The forgotten species

The versatile poplar and willow trees are potential agents for environmental clean-up

BY PHANUEL OBALLA, A MUCHUGI AND SAMMY CARSAN

Two species of the *Salicaceae* plant family are indigenous to Kenya. These are *Populus ilicifolia* and a willow, *Salix subserrata*. *Populus ilicifolia* is locally known as Tana River poplar (English), mugui or makini (Kamba), mlalali (Duruma), malalai (Galla), mulalahi or lalaftu (Pokomo), guduba or gucuba (Borana), sirkh (Somali) and mulalati (Malakote, Orma).

The species is widespread in Kenya and it is the only one of the genus that occurs naturally south of the equator. The species' natural range is along the rivers Ewaso Nyiro North, Tana and Athi. It occurs in arid and semi-arid areas of the country, where mean annual rainfall ranges from 200 to 800mm with altitude ranging from 10 – 950 metres above sea level (masl).

Salix subserrata, commonly known as kambezo (Nandi), koimboindet or kwambeo (Sebei) and olemudongo (Maasai), occurs in the valleys of Nairobi River, Kiserian, Ewaso Nyiro South, Suam, Moiben and Siyabei rivers, among others.

The distribution range of *Salix* species in Kenya covers areas of medium to high rainfall and in medium to high altitude areas (900 – 2200masl). The species is riparian and is mainly found along permanent river valleys. This species or its varieties is considered continental and has been identified in Egypt, Libya, Gambia, Sudan, Ethiopia, Tanzania, Zambia and South Africa.

Populus ilicifolia is listed among the most endangered plants in FAO's red data book, while it is a vulnerable species in the International Union for Conservation of Nature (IUCN) red list. The major threats to the survival of these species are habitat degradation by cultivation of river valleys and removal of big trees for domestic use.

Within the protected areas, large herbivores such as elephants degrade tree populations by breaking and debarking them as feed, while heavy floods uproot mature and young trees along the river systems.

The unique geographical location of *Populus* species in the tropics and the rate at which natural populations of the species are being decimated has attracted the Kenya Forestry Research Institute (KEFRI), Kenyatta University, the World Agroforestry Centre (ICRAF) and other partners to take initial steps towards conservation of the family *Salicaceae* in Kenya. An investigative survey taken in 2012 revealed the grave state of the populations of *P. ilicifolia* along Ewaso Nyiro, Tana and Athi River systems.

Salix subserrata **on the banks of a rehabilitated stretch of Nairobi River.** (Photo: Phanuel Oballa)

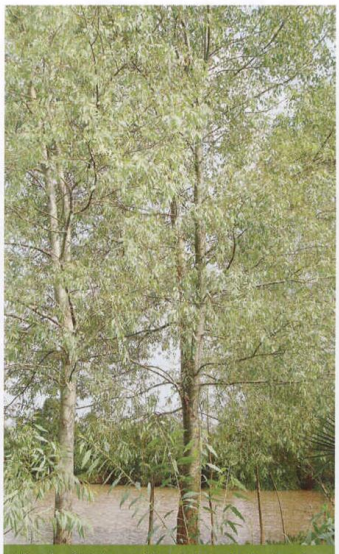
Importance of the species

In the traditional poplar and willow growing areas in temperate and sub-tropical countries, species of the *Salicaceae* family are of great socio-economic importance. This is mainly attributed to their fast growth, ease of propagation, high biomass yield and easy-to-machine wood – qualities that place the species ahead of most other forest trees.

Poplar species provide sawn timber for construction, especially interior partitioning, lamination, particle board, block board, fibre and roofing material.

Logs are usually sliced for plywood which is used for packaging and veneer for the match industries. The other characteristics such as straight clean bole, leaflessness for some months of the year, the sheltering effect during hot-dry periods, soil enrichment with leaves, compatibility with agricultural crops and high economic returns make poplars versatile and ideal for farm forestry.

Traditionally in Kenya, poplar trees are used for making dug-out canoes, mortars, beehives and corks. Straight poles, posts and



Populus ilicifolia **used to reinforce the banks of Nyandera pond.** (Photo: Phanuel Oballa)

An over 30-metre tall *Populus ilicifolia* **at Samburu Lodge in 2008.** (Photo: Phanuel Oballa)

Debarking of large specimen of *Populus ilicifolia* **by elephants.** (Photo: Phanuel Oballa)

withies are used for construction. Both wild and domestic animals browse on the species, while the salt exuded from the bark is mixed with tobacco and used as a beverage.

The *Populus ilicifolia* bark is also used in both human and veterinary traditional medicine. The traditional use of *S. subserrata* in human and veterinary medicine as antimicrobial and antiviral is well documented. The species has also been used to produce dyes, stains and inks.

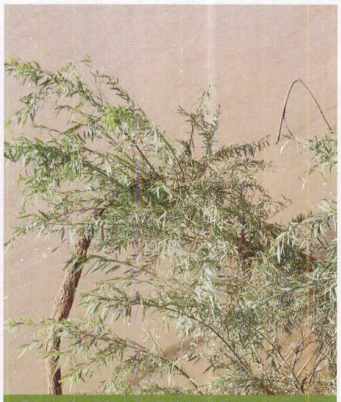
In recent years, poplars and willows have received increasing attention as renewable sources of biomass for energy and short-fibre for pulp and paper-making while contributing to stabilisation of carbon.

Poplars and willows with roots persistently in contact with water in wetlands are currently being adopted for decontamination of soils near irrigation channels and sewage lagoons. The species has the capacity to take up excess phosphorous and nitrates that cause depletion of oxygen in surface and underground waters. The tree also takes up heavy metals such as cadmium. These species are therefore potential agents for environmental clean-up if incorporated in drainage areas of municipal sewerage treatment works.

Due to scarcity of land and water in Kenya, people farm along river basins. This has resulted in soil erosion and dam siltation. To counter this, planting trees along the rivers has been encouraged, but the choice of trees is a problem. One of the trees, eucalyptus, has become controversial because of the water demand and effects to the environment, such that it is now being removed from water sources.

Salicaceae trees are adapted to the riverine ecology, and would therefore be better choices. Despite increasing rural electrification projects in Kenya, wood fuel remains the major energy source for cooking and heating. However, the diminishing tree cover has led to a fuel wood crisis. The fast growth rate of poplars and willows makes them attractive in provision of fuel wood.

The potential of the two species in wetland has been demonstrated with *P. ilicifolia* planted around Nyandera pond in Bondo and *Salix subserrata* planted to reinforce and rehabilitate the banks of Nairobi River. Observed growth rates of the two species on those sites are impressive, with poplar trees reaching over 15 metres while *Salix* attained an average height of 10 metres in four years. The diameter at breast height was over 12cm for both species. The species regenerate naturally and protect such delicate sites.



Remnants of *Populus ilicifolia* **at Samburu Lodge in 2012.** (Photo: Phanuel Oballa)

The way forward

- Mobilisation of resources for a national population survey and collection of germplasm for conservation and establishment of conservation stands.
- Initiate studies to determine range wide genetic diversity and to assist in unravelling the phylogeny within the *Populus* genus with potential of using the knowledge in *Populus* breeding. Study the species potential and selection of provenances for improvement for agroforestry.
- Promote use of species in agroforestry as well as wetland and riverine systems that require protection.

(References for this article are available at the Miti offices).

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