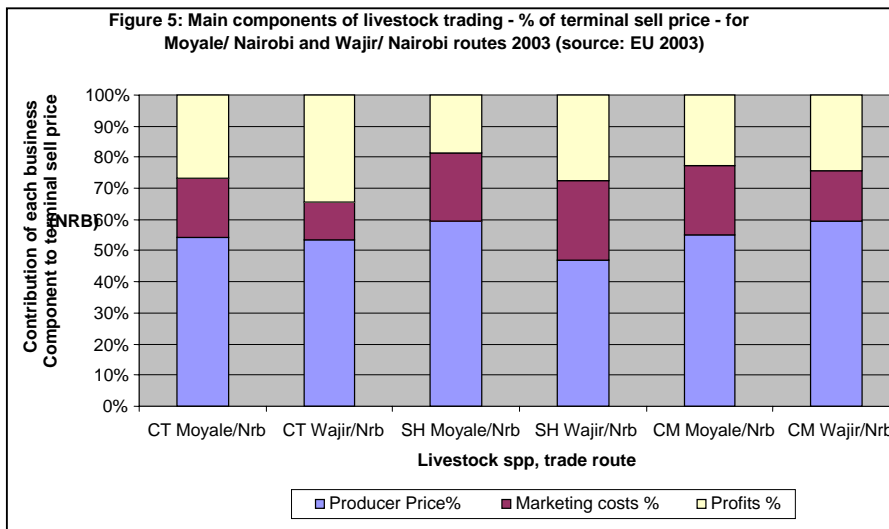
Collins and Welford (2007) have identified six strategies that successful commercialization of natural products from Africa. These are probably applicable to other products and to Kenya as well. These include:

- Supply chain development that include production and processing technologies and quality standards; volumes of production; communications; quality certification and verification; and logistics.
- Trade services to the communities that will focus on local, regional and export markets. The services can include business planning, pricing strategies, product branding, packaging, export facilitation and value addition.
- Product (biodiversity) product research and development that lead to the determination of commercial value properties of the product; quantity of the product available; and technologies most appropriate for the production and processing of the product.
- Market development by proactively identifying potential market partners and then developing close relationships with the partners.
- Long-term investments are a key to success.
- Regulatory negotiations. Regulatory mechanisms are often a big hurdle for the success of commercialization of products locally and in international markets. Most developed countries have stringent restriction on new products entering a market and its therefore necessary that negotiations at high levels be conducted successfully.

New approaches and instruments being developed include payments for environmental services. In this respect communities can receive payments or incentives from another party for adopting sustainable ecosystems management practices that improves ecosystem services and goods for the paying part. Such payments for ecosystem services may include payments for watershed protection, biodiversity markets like ecotourism and herbal medicine, and carbon sequestration / carbon trade which are payments for planting trees to absorb carbon to offset the payer's carbon emissions. A feasibility study is being carried out in the Baringo basin by DDC in collaboration with ICRAF and RAE to establish the viability of this carbon trade approach for communities (UNDP 2007).

Further to the above marketing strategies, rural people can better engage in the market so that larger proportions of income from natural resources are trapped at the community and family levels through three actions that can be derived from the above livestock market chains:

- Shorten the market chains and control marketing cost elements in order to benefit producers;
- Provision of market information to all players so that the market stabilize on correct pricing of products;
- Evolve governance structures that ensure active participation of all players – producers, businessmen (investors) and consumers.



Policy, institutional and structural impediments for market engagements and the solutions

As implied in the above analysis there may be four main challenges for the development of markets in order for communities to gain meaningful livelihoods from their natural resources and products:

- Weak policy and legal frameworks** in support of local communities and their products. For example the lack of implementation of the CBD regulation on access and benefit sharing of genetic resources has not helped rural communities and the country continues to loss resources unabated. Institutional capacity at NEMA to enforce the regulation may be responsible for this weakness, compounded by lack of awareness by the rural communities. Capacity building and awareness raising can alleviate the problem.
- Poorly developed markets.** Market access development must be supported by government and interested groups. The poor communities can not be expected to do this. Lucrative but informal markets exists for product of plants like the *Osciris lanceolata* (sandalwood), *Aloe spp*, *Prunus africana*, *Acacia senegal*, *Jatropha spp*, *Commiphora spp*, neem tree products, gum arabica, and various indigenous vegetables that are uniquely rich in various nutritional elements. However their markets are not developed

and this needs long term investments and determination by the government. Actions by the government can also include tax breaks, subsidies and promotions to enable them have a competitive edge in the international markets.

- **Low productivity and lack of standards and quality control mechanisms** in support of the communities and their particular products. Production and processing technologies and quality standards must be provided to the farmers so that they can increase production volumes to economic levels. This should be accompanied by government recognition, certification and verification for universal acceptability and market development.
- **Inadequate market information** that will act as incentives to the rural people and investors alike. This is extremely important for local communities to act as conservation agents for their own economic and social development.

In the international trade arena the poor farmers from developing countries are disadvantage. Advantage should be taken at the international forums to advance these concerns and available instruments include the Multilateral Environmental Agreements (MEAs) and other bodies like UNCTAD, WTO and Doha Round Agreements; and CBD protocol on access and benefit sharing of genetic resources currently being negotiated.

How communities can sustainably process and value-add on NR based products

The livestock and livestock products market chains is an example where a community's labor is not equitably rewarded. The marketing cost elements especially those of high transport costs, brokering, transit security, various cesses and taxes, and loss of animal quality can be avoided if processing were to be done close to production sites. This will, in addition, create employment to community members.

Unfortunately investments for any products at the local level mean that there should be in place several incentives for the investor who may be the community, the government, or independent investor or all working together in partnerships. These may include tax breaks, assurance of a minimum production volume and quality, existence and access to the market and returns in minimum time. These are investment conditions that the government must create to support the rural people. The aloe growing and processing plant in Baringo is a case in point where the community has partnered with Kenya Agricultural Research Institute (KARI) and an investor to ensure farmers grow quality aloe and have a ready market and processing facility within the community.

Beekeeping and honey processing is becoming more and technically available to a large number of communities. Processing can be done at the community level while certification can be done by Kenya bureau of Standards (KeBS). However organized local and export marketing is still lacking. Beekeeping and honey production is environmentally sustainable and socially and economically beneficial.

Ecotourism may be environmentally sustainable and economically beneficial but may cause loss of cultural traditions and values.

The production and processing of most other natural products from the species mentioned above – *Osciris spp*, *Aloe spp*, *Prunus spp*, *Acacia spp*, *Jatropha spp*, *Commiphora spp*, neem tree products, gum arabica, and various indigenous vegetables – should be socially and economically beneficial but some incentives and controls to prevent over-exploitation must be in place for that to be environmentally sustainable.

Market chains for NR products – their equity and efficient

The market chain for the natural products at the lowest level includes the producers/suppliers who may be individuals or communities, who produce or gather the raw materials from the ecosystem. The communities may be supported to produce, gather the products by technical

support from line technical government departments or NGOs. Raw material buyers/businessmen together with transporters are a set of players in the chain that will enable the processing investors receive the raw materials. Investors for processing the products locally or away from the producer community are an important group in the market chain.

After processing, finished product promoters and distributors take over. This group may also include product promoters, transporters and final outlet traders. The products consumers are the last and most important group. Without a demand for a product its value is zero. This demand or market can be developed through long term strategies by government, businessmen and other stakeholders.

5. Natural resource economics and national accounting:

Reflection of NR in national accounting and other measures of national growth

Only part of environmental service provisions are accounted for in the national accounting system directly or indirectly in the GDP. Natural resources that are formally marketed as goods and services appear in the national accounting systems. Non-market environmental services and products are not reflected in the GDP at all and four examples will suffice.

The marketed volume of timber from state and private forests are aggregated and given a value annually. The sector player are many and spread from the production sites to urban settlements where timber is needed for furniture industries, paper mills, construction industries and many others. The contribution of the timber industry in terms of employment and export earnings are also reflected in the national accounts. However the contributions of ecosystems to enable that timber grow to harvestable stage by various ecosystems is not reflected.

Tourism in this country is largely based on wildlife viewing with quite a number of tourists going for the sun and sand at the coast although this may also be combined with sea surfing and marine wildlife viewing at the various Marine Parks. A lot of income generated through tourism. It is the second foreign exchange earner after tea. Tourism supports other sectors like agriculture, transport and hospitality industry. The wildlife conservation areas (parks, reserves and sanctuaries) on which tourism depends are often not complete and self-sufficient ecosystems. The neighboring community lands are always the dispersal areas for the wildlife and it is estimated that about 70% of Kenya's wildlife live outside conservation areas (WRI et al 2007). However most of the income is spent and circulate far away from the communities or conservation areas. The income is categorized as tourism but not always directly linked to the services provided by the ecosystems upon which the tourism is based.

Water is important for many sectors. Apart from domestic use, water is extremely important for the national economic and social development. It has a major role to play in agricultural (crop and livestock) production, the mainstay of Kenya's rural economy and in hydropower generation for lighting and industrial production. Water is a raw material for all manufacturing and service industries. However, this resource is becoming scarcer and scarcer every year. Most of Kenya's water is capture through rainfall and slowly discharged from five major 'water towers' – Mt. Kenya, Aberdares Range, Mau escarpment, Mt. Elgon and Cherangani Hills.

The contribution of the water sector is reflected in the national economy in terms of what is formally marketed through the main supply lines and employment opportunities in the water supply sector. The services that the tower ecosystems play in capturing, storing, purifying and systematically discharging to various communities and urban settlements is not reflected in the national accounting books.

Currently the livestock sector in Kenya accounts for approximately 10% of the national GDP and 30% of the agricultural GDP. It employs about 50% of the agricultural workforce and about 90% of the ASAL workforce. Further, about 95% of ASAL households' income is generated from this sub-sector. The national stock base on which this sub-sector depends comprises of about 13 million cattle (3m dairy and 10m beef); 19 million shoats (10m goats and 9m sheep); and 1 million camels EU 2004). Therefore the importance of pastoralism in the ASALs as livelihood system and contributor to the national economy cannot be over-emphasized. The ASAL rangelands provide ecosystem services that support the industry

including maintenance of biodiversity and grazing resources, surface and ground water resources and biodiversity. These services are not reflected in the national accounts. It can only be said that it is partly and indirectly accounted for through the livestock industry.

Ignorance and/or non-recognition of these services lead to invasion of these areas and subjecting them to unsustainable agriculture and loss of grazing lands and biodiversity. Eventually pastoralism and the livestock industry will be affected.

There is therefore a need to map out ecosystem services provided by various regions and ecosystems that will enable land use zoning as proposed in the draft land policy. The non-marketed services can be approximated and each ecosystem will have its importance and particular services that it offers and therefore be conserved appropriately. The RoK (2006d) reckons that environmental services accounting is not carried out in Kenya because of inadequate capacity in environmental assessment, accounting and audit as well as monitoring and evaluation. Capacity building in these areas needs to be strengthened to address the existing gaps.

Indicators that reflect the value of the NR in the PRSPs and the performance of MDGs

The MDGs needs assessment reports have identified very specific interventions and activities to achieve the MDG targets. In most of the assessment reports, milestones and or specific targets to be achieved within fixed timeframes are provided in the intervention plans. What is not provided for is the means of measuring the indicators, targets and milestones.

Extent to which NR assets are reflected in national and regional marketing and trade

The main natural resources traded and reflected in national trade include:

- Timber and timber products that include paper
- Fuel-wood and charcoal
- Non-timber forest products especially honey
- Mineral resources including quarrying
- Fish industry
- Mineral/ bottled water
- Hydropower
- Piped water serviced by various to entitties
- Ecotourism

At the regional level little trade goes on in natural resources products. However there is increasing demand for timber and timber products including poles. This is due to the acute shortage experienced in the country especially after ban on logging in state forests. Historically Uganda has been supplying hydropower from Njinja for decades. But due to high local demand for the same power the Kenyan share has been decreasing over the recent years. A high tension line will soon be connected from the southern states to meet local demand for electricity.

The main reason why there is little trade between the states is because the products are the same and there is no value addition to most of them. Cross-border can be improved by putting in place value addition processing plants in any of the countries to encourage export of the raw material and may be importation of the finished product.

Use of SEA for integration of environmental aspects into the sector activities

Strategic environmental assessments (SEA) are rarely done formally for the different sector programmes in Kenya. The effect is omissions and none integration of environmental aspects of relevance to the sector. What of recent is being done in retrospective is mainstreaming of environmental issues into various national development strategies and programmes.

Mainstreaming of environmental concerns should ideally be formal and done as the plans or strategies are being developed. This will become a culture in future.

6. Emerging issues

Key emerging issues and how they impact or are impacted by environment and NR base

A subjective ranking of the importance of emerging issue in Kenya will be as follows, with HIV/AIDS ranking at the top:

- HIV/AIDS and other pandemics,
- Conflict and insecurity
- Effects of globalization
- Invasive species,
- Climate change and adaptation,
- GMOs,
- Carbon trade,
- “food miles”,

Four examples will suffice.

HIV/AIDS and other pandemic

Although HIV/AIDS prevalence is on the decline in Kenya, the pandemic has had and continues to have significant impacts on the environment due to the loss of the productive members of society who would normally take care of the environment. Since 1986 more than 75% of all AIDS cases occur in adults between the ages of 20-45, the most productive age bracket in society in every aspect. Prevalence rates peaked at about 13% in the year 2000 but the good news is that this has been declining steadily and stood at about 6.5% in 2003 (RoK 2006e).

The negative impacts are that the youths to middle aged are the most affected. They are the main bread winners, field producers or workers in all sectors including agriculture. It therefore means that food production declines and the nutritional status of the affected family members deteriorate. Land care becomes secondary and the environment is further affected. Poverty becomes further entrenched and acute. Any opportunity to exploit natural resources anyhow just to survive becomes instinctive. This leads to further degradation of the environment including loss of biological diversity.

AIDS has no cure but many medicine men have claimed to have herbal medicines that alleviate the suffering of victims or suppress significantly the virus. In such cases then the environmental resources are contributing to the health of victims positively.

Conflicts and insecurity

The Horn of Africa is a zone of various conflicts and Kenya has its share of internal conflicts. The conflicts are diverse and unpredictable. The Kenyan conflicts are mainly land and natural resource use based. They may be at household level, inter-clans, inter-ethnic level and sub-national levels. They sometimes occur along national borders between neighboring groups. A part from the conflicts being resource-based, they are further fueled because of failed governance mechanisms; acute poverty; urge to preserve a group's identity when they feel threatened. The conflicts are sometimes politically instigated. The prevalent circulation of small arms in the region has made the situation worse.

Frequent droughts that causes decline in water and grazing resources leading to loss of livestock assets make groups very vulnerable to hunger and poverty. They resort to violent rustling to restock. Retaliations are normal and the cycle continues. In Kenya, such conflicts occur between certain ethnic groups year after year.

Conflicts in neighboring states have lead to a situation where Kenya receives an influx of refugees. At one point in the late 1990s the population of refugees in four main camps was about 350,000 people.

The conflicts affect the environment in various ways:

- Refugees concentrate in generally safe areas and strain natural resources base to the extreme in terms of water, fuel-wood, and grazing requirements. Health services in many cases also rely on herbal medicine.
- Resource conflicts lead to over concentration of livestock in areas with combined security, grazing and around watering points. This leads to resource degradation around the watering points.
- In many instances populations may take refugee at particular centre where security and food aid is provided. The areas around such centers become severely degraded. This may include loss of plant cover and biodiversity due to grazing, herbal medicine and fuel-wood demands.

Examples are the Daadab and Kakuma refugee camps in Garissa and Turkana respectively for international refugees. Camps for local refugees are scattered all over the dryland district especially in Marsabit, Samburu, Turkana, Isiolo, Pokot and Nakuru.

Effects of globalization

Information and communication technology (ICT) has enhanced globalization processes and has turned the world into a global village. Global economic integration is being advanced by those with ICT advantages. Globalization has also come to mean 'liberalized or free market'. This is done through intense lobbying and coercion of the poor and vulnerable in international forums like WTO. The rich with their technological advantages including patenting of critical technologies are lording over the poor to liberalize trade when in fact they protect theirs through stringent regulatory barriers, subsidies for their farmers, tax holidays for investors and so on while enforcing 'free trade' on the poor developing countries. The result is uncompetitive pricing of commodities from poor countries. The poor farmer therefore has to cultivate large fields to produce enough for selling in exchange of a small item from the north. This is what is thought to cause severe desertification in many of the sub-Saharan countries Kenya included.

Invasive plant species.

Kenya has been adversely affected by invasive plant species. The most famous are the aquatic water hyacinth that has affected the environment and fisheries of Lake Victoria for about 15 years now. The second is the range plant *Prosopis spp.* They are native plants to South America and North America respectively.

The invasive plants establish and colonize new environment very rapidly and thus affect socio-economic fabrics of the communities. *Prosopis* was intentionally introduced in the country to control land degradation. However, how the water hyacinth was introduced into the region is not clear. Most probable it came in as an ornamental plant.

Both are causing fundamental changes to ecosystems structurally and services they provide to man. The *Prosopis* for example has colonized swaths of land in Margat Baringo to the extent that residents are protesting to the Government that the indigenous plant species are being suppressed and phased out. Although the *Prosopis* pod and leaves are nutritious to the livestock, they sometimes are out of reach because the dense thickets they form are impenetrable. The thorns of *Prosopis* are hard and prick both animal and man causing septic wounds. The community took the Government to court for introducing the weed and demanded for its eradication from the area and reparations to the community for losses so far incurred. Its eradication could be very costly.

However, other parties claim that the plant can be put into so many uses that there would be no need to require the government to remove it (Ecoforum 2006). These include:

- Fodder for livestock: the leaves and pods by direct ingestion, or by grinding the pods for rainy days.
- Honey from *Prosopis* flower is of highest quality
- Charcoal making because the stems are hard woods and suitable
- Shade tree in this area of hot and dry climate
- Hard wood timber for furniture and building poles and rafters for traditional huts
- Some *Prosopis spp* produce commercial gums of high quality similar to that of *Acacia senegal*.

Eradication of the water hyacinth has also proved elusive. Economic uses of this aquatic weed have been tried but because the plant comprises of over 98% water, it has proved to be expensive to economically harvest it.

Strategies and actions that can be used to better integrate emerging issues into national development and environmental planning processes

Intensive and integrated research and development on various emerging issues is one way of facing the emerging challenges. The *Prosopis spp* could be turned into a gold mine if the uses enumerated above are feasible.

In the case of invasive species, phytosanitary regulations at the international entry points need to be enhanced. This would have reduced the chances of introducing the hyacinth as an ornamental plant in the region. This also means that there is need for international cooperation in the control genetic materials entering the region. The weed could have been introduced through any of the Lake Victoria catchment’s states.

7. Conclusions and Recommendations

- (i) Development is about enhancing the livelihood of people, particularly the poor. A livelihood is the means of living that people in a household build through access to and use of the assets they need for this purpose. Of the five categories of livelihoods capital assets (human, social, natural, physical and financial), natural capital is most critical for livelihoods of communities. Natural capital include: natural resources stocks – the land, water, wildlife, biodiversity, grazing etc. Land degradation therefore is a threat especially to rural livelihoods.

Livelihoods – wealth creation and poverty reduction

- (ii) Ecosystems and their natural assets provide four major services to man: provisioning services; regulating services; cultural services; and supporting services. The provisioning services are the most directly relevant to livelihood systems for the creation of wealth and poverty reduction. The ecosystems provisioning services including man’s basic needs that ensure his survival: food, clothing, water, energy, shelter, health, cultural fulfillment, security. Livelihoods, wealth creation and fight against poverty are built around these basic needs.
- (iii) The per capita availability of certain finite natural resources like water, energy sources is increasingly becoming critical because of rapid population growth and demands. This is leading to the un-sustainability of their utilization and degradation. This is exacerbated by changing consumption patterns and attitudes of the people.
- (iv) Low agricultural productivity, increasing population and high poverty levels have resulted in over 50% of Kenyans being food insecure. These are indications that the ecosystems’ natural resources are being overstretched, degraded or even being inefficiently utilized in the provision of food production. Land degradation and desertification are therefore of great concern to Kenya. They cause food insecurity, famines, poor health, and poverty intensification.

- (v) The production of fibers for clothing especially cotton and wool has significantly declined over the last 10-15 years due to the structure of world market for these commodities rather than because of environmental degradation. This decline contributes greatly to poverty intensification to the production areas due to lack of alternative livelihoods.
- (vi) Annual per capita availability of fresh water is declining rapidly due to rapid population growth. The per capita water availability is already at 930m³, which is below the recommended 1000m³, making Kenya be designated as a water scarce area. It will be below 235m³ by the year 2025 if appropriate conservation interventions are not put in place.

It is therefore recommended that water harvesting and conservation measures including recycling must be put in place in order for this resource to continue sustaining livelihoods and industrialization of the country.
- (vii) Biomass energy contribution to total national energy demand by all sectors is 80.5%. The rest is from fossil fuel (18.0 %) and electricity (1.4%). This underscores the contribution of biomass fuels to livelihoods in the country. The scarcity of biomass fuel is already biting and measures are urgently required on the ground to address the situation. This is reflected in the rising prices of charcoal and firewood in the market.
- (viii) Supply of timber for shelter, furniture, housing and settlements relies on protective and productive forests which have continued to experience high pressure and now stands at 1.7% of the country's land area while the internationally recommended cover should be a minimum of 10%. Yet good housing and human settlements is a function of availability of cheap materials especially timber. Therefore in the long run private and community forests have to contribute significantly to meet the ever increasing demand for timber and poles. Farmers are already responding to the high demand for wood by planting woodlots in their land parcels especially in the high potential areas where the acute shortages are felt.
- (ix) Forests contribute significantly to people's health (diseases and mental). It is estimated that 33% of drugs produced in the developed countries are derivatives of compounds originally isolated from higher plants. Further, about 80% of Kenyans rely on traditional and herbal medicine due to poor infrastructure, few doctors and conventional medicine is more expensive. Some herbal products are now appearing in supermarkets. Annual global aloe market alone is valued at US\$20 billion. This has motivated some Kenyan communities start domesticating indigenous *Aloe spp* for the world market. Because of demand, it has also motivated traditional medicine practitioners to form associations and practice openly.
- (x) Contribution of environmental and natural resource assets to the achievement of the MDGs and PRSP have been recognized by the Government. For some, linkages between natural resources assets and the achievement of the MDGs have been demonstrated and then mainstreamed into the PRSP and Economic Recovery Strategy (ERS). This has particularly been carried out for Goal 1 on eradication of extreme poverty and hunger; Goal 7, target 10 on providing sustainable water and sanitation services; Goal 7, target 9 on ensuring environmental sustainability; as well as for energy requirements. Establishment of a coordination office for MDGs indicates the government's determination to achieve the MDGs.

Natural Resources Governance - rights, equity and devolution

- (xi) Governance over natural resource is in the process of being devolved to the lowest accountable bodies, and communities through the EMCA as well as through the new water and forest acts. Drafts on the constitution, land policy, ASAL policy, wildlife management policy, all embrace the principle of devolution of powers and

structures to the lowest level for natural resources. Despite the on-going devolution processes, the thorniest issues are on land tenure (ownership, rights and access), equity, and gender sensitivity at all levels. Traditional and customary institutions in the governance of natural resources are however strong amongst many communities.

- (xii) Improved natural resource governance will improve rural people's livelihoods and reduce risk tremendously mainly through the proposed national land policy and subsequent bill. The policy streamlines and strengthens the tenure systems, is gender sensitive, and devolves the administration of land issues to district levels. It further addresses issues and management of sustainable land use including ecosystems protection and land use zoning. Other policies under consideration under different laws are on access and equitable sharing of resources.
- (xiii) Ownership of resources will give communities rights to equitable share of the market value of various products from their land or ecosystems. They will therefore realize the value of the resources and form livelihoods around the resources. This will reduce the risk of environmental and natural resources degradation.
- (xiv) Policy and legal rhetoric are being put into practice on the ground to some extent depending on resource availability and society's perceived needs, economic gains and socio-political sensitivity to the issue. Where community demands exist, there is implementation of the policies. Examples abound in the water and forest sector reforms.
- (xv) Processes of devolution of powers, gender sensitivity and equity are on-going debates and being implemented gradually, sometimes ahead of legislations. It is therefore hoped that equitable (including gender equity) distribution of the costs and benefits of devolved natural resource governance, including equity in access and ownership rights, land and resource tenure will soon be part of Kenyan society norms and practices with the backing of various laws and regulations including the constitution.
- (xvi) Rural people and communities are not adequately informed about their rights and responsibilities for devolved natural resource governance, and may not be in position to take on such rights. This is because of challenges in awareness raising and education level that make such an undertaking a big challenge.

Market chains and value addition on natural resources

- (xvii) Rural people can better engage in the market so that larger proportions of income from natural resources are trapped at the community through four main actions:
 - Shorten market chains, number of players and control market cost elements to benefit producers.
 - Provide market information to all players to stabilize market prices.
 - Evolve governance structures that ensure active participation of all players – producers, businessmen, investors and consumers and therefore lead to local value addition.
 - Try new approaches and instruments currently being developed including payments for environmental services.
- (xviii) There are four main challenges for the development of markets in order for communities to gain meaningful livelihoods from their natural resources and products:
 - Weak policy/ legal frameworks in support of local communities and products.
 - Poorly developed markets and especially access to international market.
 - Low productivity and lack of standards and quality control mechanisms.
 - Inadequate market information - incentives to rural people and investors alike.

- (xix) Rural people and communities can better process and value-add on natural resource based products in a manner that is socially beneficial and environmentally sustainable through cutting down marketing costs and the government putting in place supportive policies like incentives for investors that include tax breaks, assurance of a minimum production volume and quality, existence and access to the market and returns in minimum time.
- (xx) The market chain for the natural products at the lowest level includes the producers/suppliers who may be individuals or communities, who produce or gather the raw materials from the ecosystem. The communities may be supported to produce, gather the products through technical support for example from line technical government departments or NGOs. Raw material buyers/businessmen together with transporters are a set of players in the chain that will enable the processing investors receive the raw materials. Investors for processing the products locally or away from the producer community are an important group in the market chain.

Natural resources economics and national accounting

- (xxi) Only part of environmental service provisions are reflected in the national accounting system directly or indirectly in the GDP. Natural resources that are formally marketed as goods and services appear in the national accounting systems. Non-market environmental services and products are not reflected in the GNP at all.
- (xxii) Environmental services accounting is not carried out in Kenya because of inadequate capacity in environmental assessment, accounting and audit as well as monitoring and evaluation. Capacity building in these areas needs to be strengthened to address the existing gaps.
- (xxiii) The MDGs needs assessment reports have identified very specific interventions and activities to achieve the MDG targets. In most of the assessment reports, milestones and or specific targets to be achieved within fixed timeframes are provided in the intervention plans. What is not provided for is the means of measuring the indicators, targets and milestones.
- (xxiv) Natural resource assets are well reflected in national marketing and trade but not at the regional level because little trade goes on in natural resources products between the states. The countries produce similar items and therefore there would be no trade between themselves on the same items. This can be improved by putting in place value addition processing plants in any of the countries to encourage export of the raw material and may be importation of the finished product
- (xxv) Strategic environmental assessments are rarely done formally for the different sector programs in Kenya. The effect is omissions and none integration of environmental aspects of relevance to the sector. What is being done of recent in retrospective is mainstreaming of environmental issues into various national development strategies and programs. Mainstreaming of environmental concerns should ideally be formal and done as the plans or strategies are being developed.

References

1. Awimbo J., E. Barrow, M. Karaba (eds) 2004. Community based natural resources management (CBNRM) in the IGAD region. IGAD, USAID, IUCN.
2. Collins R.A. and L. Welford (2007). New markets and emerging opportunities: The case of environmentally sustainable natural products from the perspective of PhytoTrade Africa. In: Trade and SLM in drylands. ICTSD selected issue briefs.
3. UNDP-DDC 2007. Working with the people to fight poverty in the dry areas of the world. Activity report 2002-2006.
4. DFID, EC, UNDP, and WB 2002. Linking poverty reduction and environmental management: policy challenges and opportunities.
5. EC (European Commission) 2003: Livestock and livestock products production and marketing systems in Kenya. Draft report.
6. Millennium ecosystems assessment (MA) 2003: Ecosystems & human well-being.
7. MA 2005: Ecosystems & human well-being: synthesis
8. Maryland K. and M. Paquin (2007). Agricultural trade liberalization, poverty and land degradation in drylands. In: Trade and sustainable land management in drylands. ICTSD selected issue briefs.
9. MoA, MoL&F 2004 (Ministry of Agriculture and Ministry of Livestock and Fisheries: Strategy for Revitalizing Agriculture (SRA) 2004-2014. Nairobi
10. MoE (Ministry of Energy 2004. Sessional paper No. 4 of 2004 on Energy.
11. MoL (Ministry of Lands) 2006. Draft land policy October 2006.
12. MoWI (Ministry of Water and Irrigation) 2007. National water resources management strategy (NWRMS), 2007-2009.
13. Mwangi, J. W. 2007. Cost benefits analysis of increased investments in genetic resources. Paper presented at workshop on strengthening capacity of Kenyans for biodiversity implementation. PA/ UNEP-DELCA
14. Mwangi, A. 2007(b). Policies and institutions for promoting sustainable land management in drylands through trade. In Trade and sustainable land management in drylands, ICTSD publication.
15. NEMA (2004): State of the Environment (SoE) Report 2003, Kenya.
16. Office of the President (OoP) 2006. Sustainable development policy of the ASALs draft.
17. UN-ESA 2003 (UN Dept. of Economic and Social Affairs): <http://www.esa.ppt>
18. RoK (Republic of Kenya) 1999: National poverty eradication 1999-2015.
19. RoK 1999. Environmental management and coordination act (EMCA) 1999
20. RoK 2001. Poverty reduction strategy paper (PRSP) for period 2001-2004
21. RoK 2002. Water act 2002
22. RoK 2002. Water Policy 2002.
23. RoK 2005: The Forest Act, 2005
24. RoK 2007: The Kenya Forest Policy, Sessional Paper No. – of 2007
25. RoK 2006a: MDG needs assessment report on requirements for Goal 1: Eradication of extreme poverty and hunger.
26. RoK 2006b: MDG needs assessment report on requirements for Goal 7 target 9: Ensuring environmental sustainability

27. RoK 2006c: MDG needs assessment report on requirements for Goal 7 target 10: Providing sustainable water and sanitation services.
28. RoK 2006d: MDG needs assessment report on requirements for Goal 7 target 11: Improving the lives of slums dwellers.
29. RoK 2006e: MDG needs assessment report on requirements for Goal 6: Combating HIV/AIDS, malaria and tuberculosis
30. RoK 2006f: MDG needs assessment report on requirements for Goal 2: Achieving universal primary education
31. RoK 2006h: MDG needs assessment report on requirements for the energy sector: an enabler for achieving MDGs.
32. UNDP and EU 2006. Improving market access for drylands commodities: Regional Policy workshop Report. Held at Nairobi safari Club, 2006.
33. UNDP 2006: Land rights reform and governance in Africa.
34. UNDP and EU 2007. Improving market access for dryland commodities in East Africa. Synthesis report. DDC Nairobi
35. UNEP 2002. Africa Environment Outlook (AEO): Past, present and future perspectives.
36. Waweru S. (2006): Taming the 'devil tree'. Ecoforum Vol. 27 No.3. ELCI
37. WRI (World resources Institute) 2005. Website: <http://earthtrends.wri.org>
38. WRI, DRSRS, CBS, and ILRI 2007. Nature's benefits in Kenya: An atlas of ecosystems and human well-being.