ARBORETUM NEWS Trsteno Arboretum, Croatia

(This is an edited version of a previously published article by Jadranka Beresford-Peirse)

Vicinis laudor sed aquis et sospite celo Plus placeo et cultu splendidioris heri Haec tibi sunt hominum vestigia certa viator Ars ubi naturam perficit apta rudem. (Trsteno, 1502)

The inscription above, with its reference to "the visual traces of the human race" is carved onto a stone in a pergola at the Trsteno Arboretum, Croatia, a place of beauty arising like a phoenix from the ashes of wanton destruction and natural disasters.

The garden and arboretum at Trsteno, thought to be the oldest in Europe, was created from the late 15th century onwards around a villa built as a summer retreat on steep hillside about 12 miles north west of Dubrovnik by the locally eminent Gucetic or Gozze family. The tiny village of Trsteno, clustered around a small natural harbour on the Dalmatian coast, had at that time a small seafaring population, who were encouraged by the Gozze family to bring back seeds and plants from their foreign travels, and also, it seems, buckets of earth with which to augment the somewhat meagre local soil. In fact, despite its thin covering of earth, the growing conditions at Trsteno turned out to be propitious, situated as it is on limestone rock, and enjoying mild coastal conditions; the site also has the advantage of a substantial supply of spring water, and to take advantage of this a 15 - span aqueduct was constructed in 1492 to bring water to the garden (see p.117). In addition to the villa, the Chapel of St Jerome, a Belvedere (known as the Gloriette), grotto, fountain of Neptune and

an olive press were all built in the 1490's, and at the same time the garden immediately next to the house was constructed in the formal Renaissance style. The cultural life and garden of this artistic family flourished until the first of many disasters struck, in the form of a devastating earthquake in 1667, in which the villa and fountain were irrepairably damaged. Both fountain and house were rebuilt during the 18th century in the Baroque style, the form in which they are seen today.

Towards the end of the 19th century the garden was expanded and replanted, and the western part of the estate, known as Drvarica (meaning 'wood' or 'forest') was laid out by Count Bassegli-Gozze on a terraced slope above the sea shore. This area, where many of the finest ornamental trees and shrubs in the collection were planted, cascades right down to the water's edge. Here could be found cycads and palms, cedars, figs, olives and pines, *Arbutus*, *Cercis siliquastrum*, *Cinnamomum camphora*, *Gingko biloba*, *Liriodendron tulipifera*, magnolias, myrtles and oaks including *Q. ilex*, *Q.pubescens*, *Q. suber* and *Q.trojana*. Pride of place, however, goes to the two enormous and ancient oriental planes, *Platanus orientalis*, which stand on the road at the entrance to the gardens (p.117). The exact history of these titans, with trunks measuring 15m (50 ft) in circumference, and a height of around 45 m (150 ft) high is unclear, but they are reputed to have been brought here from Constantinople 1000 years ago. Under the communist regime established in the aftermath of the Second World War the estate was nationalised and became the property of the Federal

World War the estate was nationalised and became the property of the Federal Republic of Yugoslavia, administered by the Yugoslav, now Croatian, Academy of Sciences and Arts, which still has overall responsibility for the arboretum and gardens today.

State ownership did not however save it from an appalling act of cultural vandalism, when it was systematically destroyed during the war of 1991-5. The garden was shelled by incendiary bombs, fired at close range from both sea and air, and over 10,000 trees were destroyed or damaged in the ensuing fire. The 19th century pine forest was completely destroyed, although fortunately the oldest part, the Renaissance garden immediately adjacent to the villa, was mainly unharmed. The Renaissance Belvedere was burnt and the villa was damaged, and the nurseries, cold frames and greenhouses were destroyed, along with most of the young plants they contained. Garden and laboratory equipment was looted and parts of the aqueduct were smashed.

In 1991, in response to the damage caused to this and other Croatian treasures, Lady Jadranka Beresford-Peirse, a Croatian by birth, founded The International Trust for Croatian Monuments, which raised funds for the restoration of the Arboretum. Work began on clearing and replanting trees, and on rebuilding the Belvedere. Just when it seemed as though progress was being made, the latest (and hopefully the last) disaster occurred. In August 2000, after a long drought, a large part of the 19th century addition to the arboretum was consumed by a forest fire but thankfully, despite damage to garden sculpture, the fire was prevented from spreading to the Renaissance area, which was miraculously spared once again. Once more the Trust's help

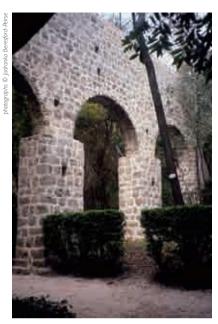


Trsteno Arboretum

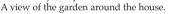
Above: Devastation in the 19th century Drvarica after the fire in 2000. Below: A folly stands amongst the ashes.

photographs © Jadranka Beresford-Peirse





The aqueduct, built in 1492, still stands and is in use today (see p.114). A view of the garden around the house.





One of the giant oriental planes at the entrance to Trsteno Arboretum (p.115.

Life and hope amongst the devastation (2001).





was needed, to raise funds and to publicise the plight of the arboretum. It is planned that the garden sculpture which suffered in this latest fire will be repaired by Croatian students who have, with the help of the Trust, been trained in the techniques of stone masonry at Weymouth College in Britain. Today, much of the garden has been cleared and replanted, and fire prevention measures have been installed. A management plan has been drawn up, and an archaeological survey undertaken, with the aim of understanding and restoring the historical plan of this important garden. Replanting is being undertaken and spontaneous regeneration of vegetation encouraged wherever possible. It is hoped that, in addition to the restoration of the garden and arboretum, Trsteno will become a centre for research into the biological diversity of the southern Adriatic region, with ex-situ conservation and a seed bank to conserve Mediterranean species and a network of contacts with similar institutions worldwide being built up. There is still much to be done.

For further information, contact The International Trust for Croatian Monuments, 0207 589 1134.

TEXT © JADRANKA BERESFORD-PEIRSE

The Karaca Arboretum, Turkey Hayrettin Karaca

In 1980, I decided to retire from business – at the time I was one of Turkey's leading manufacturers of ready-to- wear clothing – and to devote myself to the natural world, my first and greatest love. I turned a family apple and pear orchard into the country's first privately - owned arboretum. I had already done my homework, having travelled for ten years all over the world, visiting botanical gardens and arboreta of note, and started by collecting specimens of the Turkish woody flora, with special emphasis on conifers. Later, plants from all over the world were added.

The arboretum now has a rich collection of conifers, the majority of which are dwarf species and forms; I am particularly interested in pines of Mexican origin. I am also very fond of maples because of their beautiful colours in spring and autumn, and today we have a maple collection comprising 87 species, 14 subspecies, 4 hybrids, 94 cultivars and 145 of our own selected cultivars. Gradually, flowering trees such as *Prunus* and *Malus*, were added to our collection as well as broadleaf trees and bulbs, and we also aimed to have a large collection of rhizomatous and herbaceous plants endemic to Turkey. However, not all would adapt to the local conditions, so some are kept as live plants while others are in seed form. Recently we have concentrated on growing as many oak species as conditions allow and now have 164 species of *Quercus*, five *Lithocarpus*, two *Cyclobalanopsis* and a *Castanopsis*. The oaks we have propagated and collected will soon be planted on the campuses of two universities and elsewhere in order to gain more space for this large collection. Karaca Arboretum is situated on 13.5 ha of land 3 km south of the Marmara

Sea, at $40^{\circ}37'N$ and $29^{\circ}15'E$ and at an altitude of 20 metres. The average annual rainfall is 700 mm, the soil a heavy clay with a pH of 6.5-7. The arboretum currently houses 7,000 species, subspecies, varieties and cultivars of woody, bulbous, rhizomatous and herbaceous plants looked after by six agricultural engineers and technicians, four gardeners and 20 other workers. Since this site will not be large enough for our future activities, we are developing a sister arboretum on land belonging to a military training centre, situated only 30 km from the Karaca Arboretum.

The genera most well-represented in our collection are Abies, Acer, Berberis, Betula, Carya, Chamaecyparis, Cotoneaster, Fraxinus, Juglans, Juniperus, Magnolia, Malus, Picea, Pinus, Prunus, Quercus, Spiraea, Thuja and Viburnum. Other plants of particular interest include Abies nebrodensis, Acer buergerianum subsp. ningpoense, Acer campbellii subsp. sinense, A. campbellii subsp. wilsonii, Acer henryi, Acer longipes subsp.amplum, Acer nipponicum, Acer oblongum, A. obtusifolium, A.stachyophyllum, Acer sterculiaceum, A. tschonoskii, A.tschonoskii ssp.koreanum, A. campbellii subsp. wilsonii, Actinidia arguta, Alangium platanifolium, Aphenanthe aspera, Asimina triloba, Carpinus laxiflora, Cinnamomum camphora, C. japonicum, C.glanduliferum, Cladrastis lutea, Corylus jacquemontii, Cunninghamia lanceolata, Cupressus macnabiana, Eucommia ulmoides, Firmiana simplex, Fraxinus mandshurica var. japonica, Gymnocladus dioica, Hakea monosperma, Idesia polycarpa, Juniperus drupacea, Liquidambar formosana, Loropetalum chinense, Phellodendron amurense var. lavallei, Pinus taiwanensis, P.hartwegii (syn.P.rudis), Pinus taiwanensis, Platanus mexicana, Podocarpus totara, P. salignus, Prumnopitys andina (syn.Podocarpus andinus), Quercus dentata, Q.glauca, Q.sadleriana, Phellodendron lavalleei, Umbellularia californica, Sapium sebiferum and Taiwania cryptomerioides.

In the early days, we were fortunate to receive donations from the Arnold Arboretum, and now have exchange programmes with around 200 arboreta and botanical gardens worldwide. The many scientists and friends who have contributed generously to the growth of the collection over the years include Jelena de Belder, Lord Howick, Maria Mulder Ten Kate, and J.R.P Van Hoey Smith, whose suggestion it was that I become a member of the IDS.

Our principal activity nowadays is the spread of the existing collection throughout Turkey, and we have already donated 106,000 woody plants to 27 arboreta, botanic gardens, universities, municipalities and forestry departments. We have a trainee programme for botany and landscaping students from Turkey and abroad.

We carry out a hybridisation programme, using seed from both home and foreign countries, sowing about 1,600 different kinds each year. Crosses include Liquidambar styraciflua x L. orientalis, Acer rubrum x A. saccharinum, Magnolia liliflora 'Nigra' x M.sargentiana, and Magnolia stellata 'Rosea' x M. liliflora 'Nigra' hybrids. From among 20,000 individuals of Acer palmatum hybrids sown, we have developed and named 145 different cultivars. There are 220 new offspring or mutants, all named, that have been developed from plants in Turkey, either from seed or by grafting species such as Abies nordmanniana, Acer cap



Above: The Karaca Arboretum, near Istanbul, in winter Below left: An *Acer palmatum* seedling selected at the Karaca Arboretum Below right: A mutation of wild-collected *Pinus halepensis*

photographs © Hayrettin Karaca



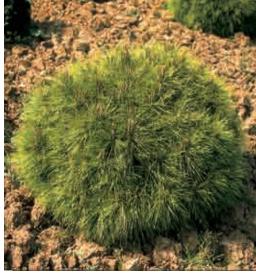




Above: Autumn colours of *Euonymus alatus* 'Compacta' in the Karaca Arboretum. Below left: A mutation of *Pinus sylvestris*, collected in Turkey. Below right: A seedling of a mutated form of *Pinus brutia*.

photographs © Hayrettin Karaca





padocicum, A. divergens, Carpinus orientalis, Cedrus libani, Crataegus monogyna. Cupressus sempervirens, Fagus orientalis, Juniperis excelsa, J.foetidissima, J.sabina, Pinus nigra, Pinus brutia, P. halepensis, Picea orientalis and Ulmus minor.

We publish The Karaca Arboretum Magazine, a scientific publication dealing mainly with the Turkish flora, twice a year and an annual Index seminum. I have a collection of over 48,500 slides of trees and other plants, accumulated during my travels at home and abroad; over the years I have travelled around Turkey collecting plants for the arboretum, and have served as a guide for the IDS and the German Dendrology Society during their tours of Turkey (see *IDS Yearbook* 1993: pp106-8). We also have a library of over 2,000 books on plants and taxonomy.

The arboretum is open to the public on Sundays, and on other days groups or individuals can visit by appointment. Visitor numbers have increased over the years, and around 12,000 Turkish or foreign visitors are welcomed annually, the busiest times being spring and autumn. In spring *Amelanchier, Cotoneaster, Crataegus, Exochorda, Viburnum, Magnolia, Malus, Prunus, Spiraea* and *Syringa,* attract particular attention whilst the vibrant colours of the birches, oaks and maples, as well as *Carpinus betulus, Fagus orientalis, Ginkgo biloba, Liquidambar formosana, Liquidambar styraciflua, Liriodendron tulipifera, Nyssa sylvatica* and *Parottia persica* are at their best in autumn.

The Karaca Arboretum, the only private institution of this type in Turkey, has been completely dependent on my personal financial support since its inception, although we have been engaged for some time in commercial nursery sales in order to meet some of the expenses. We hope to enlarge this business and are working towards the establishment of a Karaca Arboretum Foundation to keep this enterprise alive in the future.

TEXT © HAYRETTIN KARACA

Renewal of Historic Nairobi Arboretum

Ann Birnie Founder, Friends of Nairobi Arboretum

The city of Nairobi, Kenya, lies only 150 km south of the equator and about 500 km from the Indian Ocean coastline to the east. Its high altitude of 1700m ensures a cooler climate than expected in the tropics, ranging from 13-25°C. There are two rainy seasons and average rainfall is about 1000 mm per annum. The city, known by the Maasai people of the hot dry plains as 'enkare neerobi', the 'place of cool waters', is situated where the lower foothills of the Aberdare mountain range meet the Athi plains. The arboretum began on a 65 acre site, described as 'a dry, stony, grass - covered slope with a few scattered flat-topped thorn trees', entrusted to the Forest Department of Kenya in 1907. The population of Nairobi in 1909 was 14,000 people; today this has increased to around 3 million.

Initially, the arboretum had a major role as a trial site for quick-growing

exotic trees to be used as fuel. The lifeline of the country in those days was the railway which ran on wood fuel until 1952, consuming quantities of native Olive (Olea africana ssp. europaea) and Cedar (Juniperus procera) trees before the establishment of Eucalyptus as an alternative. Indigenous tree species were found to grow very slowly by comparison. After results of trials in the arboretum and at other sites, foresters selected and planted the most appropriate species for the variety of habitats in Kenya. These plantations continue to provide some fuelwood for industry and for much of the population who still use firewood in the household and have no access to electricity. Kenya remains a third world country with high levels of poverty and unemployment. Nairobi is the largest city in the whole region, containing amazing contrasts from high technology to miserable slums. Beyond the city centre and wealthy suburbs sacks of charcoal are piled high for sale by roadsides. These lorry loads of valuable fuel arrive daily, cut from indigenous trees of forest, savannah and bush, often illegally. Western Kenya has fascinating remnants of lowland tropical rainforest but the remaining highland forests are of a drier type and the 2% cover natural to this area is now severely depleted as the government seems unable to control the thirst for more agricultural land. The arboretum must have an acceptable role in this situation in order to continue its existence today. The arboretum was originally developed by devoted colonial foresters and the chief conservator of forests (CCF) had his residence near the entrance. Annual Reports related progress in the arboretum, which was seen as a showpiece. Seed was collected and exchanged with suitable gardens worldwide. In 1926 the Annual Report noted that 'many visitors came to study trees', and the arboretum became known as 'the prettiest place in Nairobi'. Under Mr H.M.Gardner, (CCF 1928-47) the policy of making as complete a collection as possible of indigenous tees and shrubs was pursued. He designed the site well and greatly extended the collection of ornamental exotics, battling with frequent droughts and diseases. By 1958, a guidebook for visitors recorded 'it is a daily sight to see schoolchildren' in the arboretum; both the tree collection and its amenity value had been accepted.

After independence in 1963 the forest department had very different priorities, and by the '70s the arboretum was quite neglected when management levels declined due to lack of funding. In 1993 the voluntary support group, Friends of Nairobi Arboretum (FONA) was established, and in 1997 a Nairobi Arboretum Management Board was set up with a chairman appointed by the chief conservator. A masterplan was drawn up and launched in 2000. It includes plans for better management, improved amenities, an educational centre and programme, and a planting policy; this forms the basis for action by FONA and the Board.

Tree Inventory

The compilation of an inventory was part of the 1997 masterplan, and over 5,000 trees in the 30 hectares of the arboretum were recorded on computer (only trees were noted, leaving all other plant families yet to be explored). The



Erythrina burtii at Nairobi Arboretum (see p.127)

land is divided into 36 blocks, and of the 350 tree species located roughly half were indigenous and half exotic.; unfortunately, every block contains a mixture of each. The full potential for scientific and management options has yet to be realized due to a lack of skilled, paid staff.

Indigenous Trees

Kenya contains one of the greatest ranges of environments in the world and boasts over 800 tree species. Indigenous trees from 43 botanical families have been recorded in the highland location of Nairobi Arboretum. Leguminosae predominate followed by Euphorbiaceae. The four commonest trees have over 100 specimens each and the two commonest trees are dominants of the Nairobi dry semi-deciduous forest whose remnants remain around the city. (The Ngong Forest Sanctuary has just been legalized through a volunteer effort similar to that of the arboretum.) It must be remembered that the arboretum was protected from 1932 as a Forest Reserve so no trees have been cut or removed since then, but the lack of pruning has produced a 'jungle' effect in some areas! Giant *Cereus* sp. and local *Euphorbia candelabrum* lie within this jungle as well as huge clumps of bamboos. Flower beds were completely overgrown and there are no water points, quite necessary in the dry season. The 527 *Jacaranda mimosifolia* from Brazil are certainly too many and they and other weed trees should be cut out to allow more selective planting.

Croton megalocarpus (Euphorbiaceae) is the most numerous tree with over 300 specimens and was chosen by FONA for its logo. Its tall graceful outline





Plants of Nairobi Arboretum Above left: *Erythrina burtii* (detail).Right: *Spathodea campanulata*, the Nandi Flame Tree (see p.126) Below: *Podocarpus falcatus*, a valuable softwood (see page 126).



decorates many Nairobi streets, gardens and golf courses. Looking up one can note the lower leaf surface with its silvery-brown scales but most people miss the lovely creamy panicles of flowers for they appear in heavy rain and then only for a few days. Metal tree labels were made from the beginning in the arboretum and FONA have taken over and improved the system, noting names, uses and distribution as far as space allows.

The second most abundant tree species is *Brachylaena huillensis* (Compositae). This tall, narrow tree was called the Silver Oak by early settlers as its hard. brown timber reminded them of European oaks, and the leaves are silver white below. It is native both to forests in Nairobi and at the coast and the timber has been over-exploited by carvers. The tree is called Muhoho by the highland Kikuyu and Muhuhu by the coastal Swahili people. It regenerates naturally in the arboretum but is a slow - growing hardwood. A trunk diameter of 40 cm represents 100 years growth and the arboretum boasts a few of this size. The East African yellow-wood, *Podocarpus* sp., is of interest to visitors as the family is spread from New Zealand across the southern hemisphere to Chile and our species is famed in South Africa as the Outeniqua yellow-wood. A primitive evergreen conifer family, the trees are widespread in East Africa as well as in Ethiopia. In Nairobi arboretum the small, greenish, berry-like fruit of Podocarpus falcatus (see p.125) can be spotted among clusters of narrow green leaves. This tall highland tree of drier forests is a valuable softwood for furniture, panels and floors etc. Also used for timber is the endemic Meru oak (Vitex keniensis) restricted to the eastern slopes of Mount Kenya. Another useful local tree is the yellow flowering Markhamia lutea (Bignoniaceae).

Other indigenous trees can be seen well on the upper lawns but many remain hidden in the lower areas of tangled woodland. This area protects some rare endemic species, including *Croton alienus*, *Premna maxima*, and *Canthium keniensis*. Several *Prunus africana*, with medicinal bark, are in this area too.

A large *Terminalia brownii* does well, although alien to the Nairobi heights, but *Terminalia catappa* does poorly compared to its rate of growth at the coast. Two unhappy specimens of the Baobab tree (*Adansonia digitata*) of low altitudes, planted in 1922, fail to produce flowers or fruit. However (Zamiaceae) from coastal forests grows easily in Nairobi and produces cones, even beside City Hall!

The upper blocks of the arboretum are well covered by local *Teclea simplicifolia* and *T. Trichocarpa*, *Cussonia* sp., *Vangueria* sp., three golden yellow *Ochna* sp., *Albizia* sp., *Trichilia emetica*, *Margaritaria discoidea*, *Suregada procera*, *Strychnos* sp., *Drypetes gerrardii*, *Acokanthera* sp., and *Turraea robusta*. The important *Juniperus procera* and *Olea europaea* ssp.*africana*, mentioned previously, are well represented but not very accessible.

The public of course will note the trees with colourful blossom and an indigenous example is the well known African *Spathodea campanulata*, named the Nandi flame tree, after the Nandi people of western Kenya (see p.125). An edge tree of Kakamega rainforest it is planted all over Kenya, even at the coast. Prickly *Erythrina* trees are seen throughout Kenya and much of Africa, and the

arboretum has good specimens of the common *Erythrina abyssinica* as well as the distinctive, flat-crowned *E.burtii* from drier areas (p.124), which is used for making stools and camel bells. Both species bear bright orange flowers on the bare tree. FONA have prepared two self-guided trails for the public and the longer trail finishes at a mature *Craibia brownii*, with delightful cream-pink pea flowers; it is found in nearby forests and across Kenya. The Calabash nutmeg, *Monodora myristica* (Annonaceae) has striking triangular cream flowers with a frilly maroon edge, hanging on long stalks like Christmas ornaments. The large fruits never mature in the dry Nairobi climate. The Cape chestnut (*Calodendrum capense*) with its heads of pale pink-mauve flowers also attracts attention as well as *Millettia dura*, bearing purple pea flowers.

Surprisingly, the arboretum has some mature Mvuli trees (*Milicia excelsa*) now almost completely cut out in Kenya but imported from neighbouring Uganda and Tanzania for quality furniture and fittings.

Mention must be made of local *Warburgia ugandensis* (Canellaceae) which continues to be used extensively in east and southern Africa for the medicinal properties of its bark and roots. The name of the smart Nairobi suburb Muthaiga is derived from its Kikuyu name, Muthiga, meaning medicine.

Exotic Trees

These were introduced for their beauty or economic interest. Most come from other regions of Africa, followed by Australian and South American specimens. A special glory in the centre of the arboretum are the rows of Araucaria columnaris, and four other araucarias also grow well in Nairobi. The South American Tipuana tipu, Thevetia sp., Schizolobium parahybum and Tabebuia chrysantha bear striking yellow blossoms. The towering trunks of mature Bombax (Chorisia speciosa), grey and prickly, are topped by a wonderful display of pink blossom followed by fluffy kapok wafting to the ground. Australian Kurrajong, (Brachychiton acerifolium) and Moreton Bay chestnut (*Castanospermum australe*) as well as exotic erythrinas have red-orange flowers. Weeping schotia (Schotia brachypetala) produces bright pink clusters of blossom on a bare tree and the purple African tree wisteria (Bolusanthus speciosus) came also from southern Africa as well as the white Strelitzia nicolai. Two Swietenia mahogoni from Central America were undoubtedly introduced for economic interest, being the prize mahogany of commerce, but they do poorly in Nairobi. Cupressus torulosa, C.lusitanica, C.funebris, and C.cashmeriana grown from seed brought from Dehra Dun in India have grown into handsome specimens. Numerous pines and palms were tried and have met with some success, and two large Jackfruit (Artocarpus heterophyllus) are sizeable trees. There are 19 Ficus sp., both local and exotic.

Future plans

FONA hopes that the new arboretum guidebook will really help to introduce both donors and knowledgeable visitors to the tree collection as well as provide a readable, attractive overview for the general public. The local populace now flock to the arboretum at weekends and FONA encourages events such as the annual musical concert for children and solar energy day. FONA are grateful to all donors, both local and international, who have made all these improvements possible.

A very recent event in the arboretum gives a glimpse of one activity. Many one day courses have been organized for the unskilled 'gardeners' or 'shamba men', normally hired by every householder in the city who has a garden, large or small. These courses have become very popular with employers who are willing to pay for the time and teaching skills required (and it also produces a small income for FONA!). 37 men and two women were given lectures and hands-on experience of compost making and planting in the arboretum as well as a lunch, and the FONA chairman gave out certificates of attendance at the close of the day to really enthusiastic and delighted participants. All were encouraged to appreciate trees and the environment and to bring their families next time. For more than half of them it was their first visit to the arboretum although all live and work in the city.

A revival programme is being put in place for the centennial in 2007.By then it is hoped that the arboretum will be re established as a worthy showpiece for visitors to Nairobi city.

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