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Abbreviations and acronyms

AGL:	Land and Water Development Division, FAO
AGP	Plant Production and Protection Division
DRSRS	Department of Resource Survey and Remote Sensing
EMCA:	National Environmental Management and Coordinating Act
FAO:	Food and Agricultural Organization of the United Nations
FAO/HQ:	Food and Agricultural Organization Headquarters
FAOR:	Food and Agricultural Organization Representative
FD:	Forestry Department, FAO
FIRI:	Inland Water Resources and Aquaculture Service, FAO
FNPP:	FAO Netherlands Partnership Programme
FORM:	Forestry Resource Development Service, FAO
FRA:	Forestry Resource Assessments
GIS:	Geographical Information Systems
GPS:	Geographical Position System
GDP:	Gross Domestic Product
INRA:	Integrated Natural Resources Assessment
KIFCON:	Kenya Indigenous Forest Conservation Programme
MWRDM:	Ministry of Water Resources Development and Management
MTU:	Multi-sectoral Technical Unit
NEMA:	National Environmental Management Authority
NC:	National Consultant
NGOs:	Non-Government Organizations
NPC:	National Project Coordinator
SC:	Steering Committee
SoW PGRFA	State of the World and Plant Genetic Resources for Food and Agriculture
TCDC:	Technical Cooperation among Developing Countries
TCP:	Technical Cooperation Programme of FAO
TM:	Landsat Thematic Mapper
UNDP:	United Nations Development Programme
UK:	United Kingdom
WEHAB	Water, Energy, Health, Agriculture and Biodiversity
WSSD:	World Summit on Sustainable Development
W/M:	Work Month

1 Background and justifications

1.1 Geographic and socio-economic background

1.1.1 Location

Kenya lies on the eastern coast of the African Continent, between latitudes 5°4' north and 4°40' south and between longitudes 33°50' and 41°45' east (Figure 1). The Equator bisects the country almost two equal parts. Most parts of the country lie within the Sudano-Sahelian belt.

It shares boundaries with the Republic of Uganda to the west and the United Republic of Tanzania to the south, and is also bordering the following countries: Ethiopia in the north, The Republic of Sudan to the north-west and the Republic of Somalia in the east. The Indian Ocean is in the southeast and serves as an important outlet and means of international maritime contact (Figure 1).

Figure 1: Site and location of Kenya

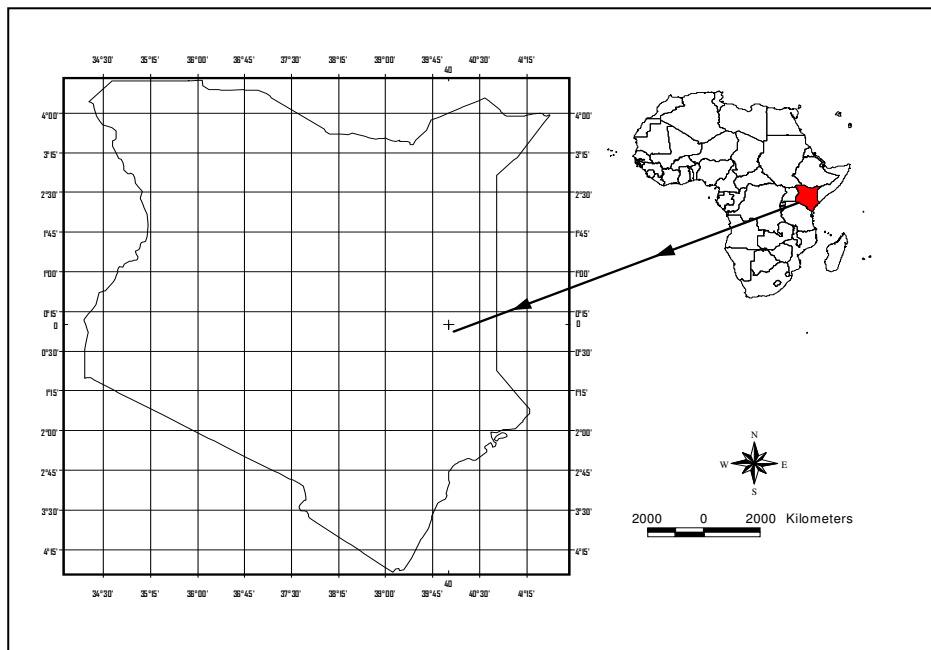


Figure 1: Site and location of Kenya

Kenya occupies total land surface area of 582,644 Km². Of this, the arid and semi-arid occupy 39% and 41% respectively while the dry sub-humid occupy 7% and moist sub-humid to humid 13%. The moist sub-humid to humid lands are classified as the high potential areas of Kenya, supporting rainfed agriculture while the dry sub-humid lands have medium potential mainly used for agro-pastoralism. The rest of Kenya, which includes arid and semi-arid lands (ASAL), is suitable for pastoralism and wildlife sanctuary and support nearly half the livestock population of the country.

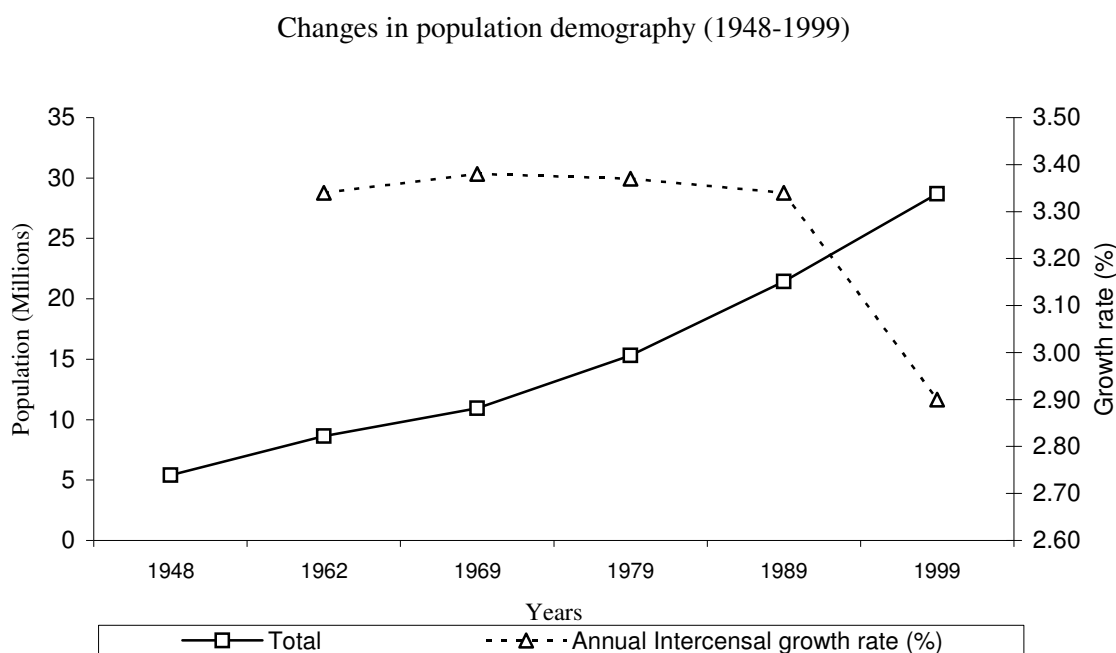
1.1.2 Socio-economic background

Kenya is a developing country whose population is still largely rural with only 25% living in urban areas. According to the 1999 census the population of Kenya stood at 29 million, projected to increase at a rate of 2.5% per year to reach 37.5 million by the year 2010 (Figure 2). 80% of

this population is concentrated in the medium to high potential areas while only 20% of the population lives in the arid lands, which account for 80% of the total land area. The high potential areas (e.g., Central Highlands, Western Kenya, areas of the Rift Valley) are characterized by high population density of 300 people per square kilometre or more, while the drylands which are marginal for crop production are sparsely populated with as low as 5 people per square km. The dryland populations rely largely on livestock production or fishing along lakeshores and coastal areas.

The main source of livelihood for the majority of Kenyans is agriculture, livestock, fishing and forestry. In addition, tourism is Kenya's greatest foreign exchange earner, and one of the largest employers. For centuries the coping mechanisms of poor rural populations have been dependent on natural assets. Degradation of these assets makes it increasingly difficult for populations to obtain their basic needs. As environmental degradation worsens, poverty often increases, particularly in the dry lands, where water is scarce and soil fertility is poor. In Kenya the highest incidence of poverty (68 – 84% in 1994) is found in the Arid and Semi-Arid Lands (ASAL) districts of Northern Kenya. For instance, the Human Development Index (HDI) in Nairobi is 0.72 and is 0.26 in Wajir which is in the northern Kenya. This situation reflects poor access to health and education facilities as well as higher risk of food insecurity and malnutrition.

Figure 2: Changes in human population demography in Kenya between 1948 and 1999



Source: CBS, population censuses 1969, 1979, 1989 and 1999.

1.1.3 Climatic variability

Kenya is prone to cyclic droughts. Major droughts occur every ten years, minor ones every 3 - 4 years and yearly droughts in northern districts of the country (UNEP and GoK 2000). Drought causes loss of ground cover as the crops and other vegetation dry before the rains. When the rain comes, the ground is bare and prone to runoff and serious soil erosion, most of the seasonal vegetation cover having dried up and died, and compacted and overgrazed by livestock. Soil erosion takes away the topsoil that is suitable for agriculture and livestock production, and reduces the land capability to support life. This climatic variability causes significant and frequent variability in agricultural production; reduces crop diversity, is a contributing cause of market failures and increases economic losses.

Drought causes shortage of water, overgrazing, shortage of energy and food, which indirectly lead to loss of biological and economic productivity of the land and as a consequence to seasonal and in some cases mass movement of people and animals. When severe drought is combined with poor land use and inappropriate agricultural practices, it results in loss of productivity and eventually land degradation.

1.2 State of natural resources and information availability

1.2.1 Forestry resources

The forests and trees outside forest play a considerable role for their national economic potential and the social and environmental benefits they provides at local, national and global levels. These benefits include the importance of forests for catchment protection, to maintain the hydrological regime and mitigate soil erosion and sedimentation, climate regulation, medicinal benefits, employment as well as their significance in terms of export earnings, carbon fixation, biodiversity, soil and water conservation, protection of indigenous people' ways of life, cultural and religious values, and recreational use. The forests and trees outside forest are therefore an essential part of the fabric of livelihoods in Kenya. They offer the main energy supply; direct source of food; habitat for wildlife that supports tourism – among the most dynamic economic activity in Kenya; they also contribute to sustainable agricultural systems; and are a repository for agro-biodiversity and a major storehouse for carbon and water. It is therefore necessary to promote sustainable use and conservation of forests. National forest programmes should be seen as part of poverty reduction strategies.

However, as natural forest are being depleted, biodiversity is declining, timber and non timber forest products and services are weakened, and most of the important biological endemic species, that have a potential to sustain the livelihood in the rural areas, are now vulnerable if not extinct.

The first comprehensive forest inventory in Kenya was carried out by the Canadians between 1963 and 1966. Over the next 20 years no work was done in forest inventory. In 1993, activities sponsored by World Bank identified the need for a comprehensive inventory of plantations in the country. Following this period, the Kenyan Government undertook a major inventory of industrial plantations from 1990 through 1993 with the assistance of the FAO through UNDP. The objectives of the project were institutional strengthening and capacity building, the creation of a reliable management database and the preparation of management plans for utilization of industrial plantations. A total of 165,000 ha were earmarked for inventory. However, owing to several constraints, chief among them being the silvicultural status of some plantations and the security problems in some regions, only 114,000 ha was inventoried by the end of the project. by 1994 the data collected had become obsolete because of rapid changes, some plantations had been clear felled, others thinned and new ones planted.

The natural forests, which cover extensive areas in many parts of the country – about 17 million hectares (FRA 2000) or 30% of the country- have not attracted attention of the decision makers for national inventory in the recent past despite their important social, economic and environmental roles. The existing information about Kenya's indigenous forests is based on work carried out by the Forestry Department of the Government of Kenya and the KIFCON programme (Kenya Indigenous Forest Conservation Programme). It is a result of several surveys undertaken during the programme period 1992-1994 inside indigenous forests and adjacent forest dwelling communities. A complete inventory of the forest cover in Kenya has not been undertaken in the

recent past but efforts have been made to carry out piecemeal assessments in particular areas/regions depending on the needs and goals (J.K Ndambiri & C.D. Kahuki, 2000).

All forest formations and trees outside forest provide a wide range of goods and services to the local population. They contribute substantially to the livelihoods of the rural populations. The extent, social, economic and environmental importance of these resources is not well known to the national policy makers and consequently, the national policy process is not well informed. The role of the trees outside the forest and woodlands is also vital in the life of the rural communities across the country and the knowledge on these resources is quite limited.

1.2.2 Agricultural resources and agricultural biodiversity¹

A. Crop and crop-associated biodiversity

The flora and fauna in Kenya's many ecological zones and habitats include many species of agricultural or food significance. Kenya is endowed with a unique heritage of diverse germplasm of vegetables, fruits, oil crops, forages, tubers, cereals and pulses. For example, there are 45 known species of wild vegetable, 200 wild fruit species and 110 multipurpose tree species in Kenya. This plant genetic diversity has been the subject of considerable research interest and discussion in various fora (ITDG, 2000, 1999; Maundu et al.; 1999; Chweya & Eyzaguirre, 1999; MEC, 1998; Guarino, 1997; Kenya Country Report, 1996).

National obligations in agricultural biodiversity are clearly articulated in the relevant CBD Programme of Work on Agricultural Biodiversity, in the legally-binding International Treaty for the Conservation and Sustainable Utilization of Plant Genetic Resources for Food and Agriculture (which Kenya acceded in May 2003), and the Global Plan of Action for the Conservation and Sustainable Utilization of Plant Genetic Resources for Food and Agriculture (FAO, 1996). Kenya is also involved in the implementation of the International Pollinators Initiative (under the Programme of Work on Agricultural Biodiversity of the CBD), notably through its involvement in the African Pollinator Initiative (API). Assessment of the status and trends in pollinators is a priority activity for the API. Kenya also prepared a Country Report for the First State of the World's Plant Genetic Resources for Food and Agriculture, and will be preparing a second Country Report to feed into the Second State of the World's Plant Genetic Resources for Food and Agriculture. It is expected that these requirements are addressed in recent government planning documents that focus on the agricultural sector, including the Kenya Agricultural Research Institute's strategic plan (KARI, 2000) and the joint strategy for the revitalization of agriculture by the Ministries of Agriculture & Livestock and Fisheries Development (MOA & MLFD, 2004). However the extent to which these strategies and plans address sustainable land use systems and ecosystem functions or services is probably more limited.

The fate of agricultural biodiversity in Kenya is intimately tied to that of the agricultural sector as a whole, whose challenges are systemic in nature. Capacity issues revolve around reform of institutional management structures, creation of an enabling legal framework, and local adaptation and adoption of modern technologies.

¹ **Agricultural biodiversity** is a broad term that includes **all components of biological diversity of relevance to food and agriculture, and all components of biodiversity that constitute the agro-ecosystem**: the variety and variability of animals, plants and micro-organisms, at the genetic, species and ecosystem levels, which are necessary to sustain key functions of the agro-ecosystem, its structure and processes.

<http://www.biodiv.org/programmes/areas/agro/dimensions.asp>

Cultivated area was about 5.2 million ha in 2002, of which 4.6 million ha arable land and 0.6 million ha permanent crops. Despite the fact that 80 percent of the country is arid and semi-arid, agriculture in Kenya is dominantly rainfed with an estimated 3.12 million ha being put under food crops in 1998. The food crops are maize, wheat, sorghum, millets, cassava, Irish and sweet potatoes, bananas, fruits and vegetables. About 1.5 million hectares were under maize, which is the primary food for the majority of the population. During the same period, an estimated 500 000 hectares were under industrial crops. Production and income from export crops, such as coffee, tea, pyrethrum, horticultural crops and cotton, contribute to food security. The main agricultural imports are wheat, rice, animal and vegetable oils and sometimes maize and sugar in times of shortage.

Trends in agriculture over recent decades fuelled by commodity driven agricultural policies and strategies have led to commercial interests driving enterprise selection and reducing farmers' interest in sustainable systems/rotations. As a result many farmers are producing crops which are less suited to the agroecological context but for which there is national support (extension, inputs, markets) and a higher "potential" economic return. Farmers have moved away from more integrated crop-livestock systems and there has been increasing use of monocultures, resulting in drier areas in recurrent crop failure and serious effects on livelihoods, food security and ecosystem resilience.

Livestock and animal genetic resources

The livestock sector contributes about 40% of agricultural GDP and about 10% of the total GDP. Dairy production is a key source of income to over 60,000 households in the high potential areas.

Ninety percent of beef cattle are in the hands of subsistence farmers and pastoralists. According to available statistics, Kenya's cattle population exceeded 10 million heads in 1990.

The sheep population stands at about 5.9 million, the greater share of which is the indigenous breeds found mainly in the drier areas and hybrids, which do well in the highlands. It is estimated that the goat population is 7.7 million, most of which are found in the pastoral areas. The size of the camel population is not well established. Pastoralism is the main livelihood in the country's arid- and semi-arid areas.

Emerging livestock comprise ostrich, Guinea fowl, donkeys, snakes for venom and skin production and crocodiles for skin and meat are also gaining momentum in production. The ostrich population under domestication is approximately 10,000 and production is concentrated in the arid and semi arid areas in the Rift valley, Eastern and Coast Provinces. Guinea fowl and quail are mainly domesticated in western Kenya where they are considered a delicacy. Donkeys are kept all over Kenya mainly as a beast of burden.

Livestock production systems in Kenya can be broadly categorized as follows:

- Intensive systems in the high and medium agricultural potential areas which is predominantly under dairy involving exotic breeds and their crosses with indigenous breeds. Small holder farmers constitute 70% in these systems;
- Ranching and pastoral systems in the rangelands which involve indigenous breeds of cattle, sheep and goats together with other livestock species such as camel and donkeys. The rangelands, produces 70%,of total beef consumed in Kenya, the Kenyan rangelands are well suited for agriculture, a potential that is not fully exploited.

Indigenous animal genetic resources offer entry points for suitable utilization of the vast Kenyan rangelands due to their evolutionary advantage which enables them to adapt to the climatic, nutritional and disease challenges that prevail in these areas. Indiscriminate crossbreeding, in an effort to improve on production traits is a risk to the diversity of indigenous animal genetic resources. However, many of indigenous African animal genetic resources, such as the Kenyan zebu breeds, are currently at risk of extinction. This trend is partly driven by lack of economic competitiveness (actual or perceived) of local breeds of cattle, sheep and goats and to a lesser extent poultry, e.g. indiscriminate cross-breeding, replacement with exotic breeds, introgression and interbreeding, and the absence of breed development programmes. Other factors include an increase in size of the human population that has led to a reduction in the amount of land available for livestock grazing, neglect of traditional livestock production systems, famine and civil conflict, and cattle rustling and livestock disease epidemics.

Animal genetic diversity allows farmers to select stocks or develop new breeds in response to changes in the environment, changing market preferences, threats to disease and societal needs, all of, which are largely unpredictable. Besides, such obvious aesthetic, economic and scientific reasons, the need to conserve the diverse animal genetic resources could be justified on both ethical and moral grounds. Although indigenous livestock breeds may not be as productive as their exotic counterparts, they nevertheless, possess valuable traits such as tolerance and resistance to disease, high fertility, good maternal qualities, unique product qualities, longevity and adaptation to harsh environments and poor quality feeds. These qualities are desirable for achieving sustainable agriculture under low-input conditions. Considering their importance and endangered status, immediate steps must be taken to conserve these indigenous breeds for use by both present and future generations (FAO/ UNEP 1995). However until recently, animal genetic resources have received much less attention than plant genetic resources.

Various studies have been conducted in Kenya, for example, analysis of productivity of various cattle herds (Sahiwal, various Sahiwal/Ayrshire crossbreeds, Small East African Zebus and Borans) across a range of production systems and management levels. In terms of production potential, environmental and genetic parameters composite breeds are promising to produce cattle adapted to major ecological zones and production systems. For example using an optimum percentage of the highest performing *Bos indicus* breeds, such as the Sahiwal, to achieve adaptability to the production environment, combined with *Bos taurus* breeds which have a high response capability for milk and beef production. (For Sahiwal, Kenya is an important source of stock and semen for the continent). However crossbreeding has in many instances led to the loss of original breeds and to a large extent, the collapse of self-sustaining traditional production systems. There is growing support for strategies for breed conservation and improvement that avoid inappropriate breed dilution or replacement.

As with plant genetic resources, there is a need to illustrate current threats to animal domestic diversity and opportunities for the development of integrated production systems (livestock and mixed) that allow the maintenance of indigenous animal diversity as an integral part of productive and sustainable land use systems for various agro-ecological zones.

1.2.3 Water Resources

Kenya's National Development Plan recognizes the country as water-scarce, whereby the water demand exceeds renewable freshwater sources. Out of 164 sub-basins with perennial river flows, it is estimated that 90 will suffer from surface water deficit by 2010 while already 33 sub-basins without perennial river flow have apparent water shortage.

Agriculture is the main user of water and currently consumes about 80% of fresh water resources, while domestic and commercial use accounts for the rest. One of the main basins presenting the area with enormous aquatic resources, Lake Victoria is shared with Uganda, Tanzania, Rwanda and Burundi, supporting one of the densest and poorest rural populations in the world. Surface water systems and groundwater aquifers constitute the main freshwater reservoirs in the basin. The Lake Victoria basin faces concerns of water quality and quantity, water supply availability and accessibility, unsustainable population pressure, water as sources of energy, unsustainable agricultural practices, loss of freshwater biodiversity, overexploitation of fisheries resources and introduction of aquatic invasive alien species, and water-borne diseases influenced by scarcity of clean water (exacerbating incidences of cholera, typhoid, dysentery and certain intestinal parasitic diseases). Furthermore, deforestation coupled with poor agricultural practices have led to an accelerated rate of river sediment transport and sedimentation in aquatic or wetland environments. Pesticides have been introduced either directly by fishermen or indirectly through runoff from agricultural areas. Recent evidence indicates that gold mining activities along the shoreline or upstream may be introducing toxic cyanide and mercury into the lake. The amount of pollutants has far exceeded the filtration ability of the lake margin swamps. Natural resources management and use in the basin is supported by the large scale Lake Victoria Environmental Management Programme (LVEMP) and Nile Equatorial Lakes Subsidiary Action Programme of the Nile Basin Initiative.

Granted through the Water Act 2002, the overall responsibility for water management lies with the Ministry of Water Resources Development and Management (MWRDM). The ministry's current policy (1999) focuses on decentralization, privatization, commercialization and stakeholder participation. The Water Act 2002 has provided the formation of a Water Resources Management Authority, responsible for water pollution, and the management of lakes, aquifers and rivers, and the establishment of a Water Services Regulatory Board, responsible for water supply through licensed water services providers.

Water use and its effect on the environment is being taken into due consideration, as 30% of the flow at any point of abstraction has to be reserved for river maintenance and environment. The National Environmental Management and Coordinating Act (EMCA) No.8 of 1999 is in place to take care of environmental impact of development and the government has established the National Environment Management Authority (NEMA) to enforce it. The act makes it mandatory to conduct an environmental impact assessment before the implementation of a project like for example large-scale agriculture, use of pesticides, introduction of new animals and plants, use of fertilizers, and irrigation development.

With the recent drought, the Government is acutely conscious of the problems of loss of livelihoods, food insecurity and famine caused by recurrent drought and the need to develop more resilient agricultural systems for arid and semi arid lands. Irrigation and water harvesting are identified as a top priority; however, it is important to recognise that these require specific environmental conditions and are not feasible in all locations. An integrated review of land, water and biological resources that illustrates trends in land use will help the Government to identify critical changes that have been taking place in farming systems and to take an integrated ecosystem approach in considering land use systems and investment options for better harnessing water. In semi-arid and sub-humid areas, there is much that can be done through more drought resilient systems and soil moisture management that captures and retains limited rainwater on the land for productive use.

1.2.4 Fisheries and aquatic resources

A. Aquatic biodiversity

Aquatic ecosystems provide local communities with natural resources important for sustained livelihoods. These resources include fisheries, water supply, building materials, pasture and recreation. These ecosystems are also important for ecological and service roles, namely water storage, flood control, water filtration, recharge and discharge of water systems. The wetlands are important wildlife habitats and perform nutrients cycling/storage and related pollution control.

Major Lakes in Kenya include Lake Turkana, Lake Baringo, Lake Naivasha, Lake Jipe, Lake Chale, Lake Nakuru and Lake Victoria. Some of the swamps include the Yala, Lorian, Shompole and other swamps that fringe the lakes and provide the buffering capacity. The lakes provide important ecosystems for both floral and faunal species diversity.

Coastal ecosystems, including mangrove forests, coral reefs and estuaries are of prime importance to economic growth and conservation. Marine parks and reserves protect marine life, and are therefore important for biodiversity conservation. They also generate revenue for local population and the country.

As recently as the 1960s, Lake Victoria supported an endemic cichlid fish species flock of over 500 species, but these have progressively disappeared from the catches to become poorly represented today. The losses are attributed to habitat degradation in the catchments, introduction of exotic species (particularly the Nile Perch) and heavy fishing pressure. Incidences of malaria and bilharzias are common in irrigated areas.

B. Fisheries

Fisheries are the most economically important aquatic resources. Kenya's fisheries is mainly composed of freshwater (lakes, rivers and dams) and marine (Indian Ocean) sub-sectors, with aquaculture still at infancy. The sector contributes about 5% to the country's gross domestic product (GDP) with an average producer value of Kenya shillings 8 billion in 2004, and supported the livelihood of about 500,000 people the same year.

The marine fisheries, especially the Economic Exclusive Zone (EEZ) and Lake Turkana are under-exploited. Fish production is estimated at 150,000 metric tonnes (MT) annually. Lake Victoria accounts for over 90% of the national fish production. Marine fish production in Kenya has shown great fluctuations since 1970s. The greatest production recorded so far from the marine fisheries has been 8,000 tonnes in one year. Aquaculture contributes less than 1% of the national fish production. Tilapia, catfish, common carp and trout are the most culture species. Oyster, crab and shrimp farming is practiced at the coast. There exists a lot of potential for aquaculture to augment natural sources, hence contributing to biodiversity conservation.

Fisheries and other aquatic resources in Kenya are faced with various threats, among others; excess fishing effort, illegal fishing, environmental degradation, pollution, unsustainable development, alien invasive species (e.g. Nile perch, water hyacinth, salvinia and crayfish) and climate change.

1.2.5 Wildlife resources

Wildlife is a valuable resource to the country's economy. To conserve the biodiversity, the Government established the National Parks which currently occupy about 8% of Kenya's land

area. Over 70% of the country's National Parks and Game Reserves are found in the ASALs which also hold 2/3 of the livestock population. Livestock and wildlife co-exist in the ASAL areas while livestock are excluded in the national and game reserves.

The wealth of biological diversity in Kenya is deemed to be high and has been the base for the livelihoods of many people both at the local and international level. The major threat to genes and species and ecosystems is loss of natural habitats due to changes in land use patterns and non comprehensive policies.

1.2.6 Soil resources and land productivity

Soil patterns in Kenya are influenced by altitude, landforms, geology and climate. A generalized soil map of Kenya has been compiled on the basis of information contained in the Exploratory Soil Map of Kenya (scale 1:1,000,000) and other soil maps prepared by the Kenya Soil Survey. There are 22 major soil types, of which 18 are found in the semi-arid and arid areas (ASALs) of the country. The soils of ASALs greatly vary in their physical and chemical characteristics, and substantially they are either saline or sodic or both. The nature of the soil influences the rate of degradation and its vulnerability to desertification. The soils have been mapped and classified according to the FAO – UNESCO system.

Kenya has a wide range of soils, including high potential areas in the highlands, however, progressive declining soil fertility and as a result yield decline and food insecurity are a serious and widespread concern in Kenya. Nutrient depletion results from continuous cropping and land fragmentation due to population pressures and inappropriate management practices. In the productive highlands, population densities reach 500-1,000 people per km². In other areas unpredictable and erratic rainfall are compounded by the declining soil fertility. For most cereal and legume crops grown, nutrients are removed in the harvested parts for consumption or sale and crop residues are used as animal fodder or as fuel or in some cases as trash lines. Manure produced on the farm maybe returned to the fields or sold but is often not managed well. For the production of major cereals (maize, wheat, rice, barley and sorghum) the major nutrients would have to be continuously applied to achieve good crop yields. In many areas farmers do not have access (poverty, infrastructure, appropriate fertiliser types).

The uptake by smallholders of improved nutrient management techniques such as improved rotations, compost, N and P fertilisers (which since 1992 are no longer subsidised and thus expensive) and cover crops or green manures (such as *Tithonia diversifolia* a common weed), has been limited. Moreover, a range of integrated practices are required, for example although composts preserve soil humidity and provide some essential nutrients, they do not provide an adequate payback in terms of increasing phosphorus levels. Composts or *Tithonia* use need to be combined with phosphorous fertilisers. Thus one of the biggest challenges facing agriculture in Kenya at the moment is to develop soil fertility restoration and nutrient saving technologies that are low cost, agronomically effective and socio-economically feasible.

1.3 Challenges in natural resources conservation and management

The Kenyan people and natural resources are affected by many environmental, social and economic problems, including environment degradation, poverty, food security, gender bias against women and loss of indigenous knowledge. Poverty was estimated² at about 56% in 2003. More than half of all Kenyans survive on less than USD 15 a month in rural areas and USD 34 in

² The Economic Recovery Strategy for Wealth and Employment Creation 2003-2007.

urban areas. Moreover, Kenya's population is growing while the economy is not³. The most vulnerable regions in Kenya are Nyanza, Coast, Eastern, and Western. In Eastern and Western, approximately 58 percent of the population live below the poverty datum line, whereas the figures for Coast and Nyanza are estimated at 62 and 63 percent respectively. To address poverty and livelihood issues, the Kenya Policy Paper 2002–2006 identified the following priority areas: capacity building, linkages, networking and information sharing, partnerships and participatory interventions.

In Kenya, like in many other African countries, land is a critical resource and the basis for survival and its degradation threatens both the economic and the physical well-being in the country. Agriculture alone contributes about 26% of the national GDP and employs large segment of its population. However the integrity of natural resources and ecosystems is being affected, through processes such as accelerated deforestation, desertification, soil degradation, depletion of mineral and wildlife resources, diminishing biodiversity, accelerated industrial pollution as well as losses of water quantity and quality. However to what extent these environmental issues are assessed at the national level and how much national level policy makers know on them?

There have been many sectoral assessments in Kenya, usually driven by narrow information needs of national policy makers or institutions targeting one particular aspect or resource. However, the various components of ecosystems are closely interrelated, and the populations are using and managing different resources in both aquatic and terrestrial ecosystems. Therefore there is a necessity of addressing biodiversity and ecosystem functions and services in a holistic way or through ecosystem approaches. Moreover there is little knowledge or understanding of the interactions between land use and management practices and natural resources and ecosystems functions and services.

1.4 Justifications for an Integrated Natural Resource Assessment (INRA) in Kenya

Increasing emphasis is being placed worldwide on the importance of promoting rural development and increasing the productivity of rural livelihoods including agriculture, forestry and fisheries. The World Summit on Sustainable Development (WSSD) process led to the identification of five critical areas for attention water, environment, health agriculture and biodiversity (WEHAB). However, due to sector approaches and institutions, the inter-linkages and impacts on livelihoods and environmental services are often neglected. The strategic framework and vision for NEPAD (New Partnership for Africa's Development) provides opportunities for increased, concerted efforts through both its Comprehensive Africa Agricultural Development Programme's (CAADP's) and Environmental Action Plan.

In Kenya, like in many other African countries, land is a critical resource and the basis for survival and its degradation threatens both the economic and the physical well-being of the Kenyans in the country. However the integrity of natural resources and ecosystems is being affected, through processes such as accelerated deforestation, desertification, soil degradation, depletion of mineral and wildlife resources, diminishing biodiversity, accelerated industrial pollution as well as losses of water quantity and quality. However to what extent these environmental issues are assessed at the national level and how much national level policy makers know on them are critical issues to examine and make appropriate decisions.

³ Central Bank of Kenya: Quarterly Financial Report 2001: Gross Domestic Product: Ksh756.7 billion at market prices by end of 2000. Economic growth 0.5 percent of the population growth.

There have been many sectoral assessments in Kenya, usually driven by narrow information needs of national policy makers or institutions targeting one particular aspect or resource. However, the various components of ecosystems are closely interrelated, and the populations are using and managing different resources in both aquatic and terrestrial ecosystems. Therefore there is a necessity of addressing biodiversity and ecosystem functions and services in a holistic way or through ecosystem approaches. Moreover there is little knowledge or understanding of the interactions between land use and management practices and natural resources and ecosystems functions and services.

In order to respond to those concerns, it is proposed during 2006-7 to develop and test the approach, methods and tools to conduct an **Integrated Natural Resources Assessment (INRA)** starting with a pilot supported under the FAO-Netherlands Partnership Programme (FNPP) and later implemented country wide with national and donor support. The assessment will cover in particular: forests, agriculture, wildlife and water resources focusing on agrobiodiversity and ecosystems services and integrity. The findings will be analysed to identify community, technical and policy considerations for consideration by land/resource users and policy makers and will bring the necessary and proper knowledge on the status of the natural resources and on their mutual influences for harmonising sectoral policies.

The relevant government of Government of Kenya Ministries are interested in such an assessment as it will generate information that will guide development of more integrated strategies for reversing degradation and harnessing of the country's resources for productive purposes (Soils, Water, Pastures, and Catchment areas).

INRA will build on available data and information systems and assessments, as detailed in the background review that was undertaken to compile an overview of available data and information systems in Kenya: "Databases Information analysis on Natural Resources in Sectoral Institutions" (Frank Msafiri, 2006). Other key assessments that will be used include, among others:

- AFRICOVER, which has completed a full 1:200,000 scale land cover assessment for 100% of the country (using agreed land classification with 10 neighbouring countries) and has established a substantial database and capacity in the regional centre for mapping and development in Nairobi;
- National assessments and reporting on the state of plant genetic resources for food and agriculture (PGRFA) which is ongoing in 35 countries - including Kenya (with support of FNPP);
- Global and national assessment and reporting on the status of domestic animal diversity;
- Agro-ecological land resources assessment for agricultural development planning. A case study of Kenya (FAO/IIASA, 1991) by FAO and IIASA with the Government of Kenya which advanced AEZ procedures with in depth data collection and analysis and development of a major GIS-oriented Kenya land resources database at the scale of 1:1 million and a PC and UNIX workstation based software system. The enhancements encompass representation of multiple cropping systems, livestock and crop sector integration, assessment of fuelwood productivity, optimization of land use. This analytical tool facilitates the integration of ecological, technological, social, demographic and economic recommendations for the appraisal of land resources of individual districts in Kenya for policy formulation and development planning.
- A recent remote sensing study of trends in Kenya's agriculture for the period 1970 – 2000 which identifies hotspots and bright spots and to which LADA (land degradation assessment of drylands) will add more variables during 2006 – e.g. forest, urban, water, rangeland.
- Poverty mapping for Kenya, based on demographic data prepared by WRI.

1.5 Scope of the Integrated Natural Resource Assessment

The integrated natural resources assessment (INRA) will cover the forest and trees outside forest resources as well as crop and crop-associated biodiversity, livestock, wildlife, soil, water and aquatic resources with focus on the agrobiodiversity.

The list of resources to include in the field survey will be defined by the project team after consultation with the concerned institutions and stakeholders. The survey will provide key information at the national level on the state, extent, uses management and functions of natural resources.

The assessment will cover a range of biophysical and socio-economic variables and indicators that can be easily measured, observed or obtained from interviews of key informants representative of the spectrum of owners, managers and/or users of the resources.

The INRA model being applied in Zambia, which was developed from the national forest assessment (NFA), will be further adapted to the Kenyan context and interests of stakeholders as well as to incorporate agro-biodiversity, food security and livelihood dimensions. The assessment will be conducted at national scale with a design process that will be piloted in selected areas in three major agro-ecological zones: humid lake zone, arid and semi-arid lands and coastal zone. The assessment will include biophysical and management dimensions, uses of products and services, users, as well as conflicts, values and marketing issues. The development process will be conducted through a technical consultative process for example, specialist working groups, technical guidance, testing and validation of assessment methods in the pilot areas.

In addition to assessing status and trends of individual natural resources and change in land use, the methodology development process will assist the Kenya inter-sectoral team to develop and validate indicators and methods to assess the status and trends of agricultural ecosystems (and their integrity), threats to agrobiodiversity, ecosystem functions, resilience to drought, vulnerability to climate variability and change, effects on food security, etc. Efforts will be made to integrate and illustrate linkages among natural resources, agricultural biodiversity and food security dimensions (the 3 FNPP themes). The assessment could take into account hot spots and bright spots that could be identified, for example, through mapping of socio-economic drivers such as population and poverty with overlays on biophysical factors such as vegetation cover.

Efforts will be made to ensure that the assessment responds to key policy questions, for example, effects of land use /farming system changes on food security, poverty and vulnerability to drought. During the 18 month project (FNPP_2) selected policy question could be answered, but with eventual donor support for a more comprehensive analysis, the process could be further applied and scaled up to guide policies and decision making at national and sub-national levels.

2 Objectives and targets

2.1 Overall objective

The overall objective of the project will be to promote integrated assessment of natural resources for policy formulation, institutional capacity building, planning, conservation and utilization of natural resources on a sustainable basis to reduce poverty, enhance food security, create

employment and wealth, while taking into consideration indigenous knowledge and the role of women in natural resource management.

2.2 Specific objectives

1. Identify information needs and adapt methodology and approach to Integrated Natural Resource Assessment (INRA) through participatory process and build national capacity to carry out countrywide INRA
2. Assess status of natural resources by implementing the new INRA approach within pilot zones for later up-scaling to cover the entire country including the development and validation of indicators and methods to assess agrobiodiversity and agro-ecosystems and effects on food security and livelihoods through selected pilot areas. The assessment will cover use, users and management of natural resources in particular indigenous knowledge and the role of women and youth in natural resource management.
3. Building on INRA findings, carry out policy impact analysis and cross-sectoral studies to support inter-sectoral policy dialogue.

3 Strategy of the project

Considering the Government priorities of capacity building, knowledge development and information sharing on land use resources, the project is designed as direct response to those Government priorities to be implemented following the participatory approach and to integrate, to the extent possible, a wide range of natural resources (forest, crop associated biodiversity, pollinators, soils, wildlife, agriculture, livestock, water and aquatic resources). The project is developed to create a complete picture about the location, state and quality of the resources at the national scale, and trends in management and exploitation up to the current state.

To reach the planned objectives (see sections 2.1 & 2.2) the project will follow a strategy founded on:

1. Capacity building and skill enhancement: the project will provide the necessary input to develop the national capacity of the concerned institutions to plan and implement integrated natural resource assessments as well as long-term monitoring of environmental/ecological impacts.
2. Partnerships building for Kenya's national Integrated Natural Resources Assessment (INRA). In order to implement this component, the project will work to build national partnership and to establish national consensus on approach to INRA and on the thematic scope of the INRA.
3. Policy driven INRA undertaking with emphasis on the social, economic and environmental benefits of the resources.
4. Information frameworks harmonization: the project will reach national consensus on harmonisation of data collection and data management systems at the national level.
5. National database development on use of natural resources and necessary capacity strengthening for information management and sharing.
6. National ownership of the project: the organisation and implementation of the project activities will be driven by national institutions, with minimal external inputs.

7. Long term monitoring programme for natural resources by institutionalizing a natural resources assessment unit.
8. Supporting inter-sectoral policy dialogue and harmonization.

The project, which aims at national integrated resources assessment of identified natural resources, will be implemented in three phases as outlined in Section 12. In the first phase, a first group of activities will be implemented to develop the experience and skills within the national institutions, reach consensus about the approach and build the necessary partnership and alliances to carry out a pilot assessment in the western part of the country. The second phase will be dedicated to complete the pilot assessment, refine the approach, strengthen the capacity and expand the survey over the entire country. The third phase will be committed to field implementation and database development and management, which will depend on the availability of the financial resources.

4 Expected outputs and results

In support of Objective (1):

- 1.1 Participation of major users of natural resources data in information needs identification enhanced.
- 1.2 National consensus on approach and method to INRA and long-term monitoring of ecological impacts established.
- 1.3 Needs of information on natural resources identified through specialised ad hoc working groups and consultations and workshop processes.
- 1.4 National institutions strengthened to plan and conduct nationwide assessment of natural resources including monitoring, presentation of results and management of information.
- 1.5 Equipment procured and installed.
- 1.6 National expertise for INRA reinforced and consolidated.
- 1.7 Vegetation types/Land use classification system developed and harmonized, up to date map and analysis produced.

In support of Objective (2):

- 2.1 Field survey for data collection planned and carried out, focusing on the socio-economic and environmental benefits of natural resources management.

In support of Objective (3):

- 3.1 National Natural Resources Database reviewed, improved and made operational.
- 3.2 Field data captured, processed and analysed.
- 3.3 Project results discussed and published.
- 3.4 Cross-sectoral policy analysis and major issues of poverty, environment degradation, water, biodiversity, etc, addressed.

5 Project activities

For Output 1.1: Participation of major users of land use resources data in information needs identification enhanced.

- 1.1.1 Identify partners to implement and/ or cosponsor some project activities;
- 1.1.2 Set up a Steering Committee (SC) to oversee and provide guidance to the project.
- 1.1.3 Convene national seminars for representatives of partners and stakeholders to inform about the project and exchange on best ways to implement it and meet all users' needs from thematic and quality point of view.

For Output 1.2: National consensus on approach and method to INRA and long-term monitoring and ecological impacts established.

- 1.2.1 Through consultations between national professionals and scientists, review the model approach of resources assessment and resources monitoring to INRA proposed by FAO-Forestry Department, adapting it to integrate agrobiodiversity, integrated ecosystem, food security and other human dimensions.
- 1.2.2 Establish specialised working groups to develop the various agrobiodiversity and agroecosystems indicators and assessment methods and provide guidance to field teams for example for linking biophysical and human dimensions.

Convene a national workshop and as required specific task forces involving professionals and scientists from the concerned sectors to review and agree on the approach.

- 1.2.3 Finalize the approach and publish for launching the project

For Output 1.3: Needs of information on natural resources identified.

- 1.3.1 Carry out a comprehensive review of needs of information on natural resources including forest, trees, land and water and biodiversity and prepare a list of biophysical and socio-economic variables of the resources taking into account the necessity to harmonise the national database with global information requirements. The core list of variables prepared by FAO will be used as basis of this assessment.
- 1.3.2 Convene national workshop involving representatives of partners and stakeholders to review and agree on the harmonised national list of variables.

For Output 1.4: National institutions to plan and conduct nationwide assessment of natural resources including monitoring, presentation of results and management of information strengthened.

- 1.4.1 Assess national experiences in the area of natural resources assessment and information management.
- 1.4.2 Define human resources needs for office and field tasks and capacity building needs for planning and implementation of the integrated natural resources assessment.
- 1.4.3 Define needs of equipment for the national database.
- 1.4.4 Review the institutional environment dealing with the natural resource system and recommend improvements for close collaboration in long-term monitoring of resources and information management and sharing.

For Output 1.5: Equipment procured and installed

- 1.5.1 Specify and procure the needed equipment for planning and implementation of field survey, data entry, storage, modelling and processing.
- 1.5.2 Initiate procurements and storage

For Output 1.6: National expertise for INRA reinforced and consolidated

- 1.6.1 Plan and carry out training of the national team in field surveys for integrated natural resource assessment.
- 1.6.2 Plan and carry out training of the national team in the area of data processing and analysis, information management and dissemination.

For Output 1.7: Land use systems classification developed and harmonized, up to date map and analysis produced

- 1.7.1 Build on existing classification systems of vegetation types and land uses developed by AFRICOVER in the region and the system used by FRA, and more specifically by INRA-Zambia, in developing the Kenyan Integrated natural resources (and agrobiodiversity) assessment.
- 1.7.2 Ensure wide dissemination and review of the developed classification system by professionals, scientists and the SC members.
- 1.7.3 Finalise the national classification system on the basis of received comments and inputs from reviewers.
- 1.7.4 Prepare a manual for the interpretation of satellite images and map production.
- 1.7.5 Support in the design and preparation of a national forest/land use map based on the harmonised legend with reference and use of the Africover map.

For Output 2.1: Field survey for data collection planned and carried out, focusing on the socio-economic and environmental benefits of natural resources.

- 2.1.1 Prepare a manual targeted at field crews describing the approach and techniques to follow for data collection and materialisation of permanent sample sites in the field.
- 2.1.2 Plan and carry out representative field sampling in selected pilot sites (phase 2) to be extended to the rest of the country (phase 3).
- 2.1.3 Set up the monitoring system, including registering the permanently established sample sites for periodic data collection and updating of baseline information and change assessment.

For Output 3.1: National Natural Resources Database reviewed, improved and made operational

- 3.1.1 Develop a functional database on natural resources including forest and TOF, other natural resources and biodiversity compatible with existing national databases in the country.
- 3.1.2 Convene an informative meeting of partners and stakeholders about the structure and extent of the database and feedback.

For Output 3.2: Field data captured, processed and analysed

- 3.2.1 Develop a manual for data processing and analysis emphasizing on harmonising project results in the country as well as with international information requirements.
- 3.2.2 Carry out entry, processing and analysis of the field data and produce results satisfying wide range of information users.

For Output 3.3: Project results discussed and published

- 3.3.1 Distribute final report among SC members and other partners for review and comments.
- 3.3.2 Convene a national workshop to validate the project results.
- 3.3.2 Define and put in place a system to disseminate information to all users.

For Output 3.4: Cross-sectoral policy analysis and major issues of poverty, environment degradation, water, biodiversity, etc, addressed

- 3.4.1 Set up a multi-disciplinary team to review and carry out analysis of the policy framework in the light of the findings of the project and of the thematic studies carried out under the FNPP and recommend improvements and measures to harmonise them.
- 3.4.2 Convene a national workshop to review and agree on the recommendations on policy harmonisation.

6 Project organisation

The organisation of the project will be set up at the Department of Resource Survey and Remote Sensing (DRSRS) designated as Focal Institution. The project will be led by a full time National Project Coordinator (NPC) who will be appointed by the DRSRS.

The NPC will work to:

- promote, liaise and maintain close working cooperation with the national institutions;
- prepare and update the project work plans;
- facilitate training of the crew –members;
- create conditions for implementation of the work plan;
- secure nomination of the national professional staff for the Multi-sectoral Technical Unit (MTU);
- supervise, guide and monitor all the project personnel;
- oversee fieldwork and secure timely deployment of the necessary logistical support to the field crews.
- report to the Steering Committee.

A national Multi-Sectoral Technical Unit (MTU) will be created. The role of the MTU will be to plan the project activities, oversee their implementation, provide the necessary logistical support to the field teams during their fieldwork, monitor and provide guidance to the teams for quality data collection, organise data encoding in the computer and database development and data processing. Under the guidance of the NPC, the MTU will be responsible of the timely implementation of the project activities and of the quality of the results.

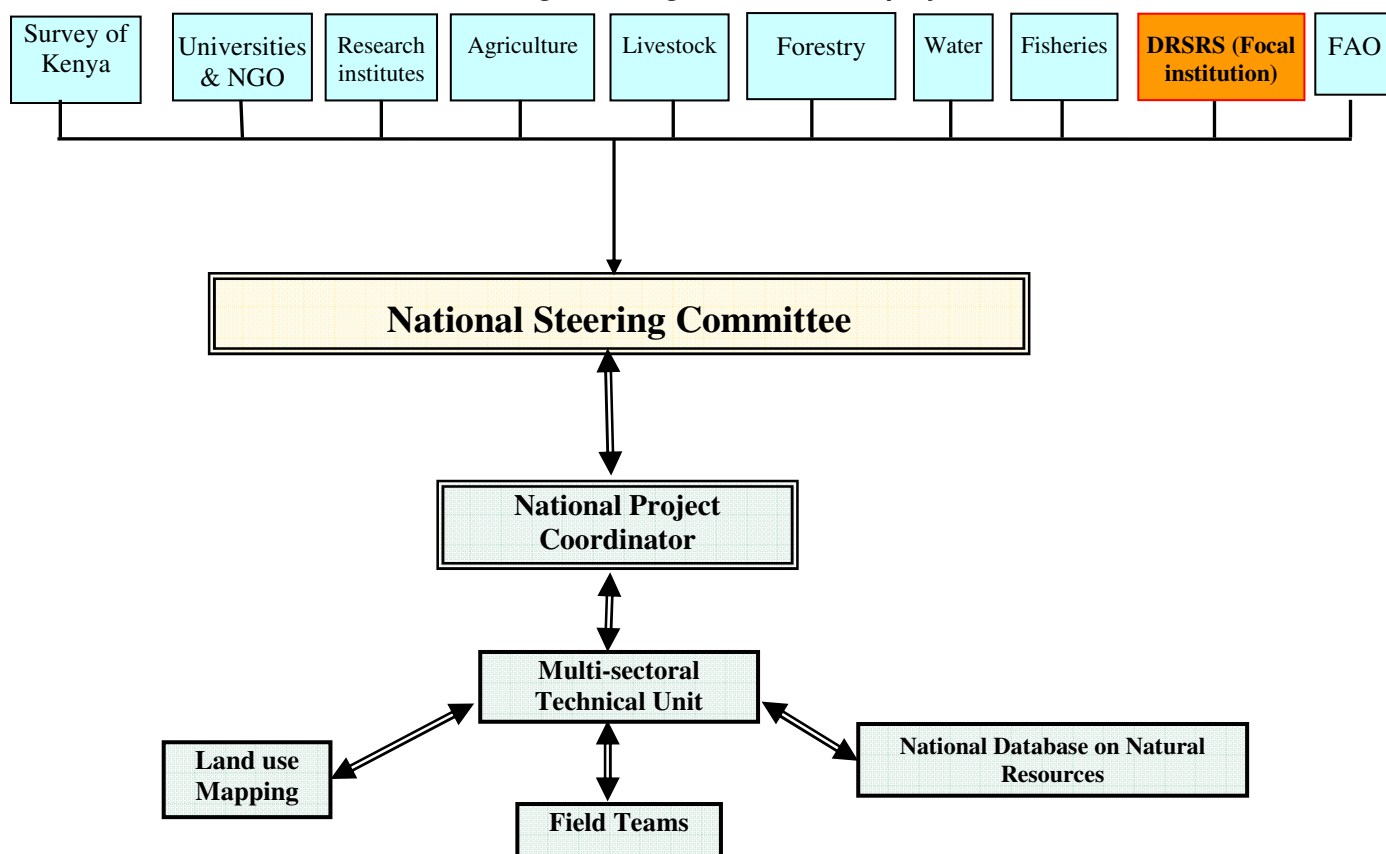
To improve the performance of the project, the MTU will be supervised by a National Steering Committee (SC) that will be set up to oversee the FNPP activities in Kenya. The SC will comprise experts from the forest, environment, agriculture and other economic sectors. The SC main duty is to monitor the planning and implementation of the project activities, to provide guidance to the project team, to advise on information sharing and help overcome constraints especially those in connection with inputs from all the concerned parties and deployment of resources. Efforts will be made to ensure that relevant agrobiodiversity related institutions/experts would contribute to this process and, in turn, results would feed into the policy level activities on agrobiodiversity, forestry and food security (FNPP national steering committee).

The SC would be composed of representatives from key participating institutions as agreed during the stakeholders workshop held in Norfolk Hotel in March 2006. The national SC was proposed to be composed of Permanent Secretaries from the following key partner institutions:

- 1) Ministry of Environment and Natural Resources (Implementing Ministry)
- 2) Ministry of Agriculture
- 3) Ministry of Water
- 4) Ministry of Tourism & Wildlife
- 5) Ministry of Livestock & Fisheries
- 6) Ministry of Lands
- 7) Ministry of Home Affairs
- 8) Ministry of Planning and National Development
- 9) FAO
- 10) Two NGOs representatives
- 11) One representative of Private Sector

The SC will be meeting every three months under the chairmanship of the Director of the DRSRS.

Figure 3: Organisation of the project



7 Participating institutions

The strategy of the project implementation requires effective participation of and coordination between all the concerned institutions to ensure that their collective efforts are directed towards achieving the objectives of the project namely an improved knowledge on the resources and their trends, a harmonised inter and intra-sectoral policies.

The stakeholders’ workshop on March 2006 identified sectors that are relevant in natural resource assessment and management with a view to identifying key institutions that will be partners in the implementation of INRA and will play active role in the planning and implementation of the project (see Table 1).

Table 1: Sectors and Institutions involved in natural resource management and assessment

SECTOR	INSTITUTIONS
1) Forestry	<ul style="list-style-type: none"> • Forest Department* • Kenya Forestry Research Institute* • Kenya Forest Working Group • Forest Action Network • Green Belt Movement • ICRAF • Tree on Farms Network of ASARECA • Moi University
2) Fisheries	<ul style="list-style-type: none"> • Fisheries Department*

	<ul style="list-style-type: none"> • Kenya Marine Research Institute • Moi University • National Museums of Kenya*
3) Livestock	<ul style="list-style-type: none"> • Livestock Department* • Livestock Research Institute* • Universities: UoN,, JKUAT and Egerton University
4) Agriculture	<ul style="list-style-type: none"> • Ministry of Agriculture* • Kenya Agriculture Research Institute (KARI)* • Agricultural Information Centre* • Universities: UoN, JKUAT, Egerton University
5) Wildlife	<ul style="list-style-type: none"> • Kenya wildlife Service* • National Museums of Kenya* • African Conservation Centre • African Wildlife Foundation • World Wildlife Fund • E.A. Wildlife Society
6) Water	<ul style="list-style-type: none"> • Ministry of Water and Irrigation* • Water Boards • Kenya Water Institute (KEWI) • CETRAD • National Irrigation Board
7) Soil	<ul style="list-style-type: none"> • Kenya Agriculture Research Institute* • Universities: UoN, JKUAT • NARL • Kenya Soil Survey*
8) Minerals	<ul style="list-style-type: none"> • Mines and Geology* • UoN
9) Lands	<ul style="list-style-type: none"> • Ministry of Lands* • Department of Land Reclamation • Universities
10) Cross-Cutting Organizations	<ul style="list-style-type: none"> • National Environment Management Authority (NEMA)* • Department of Resource Survey and Remote Sensing (DRSRS)* • National Museums of Kenya* • Regional Africover office

***=Key Institutions that will directly be involved in the implementation of INRA.**

The project will be implemented jointly by the Departments of Forestry and Remote Sensing (Ministry of Environment and Natural resources); Department of Crop Production (Ministry of Agriculture); Department of Land Use Planning; Departments of Livestock and Fisheries (Ministry of Livestock and Fisheries); Kenyan Wildlife Service (Ministry of Tourism); Department of Water Resources (Ministry of Water and Irrigation); Ministry of Lands; Kenya Agriculture Research Institute (KARI), Kenya Forestry Research Institute (KEFRI), Livestock Research Institute, Agricultural Information Centre, the National Museums of Kenya, Kenya Soil Survey, Mines and Geology, and National Environment Management Authority (NEMA).

The partners will be represented in the supervisory and technical meetings and will provide guidance to the technical team of the project. Other institutions will also be consulted and involved throughout the project phase in the area of their expertise and data input.

The project will be based within the premises of DRSRS, mandated to be the focal point of INRA during the multi-stakeholders workshop. The overall responsibility of the project implementation will be vested with the DRSRS.

8 Role of participating institutions

8.1 Planning and implementation of the project

Each of the participating institutions will be involved in the planning and implementation of the project activities. These include review and adaptation of the INRA general approach, analysis of the existing information framework in all the sectors and their format, identification of gaps, design of the national database and overall supervision of the project through arrangements put in place e.g. Steering Committee and Project Technical Unit. All the partners have, under the leadership of the DRSRS, the overall responsibility for the project. They are responsible of reviewing and adopting the project work plans, identifying the needs and mobilising the inputs, securing timely implementation of the project activities and delivery of the expected outputs. Each partner institution will designate the required and qualified personnel for the Steering Committee as well as for the Project Technical Unit and will provide personnel for the field activities and database.

8.2 Contributions of the participating institutions

8.2.1 Focal institution

The DRSRS will have the overall co-ordinating role, including the training of the national personnel, the adjustment of the approach to INRA. The DRSRS will act to reinforce and develop its capacity of land use assessments and information management at national, provincial and district levels. A Unit will be mandated to develop and maintain the base information on land use resources up to date. The envisaged Terms of Reference for the DRSRS are as follows:

Immediate Action:

- Nominate the National Project Coordinator (NPC) and;
- Set up the national Steering Committee to oversee the project implementation, facilitate inputs to the project in all phases, ensure wider dissemination of results and provide guidance as how sustainability of the project findings are ensured at the long run;
- Set up the Project Technical Unit as proposed during the multi-stakeholders workshop of March 2006.

At the near future:

- Provide physical facilities (offices for staff and database, training space, communication means, etc.);
- National counterpart staff at secretariat and professional level;
- National personnel for data collection in the field and for data entry and processing.

- National personnel and facilities for the mapping component
- Convening the stakeholders meetings

The DRSRS will also provide the existing spatial information (Landsat TM scenes and thematic maps) and will design and timely produce a harmonized Vegetation type /land use map. Interpretation and production of the map will be carried out. The project will meet the cost of field reconnaissance and checking of the interpretation, supplies and material for the production of the map and international expertise. The DRSRS will be responsible of the whole process of the map production, but will collaborate with involved stakeholders in defining a harmonised land use classification system, field truthing of the interpretation using inputs from the field teams. The DRSRS will deliver a digital map.

8.2.2 Other contributions from other partners

Other contributions from other partners will include:

- Local transportation for the entire fieldwork (14 vehicles for 9 months) and to support NTU (4 vehicles: 3 vehicles for 9 months and 1 vehicle for 30 months);
- Technicians for the field teams (to be decided later).
- 1 specialist for each partner institution to work within the PTU.
- Database staff (1 specialist and 4 technicians from all the concerned institutions).
- In-kind contribution to cover: salaries of personnel each partner assign to fieldwork and database and the field allowance (per-diem).

9 Inputs to be provided by FAO

The FAO Representative in Kenya will be operationally responsible for the project and the Forest Resources Development Service (FORM) will, through the programme of Support to National Forest Assessment, be responsible for coordinating the technical inputs, with AGL on land and water issues, AGP on plants, AGA on livestock and FIRI on fish and aquaculture. The national counterpart in Kenya will be the DRSRS.

The personnel services provided by the project are described in the following table (Table 2).

Table 2: Personnel Services

Activities supported	Experts /consultants	Months
Training and supervision	<u>TCDC Consultants</u> TCDC-1 Integrated Natural resources assessment and database management expert	5 mths/ 1.5 years (2 missions)
	Total (TCDC)	5 mths
NFA: Planning and supervision Data processing and analysis Policy Analysis	NPC National Project Coordinator	18 mths
	<u>National Consultants</u> NC-1 Integrated Natural Resources Assessment	16 mths

	NC-2 Data Processing and analysis	6 mths
	NC-3 Policy analyst	4 mths
	NC-4 Mapping and Remote sensing	6 mths
	NC-5 Agrobiodiversity consultants	6 mths
	Total (NC)	40 mths
Overall supervision and training	<u>Advisory Technical Services</u> FORM (4 missions) AGL and AGP (3 missions) FIRI (1 mission)	<ul style="list-style-type: none"> • 6 weeks • 3 weeks • 1 week
	Total Advisory Technical Services	10 weeks

Materials, supplies and equipment

- Procurement of specialized field equipment.
- Procurement of computer equipment and other office supplies to set up and run the database.
- Procurement of satellite images.

10 Project duration

18 months.

11 Budget

Items	Units	Quantity	Unit cost (US\$)	Total (US\$)	FNPP Forestry	Agro-Biodiversity	Gvt contributions (US\$)
1. Equipment and Supplies							
* Computers	Unit	3	1,500	4,500	4,500	0	
* Printers	Unit	1	600	600	600	0	
* Various supplies and consumables	LS		6,000	6,000	6,000	0	
Sub-Total Equipment and supplies				11,100	11,100	0	
2. Field Inventory Equipment (set for 14 field crews)				40,000	20,000	20,000	
Sub-total Field Inventory Equipment				40,000	20,000	20,000	
3. Inception phase							
Workshops	LS			3,500	3,500	0	
National consultants	LS			12,000	12,000	0	
Travel in country	LS			1,800	1,800	0	
Sub-Total inception phase				17,300	17,300	0	
4. Staff Training							
* Workshops (information needs, methodology, project findings)	Unit	3	5,000	15,000	0	15,000	
* Training courses to INRA	Units	2	10,000	20,000	10,000	10,000	
Sub-Total National Training				35,000	10,000	25,000	
5. Vegetation/Land use map							
* Mapping including satellite imagery	LS			20,000	10,000	10,000	
* Checking of interpretation and production of final map	set			10,000	5,000	5,000	
Sub-Total Vegetation /Land use map				30,000	15,000	15,000	
6. Technical Assistance							
* TCDC Expert	W/M	5	7,000	35,000	35,000	0	
* Travel TCDC (air tickets)	Unit	3	3,000	9,000	0	9,000	
* FAO Backstopping missions	W/M	10	4,000	40,000	20,000	20,000	
* ATS AG	LS	1	10,000	10,000	0	10,000	
Sub-Total Technical Assistance				94,000	55,000	39,000	
7. Local Consultants							
* National Project Coordinator	W/M	18	1000	18,000	9,000	9,000	
* INRA Consultant	W/M	16	2,300	36,800	36,800	0	
* Remote Sensing Consultant	W/M	6	2,300	13,800	13,800	0	
* Data processing Consultant	W/M	5	2,300	11,500	11,500	0	
* Policy Analyst Consultant	W/M	4	2,300	9,200	0	9,200	
* Agro-Biodiversity consultants	W/M	6	2,300	13,800	0	13,800	
Sub-Total Local Consultants				103,100	71,100	32,000	
8. Supervision missions from the MTU (in-country visits)							
* Supervision (allowances 2 months x 5 persons)	W/D	280	50	14,000	0	14,000	
Sub-Total supervision mission (country travel)				14,000	0	14,000	
10. Recurrent Costs							
* Salaries							
- Senior technicians (14 X 9 months)	W/M	126			0	0	NC
- Technicians (3 x 9 months x 14 teams for field work and 5 x 6 months for mapping and 5 x 18 months for data entry)	W/M	498			0	0	NC
- Field workers (max 2 per team x 9 months)	W/M	252			0	0	NC
* Per diem					0	0	
- Senior technicians	W/D	3780			0	0	NC
- Technicians	W/D	14940			0	0	NC
- Field workers	W/D	7560			0	0	NC
* Vehicles operation (17 x 9 months, 1Vx 30months, including drivers)	V/M	183	900	164,700	57,000	37,700	70,000
* Reporting	LS			3,000	3,000	0	
Sub-Total Other Recurrent Costs				167,700	60,000	37,700	
Total				512,200	259,500	182,700	70,000
Contingencies				15,366	7,683	5,000	
TOTAL Project				527,566	267,183	187,700	70,000

NC = National Contribution

W/M= Work Month - W/D = Work Days

LS = Lump Sum

12 Work plan

The work plan (see Annex 4) will be implemented in three phases.

Phase 1, of about three months, will be dedicated to the preparations for the fieldwork including methodology adaptation and information needs identification. An awareness meeting will be held for the partner institutions and stakeholders. Two workshops will also be organised. The first to review and adapt the approach to Integrated Natural Resources Assessment and the second to define the information needs.

Phase 2 will be of about four months and include training of the national staff, designation of national staff to the project, assignment of transportation means. Under this second phase, the fieldwork will start with pilot zones distributed in selected areas (see sample location map in annex 2). The phasing of the fieldwork will allow refining the field survey approach, training the field teams and assessing financial needs to extend the work in the whole country. The database application will also be developed.

Phase 3 of eleven months will include the nation-wide fieldwork for data collection by the field teams (9 months), interpretation of the satellite images (mapping activities). The data processing and analysis, policy analysis and harmonisation, reporting and evaluation of the project findings will be undertaken, including cross sectoral studies. Important logistical support will be provided to have non-stop work in the field by the teams and continuous supervision by the MTU team. The supervisory team will secure homogeneous data collection by all the teams, correct interpretation of the definitions of the variables and their entry in the field forms. The field forms will be collected by the supervisory group and assembled at the database unit of the project for encoding by the database personnel. The information system will be set up, and the national personnel in charge will be trained to manage collected data.

Project phases can be detailed as follows:

Phase 1: Project planning, partnership building and methodology adaptation (preparation)

- Build partnership for Kenya's INRA and long term monitoring: identify key participating stakeholders and other agencies and define their roles and responsibilities.
- Prepare a detailed work-plan for project activities.
- Assess national experiences in the area of natural resources assessment and information management and identify information needs and gaps with key stakeholders.
- Identify human resource and capacity building needs.
- Identify and procure the needed equipment for project activities.
- Adapt and refine FAO general approach to INRA to national context and requirements through consultation between professionals and scientists.
- Define with stakeholders biophysical and socio-economic variables be considered in the field implementation of the project, with particular emphasis on gender and indigenous knowledge.
- Develop and agree upon a harmonized vegetation/land use classification system.

Phase 2: Capacity building for field implementation, pilot phase and database development

- Carry out training of the project teams in field surveys following the agreed approach for field inventory for INRA.
- Carry out a data collection in the field in selected pilot areas.

- Develop of national centralized database for field data, harmonized with existing national databases.
- Capacity building in field data processing and data management.
- Analysis of results in pilot areas.
- Improve methodology learning from pilot phase experience.
- Carry out training of the project team in data management and dissemination.

Phase 3: National field implementation, mapping, data analysis and reporting

- Capacity building of field staff for up-scaled INRA (hands-on training).
- Expand the field survey to the rest of the country.
- Carry out mapping activities.
- Consolidate the database.
- Carry out data entry, processing and analysis of field data and produce results satisfying wide range of information users.
- Carry out cross-sectoral studies in particular assess and document indigenous knowledge of natural resources as well as the role of women and youth in natural resource management.
- Validation, reporting and dissemination of findings.
- Set up mechanisms for maintenance of the permanent sample plots and continuous data collection.
- Develop and operationalize the national information sharing mechanism and establish backup mechanisms for data security
- Support inter-sectoral policy dialogue and harmonization, and carry out policy impact analysis.

13 Approach and methods

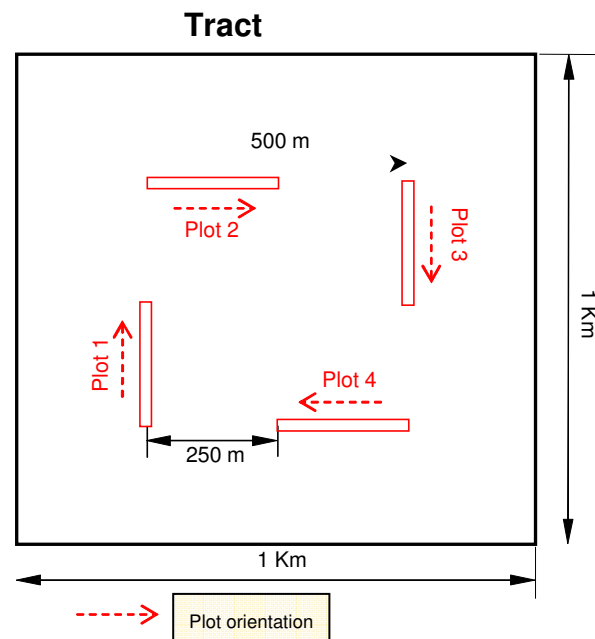
The FAO model approach to INRA will be adopted and adapted to national context and information requirements. The approach was designed to harmonise data collection techniques and data processing and to respond to country's as well as international growing needs of information. It is based on a number of considerations such as cost effectiveness, timeliness, complexity/rapidity of data collection/updating procedures, accuracy and consistency of output data (in space and time), compatibility of outputs with those from other systems of data collection (e.g. SoW PGRFA) and flexibility in land use classification/characterisation (e.g. adaptability to changes in scale and level of generalisation); capacity to rapidly facilitate a broad range of analysis in response to various decision making needs. It has the potential of responding to different and changing national international needs:

- Assessing natural resources for decision making at national level policy makers:
 - Extent and state of resources (areas, volume, biomass, biodiversity, etc);
 - Products and services;
 - Management, use and users of resources;
 - Role of natural resources in food security and poverty alleviation.
 - Setting up a long term monitoring system of resources;
- Developing and strengthening national capacity in integrated natural resources assessments, information management and long term monitoring;
- Contributing to increasing awareness of and knowledge about the multiple functions of natural resources;

- Developing harmonized land use classification, terms and definitions with international reporting systems. This is to produce comparable information between successive inventories in the country and to facilitate reporting to the international processes;
- Forging partnerships between national institutions and with regional and international agencies;
- Guiding investment and socio-economic development programmes in the country.

Fieldwork is a crucial activity for the training of national personnel. The planned outputs will depend largely on it. Permanent observation sites will be established for long-term monitoring of natural resources. GPS is a key instrument in locating plots with the assistance of latitude/longitude coordinates defined in advance on the topographic maps.

Around 500 sample sites are planned for field data collection distributed in the country according to a systematic latitude/longitude grid (see Annex 2). The sampling scheme will be systematic and stratified according to agro-ecological zones. In stratum 1, more heterogeneous, diverse and populated, the sample sites will be located at higher sampling density, set at 15 min x 10 min. In the rest of the country (stratum 2) falling mostly under the dry ecological zone and composed essentially of tropical shrub-land, the sampling intensity is lighter and is set at 30 x 30 minutes. Each sample site is a tract of 1 km² with four 20 m X 250 m (5,000 m²) sample plots located at 250 m from each other (see figure below).



Measurements of resource characteristics will be done in all natural resources categories (forest and trees, crops and agrobiodiversity, livestock, wildlife etc). Observations of vegetation type, health, diversity extent, spatial location and human activities will be recorded. Variables will be defined for this purpose during a workshop in the first phase of the project. Interviews of key informants from local communities, NGOs and entrepreneurs, etc will be done in every sample site to identify the major users of resources (men, women, children and other groups, the products and services used, the way these are managed and used). A household survey will complement the information on livestock and farming system. According to needs to adequately capture agrobiodiversity and agroecosystems dimensions the method will be reviewed to ensure it adequately captures change in habitat (e.g loss of cattle grazing and wildlife migration corridors,

dryseason grazing lands, habitat for pollinators etc.) as well as species and intra-species considerations and loss of ecological function (e.g. effects on hydrological regime).

14 field crews will be created. Each crew will include a representative of the partner institutions (forester, agriculture, livestock, etc). However for practical reasons, the crews will be optimised to include the minimum number of technical staff that is able to cover the whole set of data collection. The field crews will be trained adequately to carry out future surveys and maintain the established field sample plots. The national multi-sectoral technical unit (MTU) will also be trained in organization and supervision of the fieldwork.

Complementary mapping will be carried out using recent high resolution satellite data and a standardized and nationally agreed vegetation/ land use classification. Mapping activities will rely on existing spatial database such as AfriCover products and will include field validation to the extent possible.

14 Workshops and training

A budget provision is made for the workshops and in-country training.

- Workshop on the approach to INRA applied to long-term monitoring of the resources including harmonisation of forest/land use classification, terminology and definitions that meets national information requirements and facilitates country reporting obligations to international processes.
- Workshop on natural resources information needs and the required set of biophysical and management/use variables to be covered by the assessment.
- Workshop on the project findings and validation of the results.
- Two-week theoretical and practical training courses in resources assessment to the national team from the partner national institutions.
- One-week introductory course to the national field crew members in integrated natural resources assessment focussing on the classification system, terms and definitions used, sampling design and field forms, data recording.
- Two-week practical training course to the national field crew members in field survey following the INRA approach.

15 Reporting

The National Project Coordinator will provide FAO and the relevant technical services through the FAOR in Kenya, a Quarterly Project Progress Reports summarizing the activities performed, the progress and outcomes of the project and, a revised work plan for the next period as appropriate.

Each consultant (international and national) will present at the end of each mission a technical report containing the main results, conclusions and recommendations of his/her missions. The NPC under the supervision of the Head of the DRSRS will also prepare the following reports to be validated by the responsible Lead Technical Unit at FAO/HQ (FORM):

- Report of findings and results of the project. The final report will include a description of project implementation and all findings of the project.

- Report on policy impact analysis and harmonisation.
- Report on thematic studies.

The FAO lead technical unit (FORM), in coordination with the technical expertise associated with the Agrobiodiversity Theme as well as with other technical units in Rome, will be responsible for ensuring that the technical reports of consultants are submitted in a timely manner, are technically sound and will distribute them to other FAO units participating in the project. At the end of every mission, the FAO officers providing supervisory and advisory technical services will prepare a technical report with results, conclusions and recommendations and conduct briefings with other FAO staff as necessary.

16 Annexes

Annex 1: Logical framework

Annex 2: Sample location map

Annex 3: Terms of Reference

Annex 4: Work plan

Annex 5: Contributions of the partner institutions

Annex 1. Logical framework

Specific Objective	Expected output-Results	Activities	Indicators	
1. Identify information needs and adapt methodology and approach to Integrated Natural Resource Assessment (INRA) through participatory process and build national capacity to carry out countrywide INRA	1.1 Participation of major users of natural resources data and information needs identified and enhanced.	1.1.1 Based on thematic issues, identify partners to implement and/ or co-sponsor some project activities.	<ul style="list-style-type: none"> List of partners to implement and/co-sponsor activities 	
		1.1.2 Set up a Steering Committee (SC) drawn from identified thematic issues to oversee and provide guidance to the project.	<ul style="list-style-type: none"> List of SC Members 	
		1.1.3 Convene sub-national seminars for representatives of participating stakeholders to inform about the project and exchange on best ways to implement the project taking into consideration users' needs and without compromising the quality of information.	<ul style="list-style-type: none"> Number of Seminar held and proceedings reports 	
	1.2 National consensus on approach and method to INRA and long-term monitoring of ecological impacts established.		1.2.1 Through consultations between national professionals and scientists, review the model approach of resources assessment and resources monitoring to INRA proposed by FAO, adapting it to integrate agrobiodiversity and other dimensions.	<ul style="list-style-type: none"> Model approach of resource assessment reviewed
			1.2.2 Convene a national workshop and as required specific task forces involving professionals and scientists from the concerned sectors to review and agree on the approach.	<ul style="list-style-type: none"> Workshop report Reviewed approach document
			1.2.3 Finalize the approach and publish for launching the project.	<ul style="list-style-type: none"> Published approach document

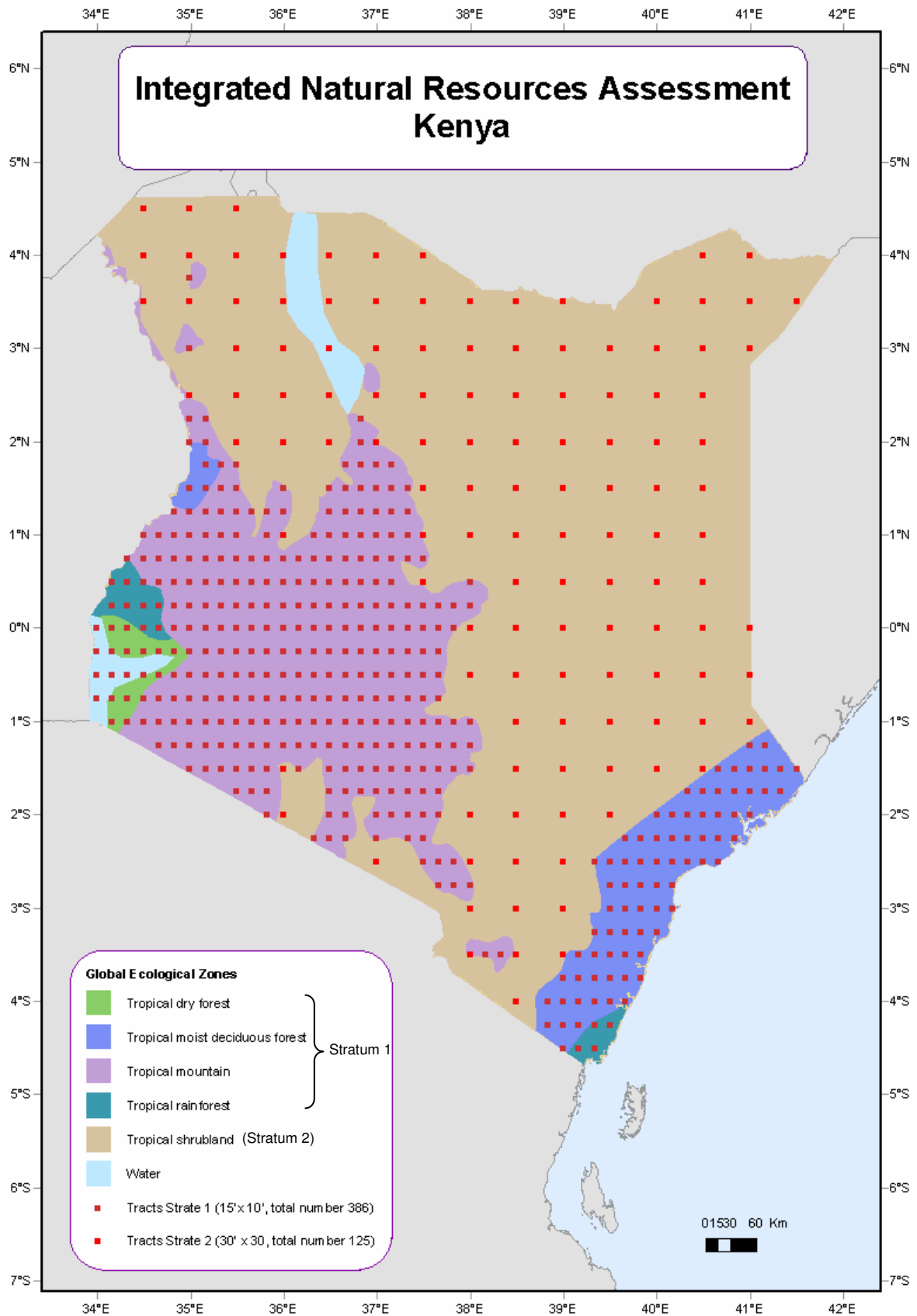
	1.3 Needs of information on natural resources identified.	1.3.1 Carry out a comprehensive review of needs of information on natural resources including forest, trees, land and water and biodiversity and prepare a list of biophysical and socio-economic variables of the resources taking into account the necessity to harmonise the national database with global information requirements. The core list of variables prepared by FAO will be used as basis of this assessment.	<ul style="list-style-type: none"> List of variables information needs on natural resources including forest, trees, land and water
		1.3.2 Convene national workshop involving representatives of partners and stakeholders to review and agree on the harmonised national list of variables.	<ul style="list-style-type: none"> Workshop report Harmonized national list of variables
	1.4 National institutions to plan and conduct nationwide assessment of natural resources including monitoring, presentation of results and management of information strengthened.	1.4.1 Assess national experiences in the area of natural resources assessment and information management.	<ul style="list-style-type: none"> Assessment report of experiences in area of natural resources assessment and management.
		1.4.2 Define human resources needs for office and field tasks and capacity building needs for planning and implementation of the integrated natural resources assessment.	<ul style="list-style-type: none"> List of human resources needs for office and field Capacity building needs for planning & implementation of INRA
		1.4.3 Define needs of equipment for the national database	<ul style="list-style-type: none"> List of equipments for the National Database
		1.4.4 Review the environmental institutions dealing with the natural resource system and recommend strategies for close collaboration in long-term monitoring of resources and information management and sharing.	<ul style="list-style-type: none"> List of Environmental Institutions dealing with the natural resource system Strategic plan on modalities of collaboration and the MOUs

	1.5: Equipment procured and installed	1.5.1 Specify the needed equipment for planning and implementation of field survey, data entry, storage, modelling and processing. Initiate procurements and storage	<ul style="list-style-type: none"> • List of sampling equipments considering those already with participating institutions • Number of tenders for procurements
	1.6: National expertise for INRA reinforced and consolidated	1.6.1 Plan and carry out training of the national team in field surveys for integrated natural resource assessment.	<ul style="list-style-type: none"> • Number of field teams trained on approach for INRA
		1.6.2 Plan and carry out training of the national team in the area of data processing and analysis, information management and dissemination.	<ul style="list-style-type: none"> • Number of national team trained on data processing, analysis and information management and dissemination
	1.7 Vegetation types/Land use classification system developed and harmonized, up to date map and analysis produced.	1.7.1 Assist in the preparation of a harmonised classification system of the vegetation types and land uses. In developing this, consideration must be taken of the classifications systems existing in the country and at international level such as the one used by FAO for global FRA, Africover, etc.	<ul style="list-style-type: none"> • Vegetation and land use classification system
		1.7.2 Ensure wide dissemination and review of the developed classification system by professionals, scientists and the SC members.	<ul style="list-style-type: none"> • List of institutions and individuals considered in the review of classification system
		1.7.3 Finalise the national classification system on the basis of received comments and inputs from reviewers.	<ul style="list-style-type: none"> • Harmonized classification system
		1.7.4 Prepare a manual for the interpretation of satellite images and map production.	<ul style="list-style-type: none"> • Developed manual for the interpretation of satellite images and maps

		1.7.5 Support in the design and preparation of a national forest/land use map based on the harmonised legend with reference and use of the Africover map.	<ul style="list-style-type: none"> National forest/land use map
2 Assess status of natural resources by implementing the new INRA approach within pilot zones for later up-scaling to cover the entire country. The assessment will cover use, users and management of natural resources in particular indigenous knowledge and the role of women and youth in natural resource management	2.1: Field survey for data collection planned and carried out, focusing on the socio-economic and environmental benefits of natural resources.	2.1.1 Prepare a manual targeted at field crews describing the approach and techniques to follow for data collection and materialisation of permanent sample sites in the field.	<ul style="list-style-type: none"> Approach and techniques manual for field sampling
		2.1.2 Plan and carry out representative field sampling in selected pilot sites (phase 2) to be extended to the rest of the country (phase 3).	<ul style="list-style-type: none"> Number of sampling sites sampled
		2.1.3 Set up the monitoring system including registering the permanently established sample sites for periodic data collection and updating of baseline information and change assessment	<ul style="list-style-type: none"> Number of permanent registered sample sites for periodic data collection and monitoring
3 Building on INRA findings carry out policy impact analysis and cross-sectoral studies to support inter-sectoral policy dialogue	3.1: National Natural Resources Database reviewed, improved and made operational	3.1.1 Develop a functional database on natural resources including forest and trees outside forest, other natural resources and biodiversity compatible with existing national databases in the country.	<ul style="list-style-type: none"> List of database information from lead institutions for database development
		3.1.2 Convene an informative meeting of partners and stakeholders about the structure and extent of the database and feedback	<ul style="list-style-type: none"> Minutes of informative meeting of partners and stakeholders Draft document on the structure of the database
	3.2: Field data captured, processed and analysed	3.2.1 Develop a manual for data processing and analysis emphasizing on harmonising project results in the country as well as with international information requirements.	<ul style="list-style-type: none"> Reviewed manual on the structure of the database

		3.2.2 Carry out entry, processing and analysis of the field data and produce results satisfying wide range of information users.	<ul style="list-style-type: none"> • Number of data forms processed and analysed • Draft report on the result of data
3.3: Project results discussed and published		3.3.1 Distribute final report among SC members and other partners for review and comments.	<ul style="list-style-type: none"> • List of SC members and other partners that reviewed the final report
		3.3.2 Convene a national workshop to validate the project results.	<ul style="list-style-type: none"> • Report on project report validation
		3.3.2 Define and put in place a system to disseminate information to all users.	<ul style="list-style-type: none"> • Information dissemination system
3.4: Cross-sectoral policy analysis and major issues of poverty, environment degradation, water, biodiversity, etc, addressed		3.4.1 Set up a multi-disciplinary team to review and carry out analysis of the policy framework in the light of the findings of the project and of the thematic studies carried out under the FNPP and recommend improvements and measures to harmonise them.	<ul style="list-style-type: none"> • A functional multidisciplinary team to review and carry out analysis of the policy framework
		3.4.2 Convene a national workshop to review and agree on the recommendations on policy harmonisation	<ul style="list-style-type: none"> • Report of the national policy harmonisation

Annex 2. Sample site location



Annex 3: Terms of Reference

National Project Coordinator (NPC)

Under the direct supervision of Director of the DRSRS and in close consultation with the FAO National project coordinator and country team, the National Project Coordinator will assume managerial responsibility of the project, facilitate its smooth implementation and will report to the DRSRS. The main tasks of the NPC will be to

1. Promote, liaise and maintain close working cooperation with the national institutions and regional/provincial services with relevance to the INRA project to ensure wide participation on decision making on the project and secure smooth implementation of all its activities.
2. Prepare and update the work plans of the project. Detailed work plans will be prepared each meeting of the Steering Committee.
3. Implement project work plans in accordance with the project requirements and ensure timely delivery of equipment, recruitment of staff, placement of consultants and reporting by them, study tours and other training activities, arrangement and fieldwork activities and project reporting.
4. Facilitate the nomination of the national professionals to work in the MTU.
5. Supervise, guide and monitor all personnel, including experts, in project implementation. Ensure that all reports, manuals and other documentation prepared by experts and their counterpart are of high quality.
6. Plan and supervise the planning, implementation and monitoring processes of project activities.
7. Ensure that inputs of the partner institutions into the project, office accommodation and administrative assistance, equipment, training and personnel are available when required and are used by the project.
8. Arrange travel and coordination arrangements for study tour.
9. Arrange internal travel in Kenya for international experts and their counterparts to the regions in accordance with the project needs.
10. Arrange and supervise all workshops, training courses, seminars and fieldwork that are required for project implementation.

Duration of Assignment: 18 months.

Duty Station: Nairobi, Kenya with travels in the country.

Qualifications: A university degree, preferably at Masters level, in natural resources with experience of at least 10 years of practical experience in Kenya in resources management, assessment/inventory, project management.

Language: English.

Recruitment: The National Project Coordinator will be selected and appointed by the Government and will be required to work **Full Time** on the Project.

Integrated natural resources assessment and database management consultant

(TCDC-1)

Under the direct supervision of Forest Resources Development Service (FORM) and in collaboration with the national authorities, the consultant will provide the technical assistance and support to the DRSRS in training of national personnel, planning and implementing the project activities and setting up the information system.

The main tasks of the consultant will be to:

- Work with the national team from the DRSRS and related Land Use Institutions to review and adjust when necessary the inventory methodology, vegetation classification, land use classification and biophysical and socio-economic variables;
- Assist in supervising interpretation of satellite scenes following the vegetation/land use classification prepared with the national staff and the production of the maps;
- Prepare, in collaboration with the national consultants and FRA/Agrobiodiversity experts, a training programme for the national personnel involved in the project and assist the DRSRS in its implementation;
- Participate in the implementation of the training programme for the national personnel including the team of supervisors, the field crews and database personnel through the planned workshops and courses;
- Assist DRSRS in purchasing, installing and using the equipment and supplies planned for the project;
- In close collaboration with the national consultant, prepare a plan of the project activities and identify timely inputs from the project and the Government;
- Provide supervision to the field crews during the survey and provide technical guidance as to homogenise data collection and best interpretation of variables and definitions. Frequent visits to all crews must be carried out throughout the assignment of the expert;
- Assist in organising collection field crews, outputs and filings;
- Work closely with the national land use and information system consultants to develop and set up a national integrated land use functional database, encode, validate and store the field data, prepare functions for data processing and initiate data processing;
- Assist in data analysis, reporting of findings and elaboration of the project terminal statement.

Duration: 5 months.

Duty Station: Nairobi, Kenya with frequent field trips.

Qualifications: The Consultant should have at M.Sc. Natural Resources Management or equivalent with five (5) years' working experience in the tropics and a background in integrated land use assessment design, planning and competence in land use information system management and have confirmed experience in capacity building and project implementation.

Language: English.

National Integrated Natural Resources Assessment Consultant **(NC-1)**

Under the direct supervision of the Forest Resources Development Service (FORM) and technical supervision of the Technical Backstopping Officer in FORM, FAO headquarters, and in collaboration with the national authorities and the TCDC expert, the national consultant will assist the DRSRS in training of national personnel, planning and implementation of the national Integrated Natural Resources Assessment.

The main tasks of the consultant will be to:

- work closely with the NPC and the TCDC expert to prepare a work plan for the project .
- work closely with the national personnel and international consultant and provide inputs for the elaboration of training programme to the national staff involved in the project and assist the DRSRS in implementing it;
- participate in implementing the training programme through the planned workshops and courses;
- assist the DRSRS in planning and running the workshops throughout the project and securing wide participation of different stakeholders;
- work with professionals from the different sectors and scientists and in close collaboration with the TCDC expert to reach a consensus on the INRA approach and long-term monitoring;
- assist in coordinating efforts of the DRSRS to define information needs and harmonize in close collaboration with the mapping team the land use classification system;
- assist DRSRS in purchasing, installing and using the equipment and supplies planned for the project;
- in close collaboration with international consultant prepare a plan of the project activities and identify timely inputs from the project and the Government;
- provide supervision of the field crews during the fieldwork and provide technical guidance as to homogenize data collection and best interpretation of variables and definitions. All teams be closely followed during the start of the fieldwork;
- assist in organizing field crews outputs and in filing them;
- in close collaboration with the TCDC expert, assist in developing the national database, encoding/storing the field data, preparing functions for data processing and undertake data processing;
- assist in data analysis and reporting of findings;
- prepare the project progress report on the component of inventory and the terminal statement.

Duration: 18 months WAE.

Duty Station: Nairobi and travel inside the country.

Qualifications: The Consultant should have at least M.Sc. in natural resources management or equivalent with more than ten (10) years' working experience and a background in integrated land use assessment design; planning and competence in land use information system management and have experience in capacity building and project implementation.

Language: English

National Data Processing and Analysis Consultant (NC-2)

Under the direct supervision of the Forest Resources Development Service (FORM) and technical supervision of the Technical Backstopping Officer in FORM, FAO headquarters, and in collaboration with the national authorities and the TCDC expert, the national consultant will provide the technical assistance and support to DRSRS in the areas of capacity building, institutional strengthening and data processing and analysis. The main tasks of the consultant will be to:

- Sort, analyse and validate the collected data. This work will be coordinated with the NC-1 and TCDC-1. The NC-2 will analyze the data in accordance with the agreed strategy for producing results and statistical calculations and store the findings in an easily retrievable format.
- Refine the analyzed data and compile the relevant sections of the report for submission to the Government and to FAO. This will be done on the basis of the recommendations from the workshop on the project findings.
- Ensure that the Focal Institution counterpart personnel fully understand all the work-processes related to extracting, sorting, processing and analyzing the collected data so that future repetitions will be possible with the DRSRS's own capacity.
- Report any technical problems related to the data and the Information System/Database to DRSRS counterpart and to FAO.
- Describe all work performed in the form of a terminal report at the end of the recruitment period — to be submitted to and technically cleared by the FAO Lead Technical Unit of FAO Headquarters. The report should contain: 1. ample descriptions to allow for accurate future repetitions of the work and; 2. recommendations for possible improvements of the database application including a description of any technical problems and any 'bugs' encountered during the work.
- Assist in any other tasks under the project at the instruction of the NPC.

Duration: 5 months.

Duty station: Nairobi

Qualifications The consultant should have a strong background in information system development, database management, statistical analysis and be familiar with MS Access database application at an advanced level.

Language: Fluency in English is required.

National Policy Analyst Consultant (NC-3)

Under the direct supervision of the Forest Resources Development Service (FORM) and technical supervision of the Technical Backstopping Officer in FORM, FAO headquarters, and in collaboration with the national authorities and the TCDC expert, the national consultant will provide the technical assistance and support to DRSRS in the areas of policy impact analysis involving wide range of institutions concerned and institutional strengthening. The main tasks of the consultant will be to:

- Undertake review of policies dealing with forestry, agriculture, livestock, rangeland, soil and water conservation, biodiversity, environment, etc;
- Carry out analysis of the natural resources sectors in terms strengths, weaknesses, opportunities and threats. Said analysis to be carried out based on project findings, and existing literature;
- Prepare recommendations to improve policy on natural resources and to engage inter-sectoral dialogue among national institutions to harmonise the policy framework;
- In close collaboration with the NPC, the FORM Expert, the NC-1, and TCDC Consultant, convene a three-day workshop to present and discuss results of the review of the different land use management policies, the natural resources policy analysis and the recommendations for harmonisation among the economic sectors;
- Prepare a report of the workshop that should define areas of harmonisation between policies, and follow up actions to consolidate the national dialogue on policy harmonisation;
- Prepare and submit final consultancy report.

Duration: 4 months

Duty station: Nairobi.

Qualifications: The consultant should have at least a M.Sc. degree in policy and planning with a minimum 10 years experience in activities related to policy and planning.

Language: English required.

National Mapping and Remote Sensing Specialist **(NC-4)**

Under the direct supervision of the Forest Resources Development Service (FORM) and technical supervision of the Technical Backstopping Officer in FORM, FAO headquarters, and in collaboration with the national authorities and the TCDC expert, the national consultant will provide the technical assistance and support to DRSRS in training the national personnel, planning and implementing the activities in connection with mapping and remote sensing on land use resources, notably in developing of maps using remote sensing materials such as satellite images. The main tasks of the consultant will be to:

- prepare inception report and submit to the DRSRS and FAO for comments;
- examine the existing thematic maps on vegetation, land cover and land use and assess their quality in terms of thematic details, dates of production, methods of production, scale and precision;
- participate in defining the harmonised land use classification which should be based on the FAO classification global Forest Resources assessment;
- define specifications of the land use map to be produced by the project and the mapping methodology and approach to be adopted;
- define the specifications of the needed remote sensing data and assist the DRSRS and the project Multi-Sectoral Technical Unit in acquisition of satellite images. Use should be made of existing data and resort to purchase only if the existing data is judged not suitable or incomplete;
- assist to build capacity in land use mapping to national personnel in the DRSRS and related staff;
- oversee the entire satellite image interpretation activities, including field checking and finalisation of the interpretation;
- validate the interpretation results, produce a final map based a harmonized legend and generate statistical results on areas of the different land use units;
- in close collaboration with FRA Expert, the national integrated natural resource assessment consultant and the TCDC consultant, prepare mapping storage system;
- prepare and submit final consultancy report describing the planned activities, the method followed for land use mapping, training programme and beneficiaries and results of the mapping work and the results aschieved.

Duration: 6 months.

Duty Station: Nairobi with frequent travel inside the country.

Qualifications: The consultant should have at least M.Sc. in information technology or natural sciences. The consultant should have at least ten years' experience in institutional support and administrative management. The consultant should have expert knowledge in integrated natural resource inventory, GIS, mapping and remote sensing.

Agrobiodiversity consultants

(NC-5)

The national consultants on agrobiodiversity (NC-AGBIO) will be recruited and under overall guidance of the FAO Representative in Kenya and will work under the direct technical supervision of the Kenya Agricultural biodiversity group and the Forest Resources Development Service (FORM), the lead technical unit. This will be facilitated through a project task force with the Land and Water Development Division (AGL), Plant Protection and Production Division (AGP), Animal Health and Production Division (AGA) and Gender and Population Division (SDW) and Inland Water resources and Aquaculture Division. The national consultants will work in close collaboration with national authorities, partner institutions and members of the FNPP project team in Kenya. The consultants will provide technical assistance in integrating agrobiodiversity issues into Kenya's Integrated Natural Resources Assessment (INRA), in particular the main tasks of the consultants will be to:

- work under the daily guidance of the FNPP national coordinator, together with other members of the INRA team (the national project coordinator (NPC), the TCDC expert and other consultants) to integrate agrobiodiversity in the INRA approach and methodology;
- assist in defining information needs on agrobiodiversity, indicator selection and data collection methods for variables on agrobiodiversity with a range of partners and stakeholders;
- assist in the preparation and implementation of the integrated data collection process ensuring an integrated ecosystem approach, with attention to temporal (e.g. growing seasons, rotations) and spatial dimensions (landscape to farm), the main components of ecosystems (forest, crop and livestock based systems in various agro-ecological zones), and ecosystem functions and services;
- contribute to the development of a training programme for the national staff involved in the project and participate in at least two training workshops for supervisors and field crews;
- assist as required, the national lead institute (DRSRS) in project implementation, with particular attention to agrobiodiversity concerns, from the selection of indicators and assessment methods, to data analysis and reporting of findings;
- review opportunities and make suggestions for linking or integrating the INRA database with existing national and international database and information systems that address relevant agrobiodiversity issues; and,
- prepare a specific report on data collection, interpretation and documentation of findings on agrobiodiversity (status, trends, driving forces, pressures, priority issues requiring attention).

Duration: 6 months for tree persons plant related, livestock related and systems functioning part time.

Duty Station: Nairobi and travel inside the country.

Qualifications: The national consultants should have at least M.Sc. in agriculture, biology or natural resources management with specific knowledge and practical experience in agroecology and/or agrobiodiversity. Required to have more than seven (7) years' working experience including competence in land use information system management and experience in capacity building. Desirable to have participated in natural resources inventory.

Language: English and Kiswahili.

Annex 4: Work Plan

Activities	Months																	
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18
Phase 1: Project planning, partnership building and methodology adaptation (preparation)																		
• Recruitment of international and national consultants	■	■																
• Set up of project organization (identification of partners, set up of national SC, NMT, co-funding)	■																	
• Prepare a detailed work-plan for project activities	■																	
• Identify information needs (review of policy issues) and define list of variables		■	■															
• Workshop on information needs (thematic working groups)			■															
• Adapt and refine FAO general approach to INRA		■	■															
• Workshop on approach and methodology			■															
• Identify human resource and capacity building needs				■														
• Identify and procure the needed equipment for project activities				■	■													
• Develop and agree upon a harmonized vegetation/land use classification system			■															
Phase 2: Capacity building for field implementation, pilot phase and database development																		
• Training of the national multi-sectoral team (NMT)					■													
• Training of field teams					■													
• Carry out a pilot data collection in selected zones (field work and supervision)						■	■											
• Improve methodology learning from pilot phase experience								■										
• Develop database INRA					■	■												
• Training in data entry, field data processing and data management								■										
• Data entry and analysis (pilot)								■	■									
Phase 3: National field implementation, mapping, data analysis and reporting																		
• Capacity building of field staff for up-scaled INRA (hands-on training)									■	■								
• Carry out a nationwide data collection (field work and supervision)									■	■	■	■	■	■	■	■	■	■
• Consolidate the database									■									
• Data entry										■	■	■	■	■	■	■	■	■
• Mapping											■	■	■	■	■	■	■	■

Activities	Months																	
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18
• Data processing and analysis																		
• Reporting on findings																		
• Institutional review on resource monitoring (maintenance of sample plots, ...)																		
• Policy impact analysis,																		
• Support inter-sectoral policy dialogue and harmonization																		
• Final workshop on project findings (validation) and outline of follow up programme																		
Technical assistance and national SC meetings																		
• Meetings of the national SC																		
• National Project Coordinator																		
• TCDC expert																		
• National Consultant on INRA (NC-1)																		
• Data processing and analysis (NC-2)																		
• National Consultant on Policy Analyst (NC3)																		
• National Consultant on Remote sensing and mapping (NC-4)																		
• Agrobiodiversity consultants (NC-5) (3 persons plant related, livestock related and systems functioning part time)																		
• FORM backstopping																		
• AGLL and AGP backstopping																		
• FIRI backstopping																		

Annex 4: Contributions of the partner institutions

Partners	Vehicles	SC	MTU	Field	Mapping	Database
■ DRSRS (Ministry of Environment and Natural resources)	2	1	1	8	5	1
■ Forestry Department (Ministry of Environment and Natural resources)	2	1	1	8		1
■ Department of Crop Production (Ministry of Agriculture);	2	1	1	8		1
■ Department of Land Use Planning	2	1	1	8		1
■ Livestock Departments (Ministry of Livestock and Fisheries)	2	1	1	8		1
■ Fisheries Department (Ministry of Livestock and Fisheries)	2	1	1	8		1
■ Kenyan Wildlife Service (Ministry of Tourism)	2	1	1	8		1
■ Department of Water Resources (Ministry of Water and Irrigation)	2	1	1	8		1
■ Survey of Kenya (Ministry of National Planning)	2	1	1	8		1
■ National Museums of Kenya	2	1	1	8		1
■ FAO		➤➤	➤➤	➤➤		
■ Other national and international partners		➤➤				
Totals	20	10	10	80	10	10