Brackenhurst Forest Botanic Garden, Kenya: towards a self-sustaining botanic garden

Mark Nicholson

Plants for Life, Brackenhurst, Kenya

Abstract

The Brackenhurst Botanic Garden in the highlands of Kenya was registered in 2004. It was started by planting indigenous trees on land previously used exclusively for exotic species like cypress, eucalyptus, wattle and Australian Blackwood. It now covers 20ha (50 acres) of 'natural' forest plus a small indigenous garden for herbaceous species. The original plan was to develop an arboretum but it was soon realised that biodiversity would be greatly enhanced by a vigorous understorey layer of herbs, ferns, orchids and shrubs (comprising mainly Rubiaceae and Euphorbiaceae). We have just passed our collection target of 1,000 species, mostly from upland East Africa but a few from other East and Central African countries. We have several endangered species growing well and producing viable seed. The botanic garden therefore encompasses indigenous biodiversity conservation (birds, Lepidoptera and mammals), watershed and wetland protection, and environmental education. Funding, or lack of it, has been the greatest obstacle to progress followed by invasive species which consumes 60 percent of our budget. Our 2010 budget to date is $10,500 which has to cover annual salaries of six staff plus all equipment. It is clear that in a developing country, supporting a botanic garden is not a priority. The only way to ensure perpetuity of the project is to make the forest income-generating. This will be achieved through six endeavours: 1) herbal medicines; 2) understorey coffee; 3) locally produced charcoal from energy efficient kilns; 4) indigenous tree seed production; 5) spring water; and 6) ecotourism: we already have numerous visits from bird-watchers and horticulturalists from Nairobi. So after 2012 we hope to be self-sufficient.

Introduction

Brackenhust forest was started as an arboretum in 2000 with the aims of recreation, education, but above all, the conservation of indigenous plants. In 2003, we registered with Botanic Gardens Conservation International (BGCI) as a botanic garden. The garden is situated near Tigoni in Limuru district, 25 km north of Nairobi at an altitude of between 1800 and 2000m. The natural vegetation type is tropical montane forest but 99.9 percent of this in the district has been replaced by agriculture (coffee, tea, flowers and smallholder farming), exotic tree plantations (eucalyptus, wattle, and cypress), and residential land.

Kenya, like all African countries is experiencing rapid population growth. The population in 2010 is over 38m compared to 2.9 million in 1930. This has led to increased land pressure and demand for scarce resources leading to deforestation in both the high potential areas and in the arid and semi-arid lands. Only 30% of Kenya's land area is medium to high potential and only 1.7% of Kenya's land area is forest. Landscapes countrywide are changing fast: the Mau forest complex, the largest water tower in Kenya has lost 150,000 ha (30%) over the last two decades and the remaining forest is all under threat. This results in loss of both ecosystem services and indigenous biodiversity.

As land becomes registered, pastoralists sell land to farmers of different ethnic origins and this leads to loss of woodland and grassland: tension rises as grazing land is lost, especially during droughts.

Meanwhile urbanization is increasing: Nairobi is approaching 3m and the cost of residential land is soaring: the land around Brackenhurst Forest is fetching over US$150,000/ha for residential purposes. Land in the area is even used for illegal dumping of waste.

In this context, a botanic garden of 20ha could be seen as an unnecessary luxury in a country with high poverty, high unemployment and scarcity of good land. Obtaining local financial support for such a venture has been impossible. But with international support, Brackenhurst Forest had just past its milestone of 1,000 indigenous plant species collected and recorded, and it now has the largest cultivated collection of indigenous species in Kenya. As the forest has grown, so has the number of recorded species of birds, small animal and Lepidoptera. By the start of 2011, signage will be in place with support from Missouri Botanical Garden.

The project started with the removal of exotic plantations. We started planting seedlings and wildings from 'uplands' (1500m-3500m with between 500 and 1500 mm annual rainfall), collecting from ecosystems under threat especially from areas of high endemism such as the Eastern Arc mountains. The collection includes trees, lianas, lianes, shrubs, scramblers (often ignored in formal arboreta) as well as >25 species of orchids (e.g. *Disa sp*. and *Vanilla polylepis*), plus ferns and hemi-parasites (e.g. *Phragmanthera sp*. and *Tapianthus sp*.).
We also grow vulnerable and endangered species on the IUCN Red Lists such as *Euphorbia cussonoides* and *Embelia keniensis*, a climber with only five adult specimens known (we now have propagated >50 young plants). More recently we have collected understory shrub species from the Rubiaceae & Euphorbiaceae plus shade tolerant herbs such as *Gladiolus watsoniodes* and *Delphinium macrocentron, Achyrospermum parviflorum* (Lamiaceae), 6 upland species of *Jasminum* and many lianas and lianes overlooked by arboreta such as *Urera hypselodendron & U. trinervis* (Urticaceae) and woody-based herbs from forest edges such as Pycnostachys spp.

After 10 years we now have a closed canopy in the original plantings. We started with bare ground and after 10 years, we find that many of the species we started with have been shaded out (e.g. *Hibiscus cannabinus, Acanthus sennii* and *Scadoxus multiflorus*) so we started a small indigenous flower garden for (woody-based) and non-woody herbs.
The issue in 2010 is how to protect the botanic garden in perpetuity. Funding is always a challenge: we tend to get small grants on an annual basis because most funding agencies only fund for short durations (1 year). No sooner have we got the funds but it is time to re-apply. The control of invasive species/weeds currently takes 60-75% of the budget.

How can we make the forest pay for itself? We are following seven avenues for income generation, so that in three years time we will generate enough funds to pay for the small staff.

1. Ecotourism through biodiversity: in addition to the >1,000 plant species, our bird count has risen from 35 species in 2001 to over 160 species in 2010.

2. Herbal medicines: *Urtica massaica* is mixed with *Prunus africana* for the effective prevention and treatment of benign prostatic hyperplasia. *Centella asiatica* (Gotu kola) grows in abundance and will be dried and sold locally. It has a huge potential and a large market in India.
3. Seed supply: as trees and plants become mature, our seed supply will become regular and we can sell this locally for other reforestation projects.
4. Cultivated indigenous timber is almost totally unknown in Kenya. Most timber is either illegally or unsustainably harvested or imported illegally from the DR Congo. Meru Oak (*Vitex keniensis*) can yield $1m^3$ after 20 years and is a valuable timber.
5. Energy-efficient charcoal. Charcoal fetches US$1 for 1kg. This is mainly because of transport and the traders' profits. We can supply a limited amount of charcoal from forest trimmings at one-fifth of that price providing about US$1,200 per year, equivalent to the annual salary of a forest worker.
6. Spring water is now reappearing from the forest and this can be bottled locally for the conference centre.
7. PLI is being contracted by European plant growers for ornamental plant cultivation of indigenous *Impatiens* and *Streptocarpus* spp.

There is little doubt that that the 20ha botanic garden and forest will be self-supporting within four years with the above ideas.

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