

THE REGENERATION OF KARURA FOREST

THE TRANSFORMATION OF A
PLANTATION OF EXOTIC TREES INTO
ITS ORIGINAL STATE

BY CHANTAL MARIOTTE

NAIROBI IS ONE OF very few capital cities in the world that can boast to have a thousand-hectare natural forest entirely within its city limits. For the last 9 years Karura forest has had a complete makeover and has become a great success story spearheaded by Friends of Karura Forest. FKF is a Community Forest Association founded in October 2009. It serves as the main vehicle for the implementation of the 5 year Karura Forest management plans. FKF works in partnership with the Kenya Forest Service (KFS) to ensure sustainable management of the precious water catchment and carbon sink and to conserve it for future generations.

Indigenous trees cover approximately 260 ha of the forest (not including some 25 ha in the largely alienated 110-ha salient east of Kiambu Road). Species include *Olea europaeae* subsp. *auspidata*, *Croton megalocarpus*, *Warburgia ugandensis* (Muthiga in the

vernacular), *Brachyleana huillensis* (Muhugu, the iconic image on the FKF logo), *Uvaridendron anisatum*, *Markhamia lutea*, *Vepris nobilis*, *Juniperus procera* (Cedar), *Craeoba brownii* (a huge specimen sits just outside the largest Mau-Mau cave), *Newtonia buchananii*, *Salvadora persica* (Mswaki, the Toothbrush Bush), *Ficus thonningii* (Mugumu), *Trichilia emetica*, *Calondendrum capense* and *Dombeya goetzenii*

Forest plantations cover some 630 ha of the 1041 ha forest. Species include imports from South America, Australia and the Asian sub-continent, such as *Araucaria cunninghamii*, *Grevillea robusta*, *Eucalyptus saligna*, *E. globule*, *Cupressus torulosa* and *Cupressus lusitanica*.

Almost all the plantations in the forest have passed their economic rotation age. The *Eucalyptus* range from 40 to

80 years, *Araucaria*, 50 to 60 years, and *Cupressus*, 40 to 50 years. Most of these plantations have already begun to succumb to age-related drying. The FKF-KFS Karura management plan includes an ambitious campaign to replace the degraded and dying plantation stands with suitable indigenous species, and to enrich the degraded indigenous areas of the forest. The objective is to recreate the natural rich and diverse habitat where local flora and fauna thrive and a functioning ecosystem rendering diverse vital services to all in terms of fighting pollution, climate change and preserving the environment.

The seedlings planted in the forest regeneration programme are a mix of species commonly found in the forest grown by the KFS Karura nursery using seeds collected from the forest itself for compatibility. The mix is adjusted depending on the location of the planting, river banks, wet lands or hill tops etc.

An inventory of Karura plant species was carried out by NMK Herbarium staff in 2012.

Apart from land grabbing, the main enemy of the forest is its invasion by highly invasive alien species such as *Lantana camara* and *Caesalpinia decapetala* (Mauritius thorn) among other less prevalent ones. They literally choke the forest to death. The fight against them started in 2011 with the progressive clearing of invaded indigenous stands. Casual workers were trained to identify indigenous from invasive species and to dig out roots properly to prevent regrowth. Chemical treatment was also tried on an experimental basis using glyphosate. Spraying was ruled out because of the collateral damage in favour of stem treatment which proved very difficult to apply and generally ineffective.

As clearing progressed manually, a major issue quickly proved to be the disposal of the dead *Lantana camara*. The clearing operations produced huge volumes of unwanted material which, as it was discovered, take years to rot and disintegrate damaging the soil underneath in the process, not to mention their unsightliness and the fire hazard they represent. Various uses for this material were reviewed such as briquette making or essential oil extracting but none appeared to be even remotely economically or logistically feasible. In the end burning ended up the only option using a rudimentary biochar method of soil amendment. Cleared *Lantana* and other undesirable species are burnt when still relatively fresh in small piles generating a minimum of soil destructing heat, leaving behind small bits of charcoal and ash which are then spread out over the surrounding area. Periodic weeding needs to be done over a

period of about a year as many seeds remain in the ground. *Melinis repens* (Natal grass), a naturalized species very common in the forest quickly takes hold after *Lantana* clearing, helping with fighting the regrowth while allowing natural regeneration of indigenous species and creating a refuge for small animals.

Another type of forest regeneration activity is the felling of aged exotic stands. Logging operations are managed by KFS itself using established tendering processes and regulations. Stands are earmarked for logging mostly in such a way that small stands are felled in different parts of the forest so as to avoid leave large empty spaces at any given time. There is also the matter of the cost of these operations. Although standard logging contracts specify that the site has to be left completely cleared including stumps, in reality those sites are left with a lot of debris and all the stumps still in place. The cost of preparing the site for planting after clear felling is significant and the time and labour it takes considerable.

Eucalyptus stump disposal has been again a trial and error affair. Manual digging is out of the question due to the scale of operations. *Cupressus* ones are no problem: they are simply cut below ground and covered with soil. *Eucalyptus* ones are the problematic ones. Earth moving machines were tried out but had a real challenge removing very large stumps which would take up to one hour per stump. The cost was clearly prohibitive. Various other mechanical and chemical methods were carefully tried alone or in various combinations: cutting below ground and burying, debarking, applying diesel oil, salt, caustic soda or glyphosate. Glyphosate was found to work

quite well with smaller trees situated on hill tops as opposed to near water. It has to be applied immediately after the stump has been cut as low as possible, and with some cross cuts on the cut surface for better penetration, requiring coordination and supervision. The method which seems to be the easiest and cheapest is the systematic cutting back of coppice shoots which basically starves the tree over time. It does require a lot of labour and its efficiency is yet to be clearly established due to its recent introduction but it looks very promising. It is easy to monitor and can be done on a contract basis as opposed to casuals, always the preferred method.

At the moment over 150 ha have been replanted in the forest, with around 18 to be added by the end of the next rainy season. A running financial analysis of all the methods used was carried out at all stages to ensure financial sustainability of those forestry activities essential to the mission of KFS in the forest. It helped to put a price on the various activities and in particular to arrive at an overall cost of clearing, planting and tending a seedling which stands at 450 KES at the moment, the amount charged to well-wishers offering to plant trees in the forest.

In the end it became a matter of policy as much as efficiency of the regeneration programme to favour manual methods as opposed to mechanical or chemical ones. This is in line with the social mission underlining all of FKF activities which is to create as much forest related employment as possible for neighbouring disadvantaged communities. Apart from its 73 permanent employees, FKF offers some 13,000 man/day of casual work a year to those communities. Forest regeneration has come to

be a real life-changer for them, turning their view of the forest from one of feared danger to one of valued opportunity, a major achievement for forest survival in Kenya.

The massive planting of indigenous species in Karura has been a matter of choice and necessity. The necessity was to replace the dying exotic stands, and the choice to turn a mostly dying forest into a safe, non-

consumptive, recreational forest in the heart of the capital city. Karura plays a crucial role in maintaining the quality of life of the city by providing a considerable amount of ecosystemic services to its citizens. As a watershed it helps to replenish the water table through percolation. According to a recent study, as a carbon sink it absorbs nearly 30% of the carbon dioxide emitted by cars in the city, not to mention

other noxious gases. Through evapotranspiration it helps with thermoregulation. Restoring it to a broadleaf, closed canopy forest will ensure that the forest can continue to help the city fight climate change for many generations to come. As for the popularity of the forest with Nairobians, Karura has just passed the 1 million visitors mark in 8 years, a figure which speaks for itself.

CHANTAL MARIOTTE has been involved in Friends of Karura Forest from its inception as member of the Board in charge of a number of projects she initiated.