KENGO's Genetic Resources Conservation Project

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Local rural people are generally very knowledgeable about the wild plants around them, many of which have local names and are important to them economically or feature in folklore. This knowledge is the best starting-point for effective conservation, which requires accurate and up-to-date information on the status of plant populations, on the extent and nature of plant use by local communities, and on the capacity of the resource base to support different economic activities. Indigenous knowledge can be used in the evaluation of the cultural, biological and economic importance of biodiversity. It is also useful in creating awareness of the importance of biodiversity, as it is generally easier for the general public to relate to than the results of scientific trials. Such public awareness is essential. Conservation projects conceived in a hurry and imposed from outside, with minimal participation by the target communities, have often actually resulted in the erosion of resources. Collecting indigenous knowledge about plants (ethnobotanical information) involves communities in conservation efforts, rekindling their interest in the plant genetic resources available in their surroundings.

A strong ethnobotanical component will ensure that conservation goes beyond basic authoritarian protective measures. It will help in developing conservation methods which are egalitarian and in harmony with the environment and local peoples' material and cultural needs. The Genetic Resources Conservation Project of the Kenya Energy Non-Governmental Organization (KENGO) was established in response to this perceived need for baseline ethnobotanical information on genetic resources.

The work at KENGO combines resource production, research and extension and training strategies. A team of specialists provides technical expertise and coordination. The principal outreach points are KENGO's Regional Resources Centres on Environment and

Development, spread through the various major ecological regions of Kenya. These centres provide support services and information to community groups in land use management, wood-fuel conservation and use technologies and natural resources conservation.

Research activities on plant genetic resources were initiated in 1983, with a focus on the indigenous trees of the arid and semiarid lands, where the need was (and is) perceived to be greatest. The impetus for the initiation of this project was the realization that the indigenous plant resource base of Kenya was being neglected at both the research and policy levels, and that this would result in severe genetic erosion, as clearing of forests and natural habitats to give way to agricultural development and infrastructure accelerated. Cultural erosion, the passing away of the older generation who are the depositories of indigenous knowledge base, added to the problem of genetic erosion. The erosion of cultural knowledge has been worsened by the lapsing of mechanisms for passing on the information to the younger generation. The project's initial task was therefore to carry out an inventory of the indigenous trees of the arid and semiarid lands of Kenya and to document indigenous knowledge on their actual and potential uses.

To date the project has carried out ethnobotanical surveys in eight districts in the arid and semiarid areas of Kenya. Technical information on the characteristics and uses of indigenous trees has been compiled for publication in local dailies, pamphlets and resource books, with the aim of promoting their use. This information, which covers the physical characteristics of species, their uses and environmental requirements, planting and management methods and the socioeconomic and cultural value of the trees, is provided in a format that is accessible to field workers and rural people.

For the botanical studies, the method employed at KENGO involves taking photographs of the whole tree, plus close-ups of flowers, fruits, leaves and bark. These are supplemented by herbarium specimens and a description of the plant. Taxonomic identification is carried out by the National Herbarium, Nairobi. A set of comprehensive questionnaires is used in describing the plant. First, there is the provenance and botanical questionnaire. This seeks to gather information on the specific locality of the population and its natural habitat, including physiographic features, pedology and associated plants. Data on the frequency of the tree are also recorded. Phenotypic characteristics of the tree, including general morphology and size, rooting and branching systems, and shapes and sizes of floral parts, fruits, seeds and leaves are recorded.

The second questionnaire records socioeconomic information. It is normally used to enter answers given by a local respondent. Very often, this is an elderly person, or one who has extensive knowledge of plants, such as a herbalist. The informant accompanies the researchers to the field and identifies the trees by their local names and then proceeds to provide ethnobotanical information, in particular the uses to which different parts of the plant are put by the local community. This may

include direct uses such as timber, food, fodder, medicine, fuelwood, gums, dyes, and so on. It may also include information on indirect uses such as soil erosion control, honey production or swamp drainage. Data on fruiting and seeding time and seed dispersal methods are also entered.

All known propagation methods of the plant and pregermination treatments of the seeds are recorded. This information is normally based on either common practice or long-term observations. For example, on how to propagate *Markhamia lutea*, a typical answer, based on common practice, would be to cut a flexible stave and introduce both ends into the ground. On the other hand, an entry such as 'seedlings and saplings of this species will only be seen after there has been a bush fire or some severe flooding' is an example of long-term observation. It is typical of *Acacia* spp.

The socioeconomic questionnaire also records information on the agroforestry potential of the species, for example how well it mixes with crops, and such limitations of the plant as weediness, susceptibility to pests and pathogens and any toxicity. The questionnaire also seeks to assess and document the significance of the plant in the local culture, for example the existence of any taboos against the plant's use, propagation and cultivation. An attempt is made to ascertain which plants or plant communities have disappeared from the area, and why.

Public awareness campaigns on the need to conserve indigenous trees have resulted in numerous requests for seeds and other propagation material. This has led to the incorporation of a seed procurement and distribution component into the project. To ensure procurement of good-quality seeds, the project organized a seed collecting and handling training course in which 35 people from various institutions carrying out forestry activities in the arid and semiarid areas of Kenya participated. These people are the core of the project's seed acquisition programme. In order to become acquainted with pertinent problems associated with seed collecting in the field, the project also organizes seed collecting expeditions. Over the years, numerous high-quality natural seed sources have been identified in various parts of the country, which are recommended to the seed suppliers. The seed stands are mapped and fenced and their conservation is entrusted to the local Forest Officers. If the stands are on private farms, farmers are given an incentive to conserve them by the project purchasing the seeds from them. Records on these seed stands are kept, including such information as species, population size, physical and phenological characteristics (including seed collecting period), precise geographic location and name and address of custodian.

Before the project team organizes a seed collecting expedition, information is gathered on the fruiting periods for different species in different parts of the country. Sources of this information are the literature, District Forest Officers and the custodians of the seed sources. In the field, 50–100 seeds are harvested from each individual tree in a population and then mixed to make one bulk sample. Seeds are normally collected from two to ten randomly chosen trees, depending on population

size and availability of physiologically mature seeds. Seeds are harvested from the crowns of healthy mother trees by climbing up the tree or using ladders and tree pruners to reach seed-bearing branches. Collecting seeds that have fallen on the ground is discouraged as they may be immature, aged or diseased. The number of trees from which a sample has been taken and phenotypic characteristics of the trees are recorded in a pre-prepared seed collecting data sheet.

All the seed collected by the project team or sent to the project by the trained collectors is documented with information on the botanical name, local name, place and date of collection, name and address of collector, uses of the tree and any other indigenous knowledge of the tree, particularly seed storage and propagation methods. Upon delivery, seeds are cleaned, dried, tested for viability, packaged and put through a registration process. This includes being assigned an accession number and being weighed. Seed samples are normally meant for distribution purposes and they are supplied free of charge. Users include research institutions, schools, individual farmers, non-governmental organizations (NGOs), community groups and development agencies. Seeds are packed in 50–200 g packages and the following information attached: source (collecting site), collecting date, name(s) of collector(s), viability, uses, known seed presowing treatment and propagation methods. The project recently developed a collaboration with the Kenya Forestry Research Institute (KEFRI) for the medium-term conservation of excess seeds received from large consignments.

In order to address some practical constraints in indigenous tree seed handling and propagation, the project initiated a pilot seed testing and growth trials programme for some indigenous tree species. The site comprises 7.5 ha donated by the Jomo Kenyatta University College of Agriculture and Technology. Seed samples for research purposes are processed and viability determined after storage under different environmental conditions and in different containers. Through the pilot trials, seed viability and storage conditions, presowing treatments and propagation methods for 40 economically important indigenous trees have been determined and recommended to farmers through the Agroforestry and Field Extension Programme. The establishment of a tree nursery has ensured the reintroduction and distribution of these trees back to the communities.

The trials site also includes seed stands and a botanical garden in which 96 different indigenous tree species are now conserved. This includes threatened taxa such as *Dalbergia melanoxylon* (African ebony) and *Diospyros* spp. The site has recently become popular for public education and demonstrations, particularly to schools and environmental organizations. It has also become an important source of seeds and propagation materials, even to herbalists.