SUB-HUMID ZONE CASE STUDY 1:

Restoring the Vegetation and Improving the Livelihoods of the Kamba and Maasai People in Kenya[1]

BACKGROUND

The Kamba people are found in south-eastern Kenya (latitude 37°47'E to 37°52'E and longitude 1°19' S to 1°22' S) whilst the Maasai are found mostly in southern Kenya (latitude 1°10' to 3°10'S and longitude 36°5' to 37°5'E). The region is characterized by low, unreliable and erratic rainfall. It has two rainfall seasons, which come from March to May (with a mean of 200 - 300 mm) and October to December (with a mean of 250 – 460 mm). Evapo-transpiration is high-ranging from 1550 to 2500 mm per year.

Most of the land is between 500 and 1000 m in altitude with a number of hills, some reaching 1600 m above sea level. The mean temperatures range from 16 to 30^{O}C. The soils are medium-textured ferrasols with the dominant type being moderately deep chromic luvisols. The vegetation is mainly dry woodlands and bushlands. The area has medium to low potential for plant growth.

Over the last 100 years or so the region has continued to attract more people and especially during the last 50 years despite the fact that the region ranges from dry sub-humid to largely semi-arid in ecological conditions. The source of these migration inflows is the neighbouring high population density areas of Machakos District and Central Kenya. This pressure has led to continued degradation of vegetation, water and soils.

Due to the evident degradation of the natural resources in the region, the Government of Kenya entered into a partnership with the Governments of Japan and Belgium to undertake a natural resource rehabilitation programme for the region. Two Ukambani Districts (Kitui and Makueni) and one division of neighbouring Kajiado District (predominantly Maasai) were identified as the focal areas of attention. Two formulation missions carried out in 1985 and 1995 found that the region experienced low farm income and inadequate food supply at household level because of various constraints. Rehabilitation of forest and tree resources was identified as a priority. But before a framework of development interventions was formulated, it was realized that the available technical tools and capacity for rehabilitation were inadequate. It was agreed that these shortcomings be addressed before a comprehensive rehabilitation action plan was adopted. The three governments, therefore, came up with a programme to perfect the tools of rehabilitation.

OBJECTIVES

The Overall Objective

To improve the capacity of extension service and farmers in tree-based land restoration;

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Specific Objectives

- To train extension agents and farmers in dryland forest rehabilitation;
- To develop techniques for the restoration of degraded woodlands, soils and soil moisture regime;
- To select, test and promote high value timber and food trees to fit into alternative-livelihood commodity development options; and
- To develop Social Forestry Extension Model (SOFEM) for arid and semi-arid areas.

APPROACH

A Social Forestry Training and Rehabilitation project for Semi Arid Areas (SOFEM) was thus initiated in 1985 in Kitui District and an Agroforestry project for Integrated Research and Development in Semi Arid Areas of Kenya (ARIDSAK) in Makueni and Kajiado Districts in 1997. Both projects adopted integrated and multi-disciplinary approaches involving all the stakeholders in the planning and implementation process. SOFEM is a bilateral project funded by the government of Kenya and Japan, implemented by the Kenya Forestry Research Institute (KEFRI) and the Forest Department (FD) on behalf of the Kenya Government and the Japanese International Co-operation Agency (JICA) on behalf of the Government of Japan. Staff from the above institutions work closely with selected core farmers, local groups and schools representing beneficiaries. ARIDSAK is also a bilateral project funded by the governments of Kenya and Belgium. The project involves KEFRI, the Kenya Agricultural Research Institute (KARI) and staff from the line Ministries of Environment and Natural Resources (Forest and Water Departments) and Agricultural and Rural Development providing subject matter specialists and selected farmers, local groups and schools representing beneficiaries. Phase I of SOFEM ended in November 2002, though various activities were still being undertaken by the government and communities beyond this date. Phase II of SOFEM was expected to start in the first quarter of 2004. Meanwhile, phase I of ARIDSAK is scheduled to end in 2005. The projects use a research and development approach on-station where technologies are developed and tested by subject matter specialists. Promising technologies are verified further under farmers' conditions. Proven technologies are packaged in the form of extension materials for use by extension staff and farmers within the project areas. Through this approach, neighbouring farmers are expected to benefit through learning experiences of the core contact farmers.

Other avenues for demonstration include greening and conservation of selected earth dams to reduce siltation. Meanwhile, capacity building through training is a major activity of the two projects. Results and experiences are extended to Eastern and Southern African countries through social forestry training.

RESULTS

SOFEM Project

Capacity Building in Dryland Forest Rehabilitation

- Courses on social forestry for dry areas focusing on farmers and extension frontline agents were conducted. Some 1400 national participants (farmers and extension frontline agents) had been trained on tree nursery techniques and management, tree establishment, protection and use by 1998.

- Regional courses on social forestry were conducted covering dryland tree technologies, extension methodologies, policy formulation to promote social forestry in drylands and the role of forestry in enhancing conservation and mitigating desertification in the Eastern and Southern African region. One hundred and eighty participants from 18 countries (mostly extension staff from government and NGOs) in the region were trained in Social Forestry.

On-Farm Tree Planting and Extension Methodologies

Seedling propagation and management

Ten commercial and 12 domestic small-scale nurseries were promoted in Kitui District, Ukambani. Women groups managed 70% of these nurseries while groups comprising both women and men managed the remaining 30%. The focus of promotion of tree nurseries included propagation and raising seedlings, tree planting in farms, and income generating opportunities.

Nursery activities were promoted for ten years (1985-1995). In 2002, seven years after the formal intervention ceased, an evaluation was carried out, which revealed that although 25% of the contact groups had stopped nursery activities, some 18% of new groups had taken up nursery activities and there were more individuals, some who were part of the fall-out groups, had taken up small-scale tree nursery activities. But what is more interesting is the fact that the estimated total annual seedling production by small-scale nurseries had increased from 550,000 in 1993 to a total of 1,255,000 in 2002. In addition, among the seven income-generating activities of the women and combined groups, tree nursery activities moved from a general sixth position to third or fourth position in importance. Groups and individual nursery owners within the R & D farms in Kitui District obtained income from the sale of seedlings ranging from USD 900 to 2500 per year. The higher earners, especially individual nursery owners, got more income through sale of seedlings of grafted mangoes and in few cases citrus, which fetch two to three times the price of ungrafted seedlings.

Promotion of High Value Timber and Fruit Trees

In addition to use of trees in rehabilitating degraded lands, a deliberate effort was made to select high value trees as an incentive to tree planting. Such trees included *Melia volkensii* (indigenous, fast growing and resistant to termites), *Dalbergia melanoxylon* (indigenous, slow growing but highly

valued for wood carving), *Terminalia brownii* (indigenous and favoured for its good form and resistance to termites), *Senna siamea* (exotic and popular for its fast growth and therefore quick provision of fuelwood), *Mangifera indica* (mango - a traditional domestic fruit tree), and *Citrus sinensis* (for its adaptability and fruits that generate good income). It has not been possible to get good estimates of the total area cover of these species in farmers' land. It is however estimated roughly that during the last 7 or so years, *M. volkensii* has gained a collective area cover of about 65 ha, 6 ha for *D. melanoxylon*, 7 ha for *S. siamea*, 4 ha for *T. brownii* and over 65 ha for *M. indica*. The cover of the target timber and fruit tree species is likely to increase since awareness of the benefits of tree planting is high due to the promotional lobbying done by the projects.

Social Forestry Extension Model

As a result of experience of social forestry and tree planting in the dry areas of Kitui District, a social forestry extension model was developed by the Kenya-Japan supported dryland initiative. In the model, results generated from research are verified under farmers' conditions and, if proven, are packaged into extension material for use by frontline agents. The model also involves farmer-to-farmers extension where core farmers (i.e., those trained by the projects) are used as extension agents. It was expected that extension agents and farmers would benefit from the model. The SOFEM project proposed to develop appropriate guidelines for practical use of the various aspects of the extension model to be implemented in phase 2.

The ARIDSAK Project

On-Farm Tree Planting and Extension Methodologies

Seedling propagation and management

- Twelve commercial and 20 domestic small-scale nurseries were promoted in Makueni District, Ukambani and Kajiado District. Women groups managed 70% and 50% of these nurseries in Makueni and Kajiado while groups comprising both women and men managed 30% and 50% respectively. The focus of promotion of tree nurseries included propagation and raising of seedlings, tree planting in farms, and income generating opportunities.

- As in the SOFEM project the tree nurseries provided income to the groups and individuals owning them. Sales of planting stock often reached USD 2,500 annually and the highest priced items were, as before, fruit trees, especially grafted mangoes and occasionally citrus.

Tree Establishment and Management

The main constraint in dryland forestry practice is inadequacy of moisture to ensure establishment of seedlings. Four water conservation/harvesting methods were therefore widely tested and an evaluation of this effort indicated that the use of soil structures to concentrate water to the seedlings had been commonly adopted by over 40% of tree growing farmers. Use of *terracottem* (a water absorbing polymer), which had also been promoted, proved to be expensive for the small-scale farmers and generally beyond the means of subsistence farmers.

Natural Restoration of Degraded Woodlands

Due to over-exploitation of woodlands and especially overgrazing, charcoal production and firewood collection, recovery of vegetation becomes difficult and slow. Monitoring of recovery of woodlands was possible after an area had been excluded from grazing for a period of as short as one to two years. Seedlings of Commiphora, Terminalia and Acacia species regenerate immediately an area is excluded from animal grazing and since these are not browsed, the open areas are fast covered. The success of vegetation recovery after grazing exclusion is an initially quick re-establishment by a dense shrubby layer. The dominant species in the shrub layer are *Hermannia oliveri*, *Aspilia mossambicensis*, *Solanum incanum*, *Chloris roxburghiana* and *Sporobolus fimbriatus*. This layer creates a favourable condition for the quick establishment of drought woodland species dominated by *Commiphora africana*, *Acacia senegal*, *A. tortilis*, *A. mellifera*, *A. brevispica* and *Terminalia brownii*. Within two to four years some of the species grow to heights beyond the browsing level by goats. This was a successful approach that has been promoted in the Ukambani districts and is largely now being used by the animal range management farmers in the restoration of degraded woodlands and thus providing more foliage and tree raw materials for various and more sustainable uses by the land owners.

REASONS FOR SUCCESS/FAILURE AND LESSONS LEARNT

The main reasons that led to the success of the projects were:

- Collaborative planning including farmers, extension workers, experts in several areas and technical advisors;
- Continuous training, especially hands-on, in tree-based land use technologies;
- Low resource input by the government and the partners which motivated the farmers to keep adopting new ideas and technologies;
- Established parallel technology demonstrations located in the Dryland Technology Development Station of KEFRI in Kitui District. The demonstrations act as the learning points for farmers and school groups.

The reasons that contributed to lack of success included:

- Inability of farmers to adopt introduced water absorbent material, e.g. terracottem due to cost, therefore limiting good establishment of tree and fruit seedlings in the field where it was practised;
- Inadequate water, especially during the drier seasons, was a limiting factor in the adoption of recommended watering regimes for nursery seedlings by farmers.

RECOMMENDATIONS

Policy

The Social Forestry Extension Model recommended for scaling up will need to take into account farmers' experiences from the non-project areas.

Management

Further training of farmers on grafting of high value fruit trees and nursery practices of problematic species like *Melia volkensii* and *Terminalia brownii* will be required to ensure successful orchards and woodlots.

Research

- More work is still needed in the area of propagation (for some species) and silvicultural management of all the identified tree species; and

- Management of natural woodlands still requires further studies in the light of increasing human populations in the drylands.