A GIS CENTERED DATABASE

FOR

MT. KENYA EAST PILOT PROJECT ACTIVITIES

A Report of the Consultancy on

Mapping All Project Activity Sites Using

Geographic Information System (GIS) Technology

Consultant

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Mt. Kenya East Pilot Project for Natural Resources Management (MKEPP), Embu

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EXECUTIVE SUMMARY

The Mt. Kenya catchment is an important ecosystem and contributes significantly to the economic development of the country. The ecosystem supports livelihoods of thousands of households through water provision for agricultural activities. It also supports other important economic activities such as hydro-electric power generation and tourism. This has however been jeopardized by unsustainable natural resource management and utilization, which lead to wanton degradation. To alleviate the situation, the Mt. Kenya East Pilot Project for Natural Resources Management (MKEPP) was established to spearhead the restoration activities on pilot basis with possible replication in other ecosystems facing similar environmental problems. Since 2005, MKEPP has collaborated with the local communities, other funding agencies and government departments in implementing water resources and development, environmental conservation, rural livelihood support, and community empowerment projects in five river basins, namely; Kapingazi/Rupingazi, Ena, Tungu, Kathita and Mutonga that lie in seven districts in the region. In spite of this intervention, neither mapping of the geographical distribution of the project activity sites nor the database detailing the events at each point of intervention has been undertaken. Thus, through a competitive bid, MKEPP consulted CETRAD to undertake the mapping exercise of all its project activity sites using GIS technology based on defined Terms of Reference (TOR) in order to provide a "bird's eye view" of the spatial distribution of the project activities.

CETRAD organized field visits and consultations with project implementers and other key resource persons with the aim of gathering information about these projects. With the assistance of MKEPP project management personnel, government departments affiliated to MKEPP projects, local administration, FDA leadership and other key resource persons, field visits were made to capture geographical coordinates and attribute information of the projects activities. The geographical coordinates of every project were captured using hand held GPS sets while discussions were held with project implementers in the river basins. As a result, 37 FDAs and numerous projects within them spanning over the three main sectors of MKEPP intervention (water, environment and rural livelihood) were mapped and their attribute information gathered for database development. The mapped features included those implemented under MKEPP support and others of interest to

MKEPP such as credit facilities, hotspots and wetlands, among others. The following provides summaries of the mapping exercise in the respective river basins.

Tungu River basin lies partly in Meru South district and the newly Maara district. It has 3 FDAs two (Ntuntuni-Karimba and Kaanwa-Ndumbini) of which are operational and the third one (Upper Tungu) was being initiated. A total of 157 features were mapped during the exercise. Of these, 3 rehabilitated cattle dips, 11 conserved/developed springs, 1 earth dam, 21 demonstration sites, 1 district water office at Chuka, 3 FFSs, 4 dairy bucks stations, 2 marketing billboards, 3 river gauging stations, 1 section of rehabilitated rural road, 2 sections of riverbank protection, 18 school greening projects, 7 tree nurseries, 1 water supply system (kiosk), 1 water tank and 11 rehabilitated forest patches are under MKEPP support while the rest were mapped based on interest expressed by MKEPP.

Kapingazi/Rupingazi basin cuts across Embu and Mbeere districts and has 6 FDAs with 4 being operational (Kithunguriri, Kiriari, Gachuriri and Rwika) and 2 (Kairuri and Rianjeru) were being implemented. 241 features were mapped in the river basin. Those supported by MKEPP include 2 poultry sites, 9 conserved/developed springs, 20 demonstration sites, 1 district water office at Embu, 11 energy saving technologies, 3 FFSs, 1 rehabilitated irrigation scheme, 14 dairy bucks stations, 4 marketing billboards, 3 rehabilitated forest patches, 5 sections of protected riverbanks, 12 school greening projects, 4 shallow wells, 1 water laboratory at Embu, 4 water tanks, and 6 tree nurseries.

Kithinu/Mutonga river basin, on the other hand, is defined by Mutonga River and its tributary Kithinu. The basin stretches from the edge of Mt. Kenya forest to the confluence of Mutonga and Tana rivers. The basin cuts across the former Meru Central and Tharaka districts. It comprises 11 FDAs, six of which are fully operational (Gaatia, Kithurumwene, Mariene, Mutaranga, Muragara, and Kaare-Mikui) and the rest (Kirui, Kamarandi-Kamanyaki, Mutino, Gakuika and Weru) are newly initiated. 256 features were mapped in total and those under MKEPP support include 1 river abstraction, 2 rehabilitated cattle dips, 1 poultry site, 7 conserved springs, 1 earth dam, 49 demonstration sites, 1 district water office, 3 energy saving technologies units, 5 FFSs, 26 dairy buck stations, 6 marketing billboards, 4 rehabilitated hilltops, 2 river gauging stations, 5 sections of rehabilitated rural roads, 5 sections of protected riverbank, 78

school greening projects, 2 shallow wells, 12 tree nurseries, 5 water tanks, and 9 water supply systems (kiosks).

Ena river basin covers part of Embu and Mbeere districts and has 6 FDAs, four of which are operational (Maranga, Kiringa, Kiang'ombe, and Nthawa) and the rest two (Ishiara-Ndurumori and Kawanjara) were under implementation. The study mapped 162 features in total in the basin among which 1 earth dam, 26 demonstration sites, 2 energy saving technologies units, 5 FFSs, 17 dairy buck stations, 4 marketing billboards, 1 rehabilitated hilltop, 25 school greening projects, 5 river gauging stations, 21 shallow wells, 7 tree nurseries, 1 water supply system (kiosk), 3 water tanks, and 1 district water office at Siakago are supported by MKEPP.

Kathita river basin covers parts of Tharaka and the former Meru Central districts and has ten FDAs, four of which were operational (Gitwiki, Ndurumo ya Ngari, Marimanti-Gituma and Turima-Nkondi) and the rest were newly initiated (Ndurumo ya Arithi, Ndurumo ya Nguo, Kamwathu-Gituma, Mukunga-Maigani, Kiagu and Mweru-Biangure). The exercise mapped 242 features that are included in the report and database. Those supported by MKEPP are 3 rehabilitated cattle dips, 3 conserved springs, 1 irrigation scheme, 12 dairy buck stations, 2 marketing billboards, 25 demonstration sites, 3 district water offices, 3 energy saving technology units, 3FFSs, 1 earth dam, 11 rehabilitated forest patches, 2 sections of rehabilitated rural roads, 13 shallow wells, 3 water tanks, 12 tree nurseries and 60 school greening projects.

All the above information was compiled and GIS maps and the database generated. This report presents the results of the mapping exercise and the generated GIS maps. The soft copy of the report and the database are provided in the accompanying DVD. Detailed attributes information of the mapped features are provided in the appendices.

While this report reflects what was implemented by the time of mapping, projects implemented after the study are not included. Therefore, MKEPP should ensure that those features that were not implemented by then and their information are added to the database. Moreover, using GIS technology, regular updates should be emphasised in order to ensure that the information in the database is current.

ABBREVIATIONS & ACRONYMS

AWPB	Annual Work Plans & Budgets
CAP	Community Action Plan
CFA	Community Forest Association
DPC	District Project Coordinator
FDA	Focal Development Area
FFS	Farmer Field School
GEF	Global Environmental Facility
GIS	Geographic Information System
GoK	Government of Kenya
GPS	Global Positioning System
HH	Household
IFAD	International Fund for Agricultural Development
IGAs	Income Generating Activities
KFS	Kenya Forest Service
KWS	Kenya Wildlife Service
LPA	Lead Project Agency
MKEPP	Mt. Kenya East Pilot Project for Natural Resources Management
PMU	Project Management Unit
PSC	Project Steering Committee
RGS	River Gauging Station
SHG	Self Help Group
TOR	Terms of Reference
WP	Water Project

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CHAPTER 1

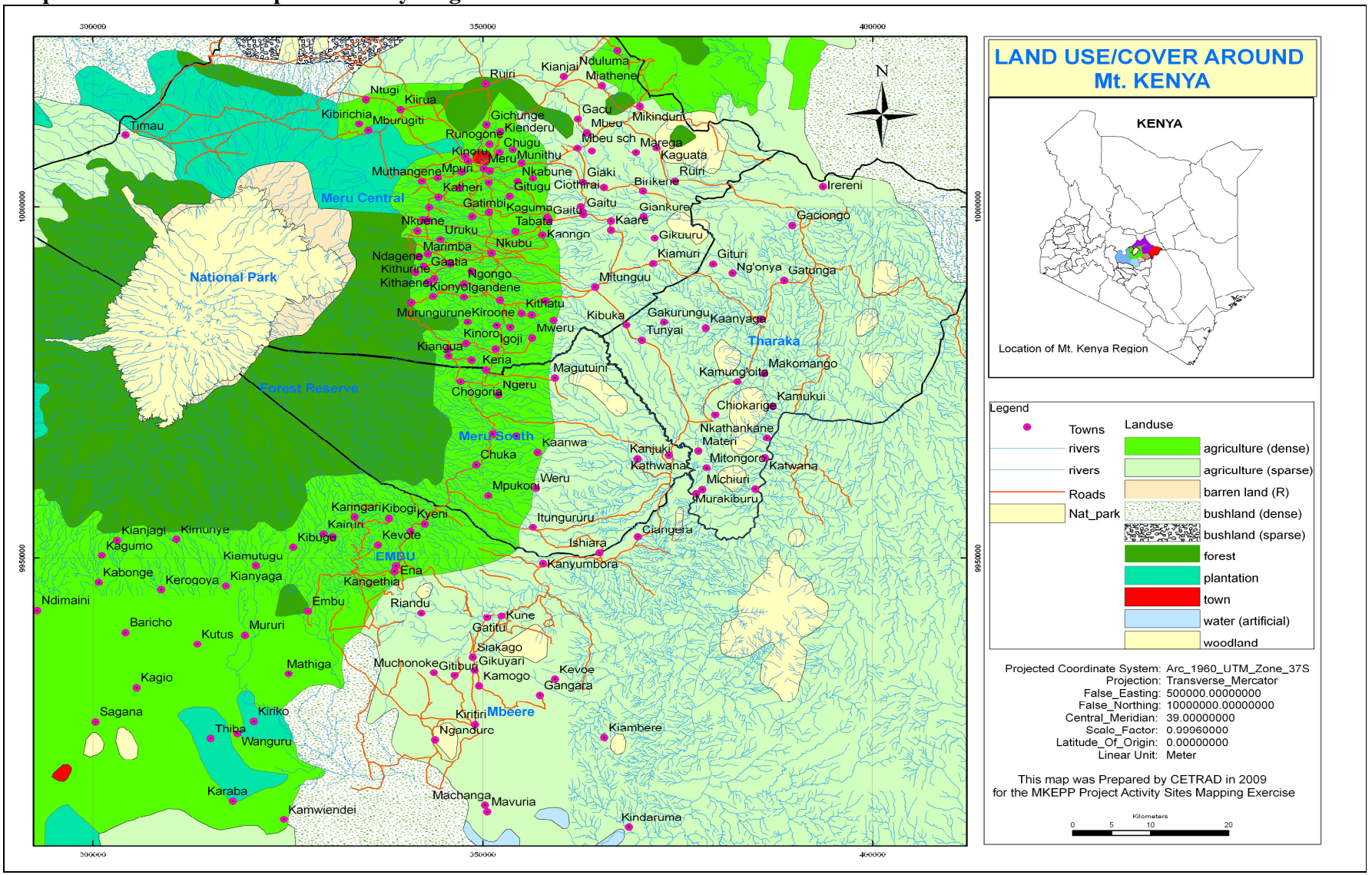
INTRODUCTION

The Mount Kenya ecosystem is of critical importance because it forms one of the Kenya's major water towers. The Mt. Kenya East forms the catchment for some major rivers including the Tana River. Water flowing from this catchment plays an important economic role by supporting agricultural activities in the neighbourhood and lowlands that are major sources of livelihood. In addition, the catchment plays important roles in supplying water for agricultural and hydro-electric power generation in the country; timber production, tourism and conservation of both flora and fauna. However, the ecosystem has over the years' undergone tremendous degradation due to the increasing human population, changing land uses and the failure by institutions governing natural resource management. Map 1 illustrates the status of land uses in the catchment.

Past socioeconomic and biophysical studies identified relentless deforestation through unsustainable logging and charcoal burning, poor management, encroachment for agriculture and settlements, forest fires, overgrazing, soil erosion and various processes of land degradation together with low productivity of agricultural systems as mutually reinforcing impacts of human activity on the environment resulting from a fragmented and uncoordinated approach to natural resources and ecosystem management. These development problems include a large population lacking employment or reliable income generating activities with an extremely poor infrastructure, the collapse and general lethargy of markets, and an increasing demand for water for irrigation, livestock and human use (MKEPP Appraisal Report, 2003). Consequently, livelihoods of many households that depend on its resources get threatened.

For instance, over abstraction of water in the upper Catchment areas leads to decline in the downstream flows. The scale of this problem, in which only 20% of the abstractions have been sanctioned and the lack of previous enforcement of water permits, presents a major challenge. One of the leading causes of over abstraction is inefficient and excessive use of water for irrigation and urban consumption. There is a challenge to reduce the high level of water wastage (50%) in order to maintain water levels in the rivers for the users down stream.

Map 1: Land use/cover map of Mt. Kenya region



Other issues of concern that required attention in a bid to solve the issue degradation in Mt. Kenya ecosystem are sediment loads and pollution from coffee and urban areas, lack of clear organizational roles and areas of jurisdiction for the case of Kenya Wildlife Service (KWS) and the Kenya Forest service (KFS), increasing poverty among the communities living around the National Reserve and high incidences of human-wildlife conflicts. Similarly, communities around the Mt. Kenya ecosystem had not been fully involved in the conservation of wildlife and natural resources to make conservation a realistic and credible land use option. All these issues needed to be addressed.

Nevertheless, there were special opportunities to take advantage of as provided by the existence of a strong support from the government for reforms in the sectors dealing with natural resources management. Among them the government strategy for poverty reduction, the National Environment Management Act for natural resources management, and the Water Act 2002. The National Environment Management Act provided a solid base for tackling environmental degradation while the Water Act 2002 provided for better management of water resources with involvement and active participation of the communities. The above reforms provided a platform for the establishment of the Mt. Kenya Pilot Project for Natural Resources Management (MKEPP) to guide investments in water resources management, environmental conservation and community development as a support for the ongoing Government reform.

1.1. MT. KENYA EAST PILOT PROJECT FOR NATURAL RESOURCES MANAGEMENT (MKEPP)

The Mt. Kenya East Pilot Project for Natural Resources management (MKEPP) was conceived and formulated by the Government of Kenya (GoK) in 2002. This was followed by resource mobilization from the International Fund for Agricultural Development (IFAD) and the Global Environmental Facility (GEF). On 26th February 2003, the Government of Kenya (GOK) and the International Fund for Agricultural Development (IFAD) signed Loan and Finance Agreements (Loan No. 599-KE) of about 12.6 SDR (approx. US$ 17 million to finance a seven-year Mount Kenya East Pilot Project for Natural Resources Management (MKEPP). The project seven year became effective on 1 July 2004 and therefore the project completion date is July 2011.

The overall goal of the MKEPP project is to reduce poverty through improved food security and improving levels of income of farmer's particularly rural women. This is by promoting more effective use of natural resources, improving access to water and introducing better farming and water management practices for sustainable use of land and water resources.

The immediate objective is to enhance equitable use of natural resources with particular focus on environmental conservation. Among the measures used to halt and reverse environmental degradation while alleviating poverty include:

- Capacity building at the local level in order to achieve more equitable abstraction of river water and its more efficient use for irrigation;
- Environmental conservation and rehabilitation in the areas adjacent to rivers by concentrating on soil erosion control on farms and on road sides;
- Improving agriculture productivity and promoting marketing of agricultural and natural resources based products to raise household income;
- Better management of the Mt. Kenya Forest Reserve and National Park ecosystem; and
- Minimizing human/wildlife conflict along the Mt. Kenya Forest Reserve and National Park.

The project works in five river basins, namely: Kapingazi, Ena, Tungu, Mutonga, and Kathita within the river Tana catchment, which fall within the five administrative districts of Embu, Greater Meru Central (currently Meru Central, Imenti North and Imenti South), Meru South, Mbeere and Tharaka. The project under IFAD support targets a population of about 136,000 households. The IFAD loan supports several activities related to agriculture, water, environment, public works and community empowerment within the region, while GEF funded activities are implemented around the Mt. Kenya Forest Reserve covering Nyeri, Kirinyaga, Meru Central, Meru South and Embu Districts and designed to benefit more than 800000 households living in the 10km belt from the forest boundary.

The Ministry of Water and Irrigation is the Lead Project Agency (LPA), with overall responsibility for implementation of the project. The Project Steering Committee (PSC) ensures that project activities are in line with government policy; conditions in loan documents are adhered to; and processing of project financing complies with Ministry of Finance requirements. The PSC also approves annual work plans and budgets and provides a

forum for conflict resolution. Project implementation is guided by Project Management Unit (PMU). Activities of the PMU include: assisting in AWPB preparation and preparing the consolidated AWPB; submitting withdrawal applications; maintaining adequate project financial records; supervising district level activities; developing and maintaining an M&E system and undertaking suitable M&E activities. The PMU has full time technical officers to support and monitor each component.

1.2 PROJECT COMPONENTS

MKEPP activities lie within five broad categories, namely:

1.2.1Water Resources Management

The project supports community based water resources management and strengthens the capacities of water departments in water resources planning, management and control. The project undertakes an assessment of the current situation with regard to water together with a comprehensive assessment of the baseline situation with regard to the number of pipes placed both legally and illegally to with draw water (abstractions) water quality and water flows. The project also supports the formation of River water users associations to work in partnership with the district water departments to address specific river basin management challenges such as water apportionment and Catchment degradation and or resolve water conflicts.

1.2.2 Environmental Conservation

Environmental conservation focuses on Trust lands and other publicly owned lands, both within and outside the sub basin Catchment areas. It supports preparation of local community natural resources management plans, tree planting and other activities to reduce erosion. It also controls erosion emanating from road runoff.

1.2.3 Rural Livelihoods

Rural livelihood activities support on-farm integrated soil and water conservation measures for agricultural and livestock activities; promotes income generating activities (IGAs) and promotes improvement of access to the local markets in order for the farmers top obtain fair prices for their goods, by mobilizing farmers to form marketing groups, disseminating market information to target groups and rehabilitating rural infrastructure, including selected access roads.

1.2.4 Community Empowerment

This is mainly two fold; a) community development that strengthens sub basin operating organizations such as water users associations and community afforestation of trust lands and supports implementation of innovative community initiatives in agriculture, marketing and micro processing of natural resource products and by products; (b) it strengthens district technical capacity through training of district level staff in project cycle management, preparation of annual work plans and participatory techniques including those of monitoring and evaluation and field level physical audits of community support activities

1.2.5 Project Management and Coordination

This category is charged with the responsibility of coordinating the project activities and implementing project interventions according to Annul work plans and budget approved by the Project Steering Committee (PSC). The is responsible for preparation of project implementation manuals, organizing Annual Review Workshop, facilitating the preparation of annual work plans and budgets, financial control and management, participatory monitoring and evaluation, procurement of projects goods/services among others.

1.3 IMPLEMENTATION OF MKEPP ACTIVITIES

MKEPP activities have been implemented in five river basins, namely Kithinu/Mutonga, Tungu, Ena, Kapingazi/Rupingazi and Kathita which lie within seven districts of Embu, Mbeere, Tharaka, Meru South, and former Meru Central (currently sub-divided into Imenti North, Imenti South and Imenti Central). The districts are shown in map 2.

Several activities and projects falling under the four thematic areas highlighted above (1.2.1 – 1.2.4) have been implemented since 2005 when MKEPP rolled out its first projects. Nevertheless, the actual distribution of MKEPP activity sites has not been mapped to show their geographical distribution. To realize this objective, MKEPP tendered a consultancy exercise to interested firms to map all its project activity sites using Geographic Information Systems (GIS) technology, which was awarded to CETRAD to implement. The essence of carrying out this mapping exercise is to provide a "bird's eye view" of the geographical distribution of project activities. This is because mapping enables effective visualization of

the distribution pattern of projects thereby helping in planning for new ones. It also guides in management and monitoring purposes.

1.4 OBJECTIVES AND SCOPE OF THE MAPPING EXERCISE

The consultancy project "**mapping all project activity sites using Geographical Information System (GIS) Technology***"* aims at providing a "bird's eye view" of all project activities implemented by MKEPP since 2005 and generate information that will assist in monitoring and evaluation.

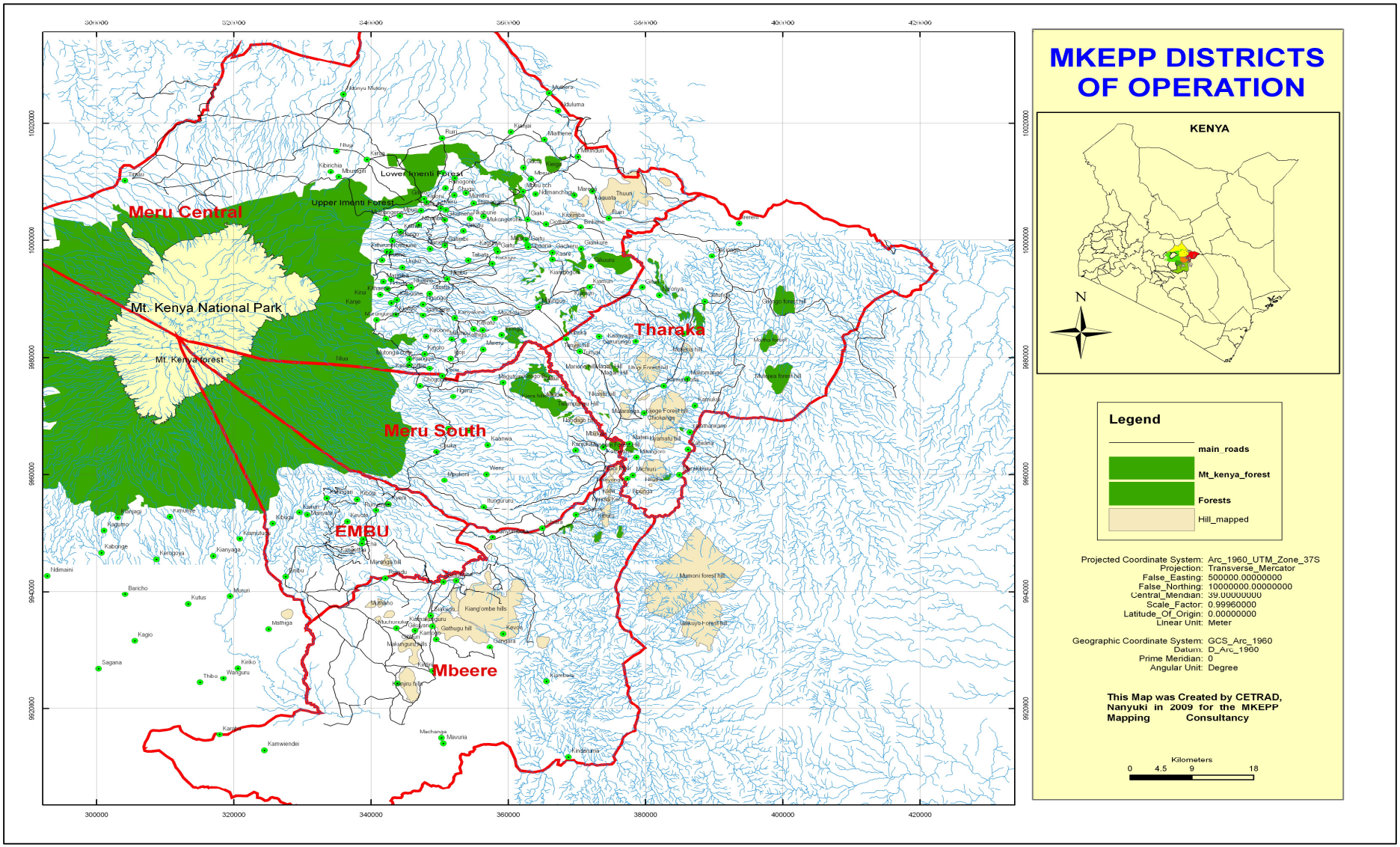
The exercise is guided by the Terms of Reference (TORs) provided by MKEPP, under which the following are to be captured and presented within the project outputs:

- The boundaries of the 32 FDAs;
- The boundaries of the 7 districts within which the project activities are implemented;
- Hilltops and rehabilitated areas within them;
- Hotspots i.e. areas or activities that are likely to affect activities in FDAs.
- Degraded and rehabilitated areas;
- Similarly, the exercise captured and documented attributes information regarding the various project activities.

1.5 ORGANISATION OF THE REPORT

This report is divided into five chapters. Chapter 1 provides an introduction to Mt. Kenya ecosystem, the origin of MKEPP and the range of activities it supports, the objectives and the organisation of the report. Chapter 2 presents the range of project activities mapped, methodologies and tools employed. Chapter 3 details the obtained results from the five river basins. Chapter 4 presents the generated GIS maps of activities and features mapped while Chapter 5 provides the conclusions and recommendations. The attributes information about the mapped features/activities, tools for field data gathering and photographs of mapped project activities are appended to the report.

Map 2: Districts of MKEPP operations in Mt. Kenya region



CHAPTER 2

MAPPED PROJECT ACTIVITIES, METHODOLOGIES & TOOLS

2.1 RANGE OF PROJECTS ACTIVITIES MAPPED

The Mt Kenya East pilot project activities are implemented in areas delineated as Focal Development Areas (FDAs) in Tungu, Ena, Kapingazi/Rupingazi, Kithinu/Mutonga and Kathita river basins. There were 21 operational FDAs and additional 15 that had just started operating by the time this mapping was conducted. Within the operational FDAs, a range of project activities have been initiated under water resource management and development, rural livelihood support, environmental conservation and community empowerment as discussed earlier in this report. In this section we present the range of project activities mapped, the methodologies employed and tools used to accomplish the study.

2.1.1 Water Resources Management Projects

The activities implemented under water resource development include rehabilitation and conservation/ protection of water springs, rehabilitation or construction of water supply systems (shallow wells and water kiosks), initiation of smallholder irrigation schemes, construction of earth/concrete dams, facilitating District Water offices, funding a water analysis laboratory, rehabilitation of wetlands, construction of water tanks, and erection of river gauging stations, formation of river water users associations, and identification and construction of water abstraction points.

The type and number of water projects varied from one basin to the other depending on nature of available water resources or the scarcity of it. For example, in Meru South, springs protection was common due to existence of numerous springs while in lower Embu shallow wells are prominent for harvesting belowground water. In upper parts of Embu covering the Kapingazi basin, water projects were few due to existence of several streams and rivers that serve as sources of water for the local households.

Most of these projects were implemented in collaboration with the local community in the FDA for sustainability purposes. Hence, MKEPP provided financial and material support; the government departments provided the technical expertise in project implementation, while the community supplied unskilled labour as a strategy for creating ownership.

While most of the mapped activities are supported by MKEPP, only a few of the river abstraction points received such support i.e. abstractions points for irrigation or community water supply. Most others existed by the time MKEPP rolled out its projects and were mapped following a request by MKEPP since there was need to know their spatial distribution in the river basins it was operating in. However, only a few were mapped because time and expenses could not allow. Similarly, only two irrigation schemes were mapped since the rest were yet to be implemented. For that case only the identified abstraction points were mapped. The river water associations are amorphous groups and are in the process of registration but with no official or permanent place of operation. It was therefore not possible to capture their geographic distribution as planned. Similarly, most wetlands are undeveloped and this study only mapped their distribution for purposes of future development. The following list summarizes features mapped under the water component.

- ✓ River abstraction points
- ✓ Rehabilitated/conserved water springs
- ✓ Earth & concrete dams
- ✓ Wetlands
- ✓ Water supply systems (shallow wells & water kiosks)
- ✓ Water tanks
- ✓ Protected springs
- ✓ Wetlands (identified for future development)
- ✓ River gauging stations
- ✓ Water analysis laboratory
- ✓ New/rehabilitated irrigation systems
- ✓ District water offices

2.1.2 Environmental Conservation and Management Projects

The activities implemented under environmental conservation and management include establishment of school greening programmes, identification of hotspots, river bank protection, rehabilitation of degraded areas on hilltops and forests, support to community and private sector tree nurseries, and supply of tree seedlings to individuals farmers for adoption. Similarly, efforts have been made to encourage the formation of Community Forest Associations (CFAs) to facilitate the rehabilitation of degraded areas in the Mt. Kenya forest in conjunction with the KFS and KWS.

Among these projects, the school greening programme and establishment of tree nurseries are the majority. This is because tree nursery projects are supported by MKEPP through materials (plastic bags, seeds, watering cans, spades and watering pipes) or through purchase of seedlings for the school greening programme. Rehabilitation of hilltops though initiated in several areas was challenged by droughts, termites and management of planted seedlings. This led to massive loss. Community forest associations exist in Embu, Meru South and the former Meru Central districts due to proximity to Mt. Kenya forest reserve. However, they are autonomous groups comprising Network Groups that raise seedlings for planting in the degraded forest areas. For that case, the location of Network Groups tree nurseries and areas they have rehabilitated were mapped.

The Riverbank protection is undertaken in collaboration with farmers who are supplied with seedlings to plant along identified rivers. This implies that the success depends upon their willingness in adopting, planting and caring for the seedlings. While MKEPP provided seedlings, it was revealed that the pace of progress was challenged by lack of effective collaboration among some farmers.

Hotspots exist both in and beyond the FDAs. They were identified on their basis of impacts on what is going on in the FDAs. They include effluents sources that pollute rivers (e.g. slaughter houses, hospitals, factories and dumping sites), wetlands under threat, quarries and highly eroded areas that need urgent attention.

The following list provides the features considered under environmental conservation and hotspots.

- ✓ Tree nurseries
- ✓ Degraded & rehabilitated areas in Mt. Kenya forest reserve
- ✓ Greening programmes in schools
- ✓ Rehabilitated hilltops
- ✓ Community forest associations
- ✓ Rehabilitated areas within forest reserves
- ✓ River bank conservation sites
- ✓ Quarries
- ✓ Sources of effluents and pollutants e.g. factories, slaughter houses, car washes along rivers, hospitals/dispensaries

- ✓ Degraded areas or those prone to
- ✓ Wetlands under threat
- ✓ Dumping sites

2.1.3 Rural Livelihood support activities

Under the Rural Livelihood sector, the activities undertaken include establishment of farmer field schools, demonstration sites for training farmers on various farming/production techniques (e.g. fodder crop production, kitchen gardening, tree-crop farming, runoff harvesting, soil conservation and fertility management, and establishment of apiaries, among others), rehabilitation of cattle dips, establishment of buck stations to improve local goats for milk and meat production, and poultry sites. Moreover, there was the introduction of energy saving technologies in order to facilitate environmental conservation, and erection of marketing information billboards at strategic locations to provide market information for various agricultural and livestock products at various market outlets in the country. The marketing billboards are meant to equip farmers with information about price changes for the various products in the major market outlets in the country. Similarly, there has been emphasis to rehabilitate or open up rural access roads in order to facilitate easier transportation of farm produce to markets and inputs to the farms.

Rural markets where farmers trade their commodities were also mapped despite the fact that most are outside the FDAs and do not lie within the scope of MKEPP activities. They were considered because of their importance in providing the much needed produce outlets for farmers in the FDAs. Similarly, the geographical location of credit and financial institutions were mapped. This is due to the relevance of credit facilities in supporting on-farm and off-farm enterprises development for groups trained in various aspects of community empowerment.

The following list summarizes activities mapped under the rural livelihoods component

- ✓ Farmer field schools (FFS)
- ✓ Demonstration sites
- ✓ Marketing information billboards
- ✓ Dairy goats and bucks
- ✓ Rehabilitated cattle dips
- ✓ Poultry sites

- ✓ Rural Markets
- ✓ Credit and micro-finance institutions
- ✓ Energy saving technologies
- ✓ Rehabilitated rural roads

2.1.4 Community Empowerment

In addition to activities initiated through MKEPP-communities collaboration, MKEPP further supports community empowerment through farmers' training on micro-finance, value addition and group dynamics. However, it was not possible to map where such activities took place because they had no central location and were undertaken at various points except where farmer field school or demonstration sites acted as meeting points. In that case, the later was picked as the representative.

2.2 METHODOLOGIES, TOOLS AND ACTIVITIES

Varied methodologies suitable for generating the required information and data were employed. Similarly, appropriate tools to enable information/data gathering were developed and utilized. To ensure that all the requirements and information needed as per the TORs were captured, the mapping exercise was planned and executed in phases.

2.2.1 Inception Phase

The inception phase comprised the period after the communication from MKEPP of the award of the consultancy to implement the mapping project, to the official signing of the contract. This period was dedicated to discussions with MKEPP personnel over TORs, programme of work, defining the roles and responsibilities of each party, and signing of the contract. First, discussions were held with the MKEPP PMU staff in order to clarify some of the issues highlighted in the technical proposal for purposes of developing a common understanding of the TORs before implementation could commence. This was conducted through a presentation meeting at Kaguru Training Centre at Nkubu. The programme of work was also discussed during the meeting of the parties. Similarly, the responsibilities and roles of each party were identified and elaborated, an exercise that culminated with the signing of the contract between MKEPP and CETRAD, giving the later the mandate to implement the project.

2.2.2 Preparatory Phase

The preparatory phase involved gathering information about the geographical distribution of FDAs and project activity sites and designing tools for data collection. A planned desk review

to familiarize with the project portfolios and Community Action Plans before undertaking field data collection was not possible owing to time constraint and segregation of activities and information in the various government departments involved across the districts. Instead, the exercise was integrated within the field phase and information regarding the various projects and FDAs sourced from the Districts Officers through discussions and existing reports. This enabled to have an understanding of the scope of implemented projects within each sector for purposes of guiding the field data collection.

Similarly, during the preparatory phase the necessary materials were sourced and field data gathering tools generated in agreement to attribute information agreed with the client.

2.2.3 Field Data Collection

Field data collection was undertaken in phases between June and December 2008. The target was to map and collect attributes information regarding project activities within the five river basins. However, due to the fact that MKEPP activities are implemented within the framework of administrative units (Districts) rather than river basins, field campaigns were organized on basis of districts. It is worth noting that Meru South and Meru Central Districts were subdivided into new districts prior to 2007 general elections. However, the official boundaries are not yet declared and therefore the mapping was based on the spatial extents of the old districts.

The field phase was carried out by a team of six who worked in collaboration with District Project Coordinators (DPCs), District Facilitation Team Officers from various Government Departments seconded to the MKEPP project, Focal Development Area (FDA) leadership (or persons allocated the responsibility), local administration, institutional representatives (e.g. schools) and village leaders with information regarding the concerned project activities. Consultations were also made with representatives of credit and micro-finance institutions on credit facilities availed to public or members.

With the assistance of the above-mentioned personnel, visits were made to the various project sites. The geographical coordinates of the project sites were recorded using hand held GPS sets for purpose of geo-referencing implemented activities. Attribute information were gathered through consultations and discussions with project implementers; and other relevant personnel mentioned above. The gathered information was recorded in generated field data

collection forms. A checklist of the attributes information used is appended to the report (Appendix 1). Photography was also used to pictorially document some of the projects activities.

Mapping of the FDAs boundaries and other features covering relatively large area or lengths was undertaken through GPS ground tracking. Where it was not possible, participatory methods were employed to identify features that define the spatial extents of features considered. The geographical coordinates of the identified features were then used to generate polygons.

2.2.4 Analysis and Generation of Outputs

After the field data collection in the five river basins, the gathered data and information were analyzed for the preparation of this report. The analysis involved organizing the data collected using the GPS sets and field data forms in order to link the attribute information with the spatial data; geo-referencing project sites; generating the spatial distribution maps of project activities in ArcGIS; and developing the database. The results and GIS maps are presented in chapters 3 and 4, respectively.

CHAPTER 3

RESULTS OF THE MAPPING EXERCISE

Chapter 3 provides the results of the mapping exercise within the five river basins. These are broken down into sections (3.1 to 3.5) based on river basins: Tungu, Kapingazi/Rupingazi, Kithinu/Mutonga, Ena and Kathita. The spatial distribution of the five river basins is in chapter 4.

3.1 THE TUNGU RIVER BASIN

The Tungu river basin largely covers Meru South district and part of the newly created Maara District. The basin has two operational FDAs named Ntuntuni-Karimba and Kaanwa-Ndumbini and another under implementation named Upper Tungu. Kaanwa-Ndumbini FDA was started in the year 2005/06 and Ntuntuni-Karimba in 2006/07.

The projects/activities supported by MKEPP comprise conserved springs, cattle dips, riverbank protection, cattle dips, conserved/protected springs, dairy bucks, marketing billboards, demonstration sites, equipping District water offices, farmer field schools, an Earth dam, rehabilitation of rural roads, river gauging stations, water tanks, woodlots on farms, tree nurseries and school greening projects. Other features were mapped due to their relevance or influence on MKEPP activities. The following sections provide summaries of the features/activities mapped while the GIS maps are presented in Chapter four and detailed attribute information tables are appended to the report.

3.1.1 Number of features mapped in the basin

A total of 157 features were mapped with river abstractions at 36 (22.93%), demonstration sites at 21 (13.38%) and school greening projects at 18 (11.46%) ranking highest. The proportions of the mapped features are shown in figure 1.

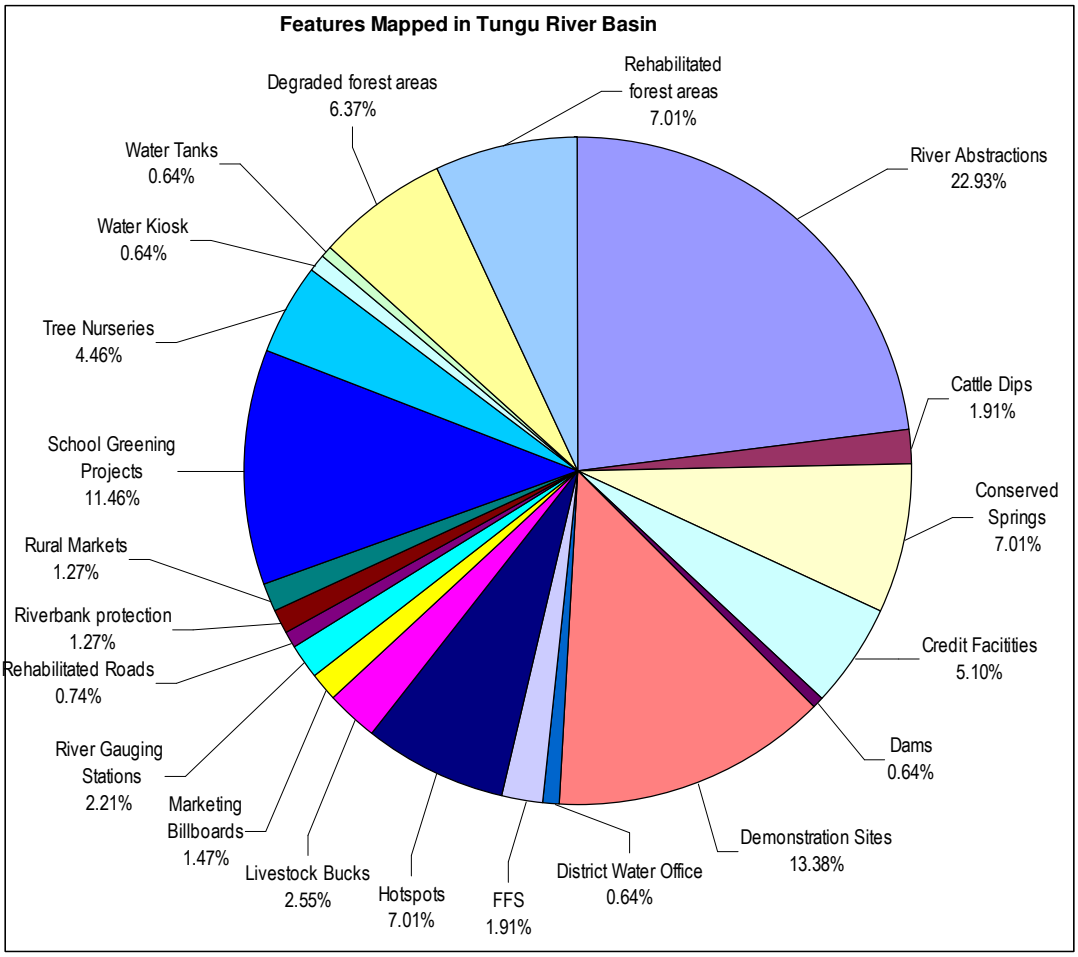


Figure 1: Features mapped in Tungu River Basin

3.1.2 Year of implementation/completion

The year of implementation/completion for the various mapped features is shown in table 1.