

“The sale of firewood and pulpwood is absolutely necessary, as the income from these activities has helped with diesel (Government doesn't supply diesel) and equipment maintenance,” said James Ballantyne, one of the directors of Umsonti, who has been working closely with the community for a number of years. “If it wasn't for the wattle clearing and the income from this, there would have been no maize production, as a lot of money is spent on diesel for ripping, lime spreading, ploughing, spraying and planting.”

The community is budgeted to be clearing roughly one hectare of wattle per week, translating into around 48 ha per year. There are three teams doing the initial wattle clearing. Each team comprises a chainsaw operator and three people stripping bark and stacking branches and bark in brushlines while utilizable timber (poles, pulp and firewood) is left in the middle of the 'indimas'.

The pulp timber is kept separate from the large logs of firewood timber which get sold to the local community. Depending on distance from the project, the 1.5 ton loads of firewood are sold for between R500 and R1 200. The income (around R 10 000 per month) is used to purchase diesel for the tractors to transport staff from the community to the forestry project.

“The philosophy of paying for a product is being entrenched in the community,” said James. “The ‘everything for free’ (EFF) model does not work.”

Wattle pulpwood logs are sold to either NCT Durban Woodchips (when tickets are available) or PG Bison. The Chevy Chase LandCare project has the potential to generate between one to two truckloads (30 tons) of pulpwood per month.

The funds generated from pulpwood sales have been used to assist with purchasing diesel for the ripping, liming, ploughing, planting, fertilizing and spraying of maize, as Government pays for all the inputs (equipment, fencing, seed, lime, fertilizer and chemicals), but not for diesel or equipment maintenance. The people working on the maize are paid as part of the LandCare project.

### Environmental considerations

Roads have been planned using natural or existing routes such as cattle tracks and wattle extraction routes that have been used for decades by the community. Bridges across streams have been made from rocks or wooden



Livestock auction at Chevy Chase.



Trustees outside FNB Mount Fletcher where they opened a bank account for their farming business.

“*The formalisation of structures and investment by government provides an opportunity for sustainable development.*

- James Ballantyne, Umsonti ”

poles so tractors and bakkies can cross safely and without causing any disturbance to the rivers.

“Ultimately, concrete pipes and culverts will be constructed, but with the shortage of funds, we have had to make a plan to minimise the impact on the environment,” said James.

The key to sustainable rural development at Chevy Chase is the agroforestry approach i.e. integrating agricultural activities with forestry, maintains James. This has allowed cash generated from pulpwood and firewood sales to be ploughed into clearing of alien

invasive plants and crop production which has provided winter food for livestock – all of which has provided an opportunity to improve management of the land. In addition these activities have created a vehicle – in the form of a community trust - to mobilise community resources and efforts which has the potential to create further opportunities going forward.

“The formalisation of structures and the investment by Government provides an opportunity for sustainable development, which creates jobs and benefits for the community both formally and informally,” says James. 🌱



Cool, shady tree, Mkhuze Game Reserve, northern Zululand, KZN.

*Never mind the science, trees are magic beings that inhabit a beautiful world and fill our lives with wonder ...*

By Gaynor Lawson

Trees have been a vital, integral part of mankind's existence since before history began. They are the largest living things on earth, and live longer than any animal (some species such as the Californian giant sequoia may live for over 3,000 years), forming a set of new cells each year. Trees provided earliest man with shelter from the elements, food in the form of fruit and nuts, fuel to burn, and protection from dangerous beasts - as long as he could climb!

### Divine beings

We have always been fascinated by the majesty of tall trees. Before there were temples, churches and other man-made places to celebrate our beliefs, people worshipped in forests and under trees. Genesis tells us that eating of the tree of knowledge set us apart from all other living creatures, and trees are significant in most religions, as well as in ancient and pagan beliefs.

Although they were some of the first people to worship a single God, early members of the Jewish faith also appear to have viewed trees, especially oak trees, as divine. Two words frequently appearing in the Bible, alon (oak) and ela (terebinth - a kind of pistachio tree), are apparently derived etymologically from "el", the Hebrew word for "god". The ancient

Hebrews considered the oak to be sacred because it was under an oak that God and his angels appeared to Israel's founding father, Abraham, disguised as travellers (Genesis 18); this is one of 60 references to oak trees in the Bible. An almost 5,000-year-old tree is allegedly located in the exact place where God and his angels appeared.

Other 'holy' trees mentioned in the Bible include the ela under which King Saul and his sons were buried, and an angel is said to have delivered the word of god under the "oak which was in Ophrah" (Judges 6:11). The sycamore and almond tree also feature extensively in the Bible.

In Greek mythology, dryads and oreads were nymphs, minor goddesses of forests, groves, and woodlands who were spirits of trees such as oaks and pines, poplar and ash, apple and laurel. Hamadryads were tree

nymphs whose lives were so connected to a particular tree that if it died, so did they. Consequently, dryads and the gods would punish any mortals who harmed or felled trees.

Norse religion features the Tree of Life or Yggdrasil, a massive tree (perhaps a yew or ash tree) that exists at the centre of the world, which it supports and nurtures.

Few peoples held trees in such high regard as the Celts and their druids, who were religious leaders as well as healers, legal authorities and judges, lorekeepers, and political advisors. The druids' veneration of trees is considered not merely a pagan, primitive form of worship but was based on a deep understanding of the vital significance of trees for mankind's existence. The Celts believed that we are descended from the 'Great Oak', growing like fruit from its branches.

The oak was also revered by the early Gauls as a symbol of their supreme god. Penalties for damaging trees are reflected in the rulings of the Brehons or Gaelic judges, close in power to a chieftain, who would impose severe penalties for those who felled trees or even wantonly hacked off branches without their chief's permission - one of the earliest examples of ecological legislation. Trees were divided into distinct categories, with fines determined by which tree was damaged. Oak, hazel, holly, yew, ash, pine and apple were classed as *airig fedo*, or "nobles of the wood" because the oak has acorns and nobility, hazel has nuts, apple has fruit and bark, yew because it is good for building, holly for making chariot-axles, and ash for spear shafts. Other categories were trees such as willow and birch, considered as *aithig fedo*, or "commoners of the wood"; aspen, elder, and juniper were some of the trees called *fodla fedo*, or "lesser divisions of the wood", while the lowest ranked group, the *losa fedo* or "bushes of the wood" included bracken, bramble, and heather.

Today's sustainable forestry is not a modern concept but is based on principles of Celtic woodland management that aimed to ensure that their precious natural resource was preserved, including pollarding, coppicing, planting, drainage, hedging, and foraging (by people and animals). Folklore advised that those wanting to cut down a tree should ask the tree's permission, and to leave a gift or offering in thanks, such as wine or a coin buried in the roots.

Trees were so important to some ancient tribes that they named themselves after them, such as the Eburones (the Yew People), and the Lemovices (the Elm People) of Gaul.

### Tree worship today

In the Middle East and North Africa, sacred trees are still regarded as the abode of souls of local saints known as Wellis, which protect their tree from humans with their divine power. Any damage to this tree is regarded as a personal insult against the saint, who will retaliate.

In Japan today, there are more than 15 tree species are related to the Shinto and Buddhist religions.

In Madagascar, the Baobab tree is said to be where ancient spirits reside, and where the spirits of dead family members linger. Gifts of wine, honey and old money are placed at the foot of the tree in their honour.

### Our arboreal heritage

Locally, there are many plants and trees that form an essential part of our indigenous heritage. In Zulu culture, trees are often referred to as 'growing people', in acknowledgement of their status as a sacred being, the home of the spirits. 'Inyanga' means 'man of the trees' in Zulu and refers



Iconic palms frame a church in Matatiele, southern KZN.

“Norse religion features the Tree of Life or Yggdrasil, a massive tree that exists at the centre of the world.”



Buddhist face carved from tree and roots. Photo courtesy of Ben Yi.

to herbalists who make medicine or 'muti' (from the Zulu/Xhosa word *umuthi* meaning 'tree') from bark, herbs, and roots. Crushed rocks, bones and animal horns may also be used.

The reverence for trees is also significant amongst 'sangomas', who use divination rather than herbs for healing. Sangomas have their own specially chosen sacred tree that is believed to be metaphorically linked to their physical body. During ritual ceremonies commemorating the Nguni ancestors, these trees are 'dressed' with brightly coloured cloth or fabric wrapped around the trunk.

Traditionally, buffalo thorn branches are placed on the graves of Zulu chiefs and carried by a family elder leading the pallbearers, while the *Umsinsi* or "lucky bean tree" is another auspicious tree associated with Zulu royalty, with these trees planted on the graves of Zulu chiefs. It is also used as an effective, living fence to contain and protect kraals, and is used in traditional 'muti' because of its antibacterial, anti-inflammatory and analgesic properties.

In the same way that the Gauls valued ash for making strong spear shafts, the *Umsimbithi/Umsimbithwa* (*umzimbeet*) is prized for its strength, making it a trusted wood for assegais, knobkerries and walking sticks. Its seeds were worn as a necklace by Zulu impis to indicate a heroic warrior, much like a military medal, while the leaves of the *umyezane* or willow were worn around their waist to indicate that they had been victorious in battle.

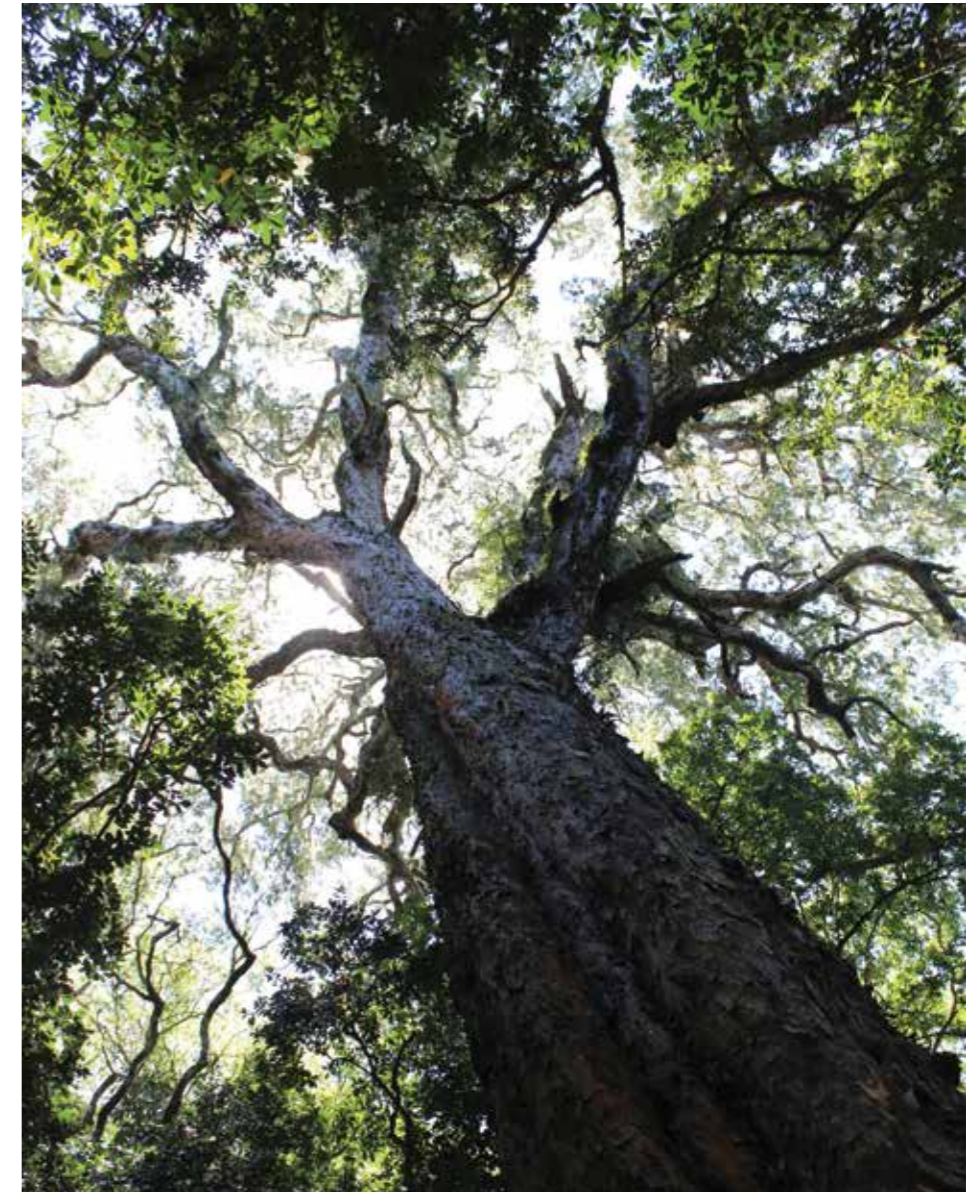
### The ancient giants of Knysna

The Knysna forests are the country's largest forest complex, covering around 568 square kilometres, and include fifty different species of indigenous trees, such as giant yellowwoods, wild fig, Cape chestnut, candlewood, white milkwood and stinkwood. This ancient place was once home to indigenous people from the early Stone Age onwards who lived in harmony with their green canopy, but that changed when the settlers arrived with their commercial need for wood, which became the commodity that underpinned the local economy. The forests were harvested mercilessly to the detriment of the local wildlife, including the legendary Knysna elephants, until 1939 when all logging in the forests was stopped by the government and the demand for timber replaced with sustainably produced exotics such as pine and gum.

Today the forests (and the Knysna Lagoon) are protected, and since 2009 have formed part



Tree growing over a ruin. Photo courtesy of James Wheeler.



800-year old yellowwood, Hogsback, Eastern Cape.

of the Garden Route National Park, which covers more than 160 000 hectares. There are four official Big Trees in this park: the Dalene Matthee Big Tree (named after the author of "Circles in a Forest"); the Tsitsikamma Forest's Big Tree, a yellowwood estimated to be between 600 and 800 years old and is 36.6 metres high with a trunk circumference of 9m; the 800-year-old Woodville Big Tree, an Outeniqua yellowwood that stands over 30 metres tall; and the King Edward VII tree or the Diepwalle Big Tree, a famous Outeniqua yellowwood near Diepwalle Forest Station that is close to 40 metres high and is more than 800 years old.

It is interesting to note that the names of the forest derive from the Khoekhoen people, who lived in the area in pre-Colonial days. Outeniqua means "honey-gatherers", Hessequa means "men of the trees", Tsitsikamma means "bright waters", and Knysna means "ferns", according to Professor Mike de Jongh, author of, "A forgotten First People - The Southern Cape Hessequa".

### Intertwined

The existence of man and trees is so interwoven that without trees, man often ceases to exist. Jared Diamond's 2005 book, "Collapse - how societies choose to succeed or fail", describes five factors that could bring about the collapse of life as we know it: climate change, hostile neighbours, trade partners, environmental problems, and a society's response to its particular environmental problems. Deforestation is highlighted as a key element of man's survival, and Diamond looks at case studies of communities who died out because they did not value trees. These include the residents of Easter Island and Norse Greenland.

Vikings had lived in Greenland since the year 985 AD, when the Icelandic explorer Erik the Red arrived with a fleet of 14 longships, a journey made easier by the warming of the seas during what is known as the Medieval Warm Period (from around 900 to 1300) that saw a dramatic reduction in sea-ice. The settlers thrived, developing farms where they grazed cattle, goats and sheep; built manor houses; and even traded imported stained glass for live polar bears, furs and walrus-tusk ivory. But a volcanic eruption in Indonesia in 1257 caused sulfur to be rocketed into the stratosphere. It reflected solar energy back into space, cooling Earth's climate and causing global famine. Greenland's Vikings, numbering at most 5,000 people, refused to adapt, stubbornly trying to raise crops and livestock on the now over-grazed and eroded landscape. They had depleted the island's few trees, mostly scrubby birch and willow that grew near the fjords, and so could not build boats to escape. They refused to learn from the Inuit, who arrived in northern Greenland a century or two after the Vikings landed in the south and lived off the natural resources, hunting seals, whales and walrus. When the livestock died and the crops failed, the Vikings died out too. The adaptable Inuit, survived.

The fate of the human inhabitants of the remote Easter Island, called Rapa Nui by its indigenous people, was another example used



Wooden totem god. Photo courtesy Mohammad Jumaa.

by Diamond to show catastrophic societal collapse through mismanagement and abuse of an environment. By around 1600, the island's population had descended into warfare, cannibalism, and population decline. Diamond's theory of deforestation causing the islanders' downfall is now being debated by archeologists, some of whom believe the islanders did not self-destruct but rather practiced environmental stewardship and continued to thrive, as proven by stone platforms on which the iconic statues stand, built after the 1600s. Possibly, it is conjectured, European settlers brought disease, slave-trading, and conflict that wiped out the island's residents.

### Industry of the past, present and future

Trees and the various ways that we use them formed the basis for one of mankind's earliest industries. From primitive sledges and wooden shelters to wheels and carts, ploughs and tools, construction of bridges to cross waterways to boat-building and railway sleepers that allowed for exploration and expansion, trees and forests helped the advancement of mankind. Let's not forget that most coal, petroleum and natural gas consist of submerged forests and plants from a long ago time. Wood has evolved into a modern engineering and industrial material, and with the increasing focus on more sustainable living and reduced dependence on oil-based materials such as plastic, wood is coming to the fore again.

In 2016, the U.N. Food and Agriculture Organization (FAO) released a report that confirmed that (sustainably-sourced) wooden furniture, floors, doors and similar building materials require less energy to produce than aluminium, concrete or plastic, and in addition, the timber so used continues to store carbon for years, offsetting almost all of the greenhouse gas emissions related to the production process.

There are also physical and mental health advantages of using wood in our environment that is a key part of a trend called biophilic design (biophilic means love of nature). This movement encourages the use of organic materials, natural light, real vegetation, nature views and other aspects of the natural world in our built environment. Being near wood mirrors the sense of well-being that we feel after time spent outdoors in nature, with reduced stress, fatigue and anxiety; lowered blood pressure and heart rates; mental invigoration; enhanced moods and improved productivity; reduced employee absenteeism and faster healing times. Wood products also improve indoor air quality by moderating humidity. Incorporating wood into our homes and places of work, healing, and education makes so much sense.

The use of trees outside is a further way to enhance our living spaces, buffering the sounds of a city, lowering street-level temperatures, creating a haven for birdlife and wildlife, and generally breaking the monotone concrete and steel grey hues of city centres.

### Buildings of the past and the future

Cross laminated timber or CLT is a popular way to build, especially in

Europe. Invented in Austria in the mid-1990s, this type of engineered timber consists of three to eleven layers of wood, glued together to form solid panels between 60 to 320 millimetres thick. It offers sustainability, flexibility of application and faster construction processes, but is not accepted everywhere, with fire regulations in places such as the UK prohibiting or limiting its use in tall buildings. Currently used for low rise residential, commercial, and mixed-use buildings, architects and developers are starting to propose that it could be used for buildings of six or more storeys.

Timber is tough and resilient. Aged structures made of wood are still standing, the oldest being an ancient Japanese temple built in 607 AD that is the world's oldest surviving wooden structure. The Horyuji Buddhist temple with its five-storey pagoda was constructed from Japanese cypress trees that were around 2,000 years old when felled. It's been 1,300 years since the cypress trees were cut down, and the wood still stands firm. Railway sleepers take the punishment of heavy trains for decades without breaking. Submerged forests still stand underwater. Mine props are made from timber (usually spruce) because it is cheap and readily available, and most importantly, because of its ability to yield under immense roof pressure while metal and concrete props are inflexible and collapse.

Wood can also be reused / recycled repeatedly without degradation or damage to the environment, while materials such as concrete, plastic or aluminium require extensive energy from fossil fuels to produce, and even using recycled plastic is not as environmentally friendly as some people may think, as the recycling process also requires a lot of energy. We need to spurn plastic wrapping, cutlery and Styrofoam fast-food containers, and revert to using paper packaging for our shopping and insist on paper straws.

### Do trees do math?

In nature, the intervals at which branches emerge from the trunk of a tree reduce towards the top of the tree, in the same way that the intervals between leaves decrease towards the tip of the branch. These intervals are related to one another by a mathematical law called a Fibonacci series, which was discovered by an Italian mathematician around 1200.

### Do they talk?

While the likes of authors such as Tolkien and CS Lewis said that trees definitely communicate, it's taken a while for botanists to agree. Studies indicate that trees do communicate, in the sense of mutual interaction, mostly through the release of pheromones (chemicals produced by living creatures that cause a social response or change in behaviour in creatures of the same species) to share information. In 1979, a chemist called Rhoades used willow trees to show that when one tree was under attack from insects, it could send out a warning to other willow trees, which would then produce chemicals to defend against the bugs.

While researching her doctoral thesis two decades ago, American



Tree sculpture, Hogsback, Eastern Cape.

ecologist Suzanne Simard used radioactive isotopes of carbon to determine that paper birch and Douglas fir trees were sharing an underground network of soil fungi. These underground fungal systems or mycorrhizal networks consist of delicate, hairlike root tips of trees that join with microscopic fungal filaments in a symbiotic relationship. The fungi consume about 30% of the sugar that trees photosynthesize from sunlight to fuel their search for nitrogen, phosphorus and other mineral nutrients in the soil that are in turn absorbed by the trees. This network also enables trees to share water and nutrients, and send distress signals about threats such as insect pests, drought and disease - significantly, the nearby trees alter their behaviour accordingly. They may increase their levels of toxins and repellents in their tissue to deter pests, or may produce airborne

compounds that attract the natural enemies of a particular pest.

Simard and her study group grew seedlings of Douglas fir alongside ponderosa pine, and then damaged the one that would have been acting as the 'mother tree' (one of the largest, oldest trees that favour and nurture their own 'kin' - the seedlings that are growing around them - by sharing nutrients with them along the network). She says, "When we 'injured' these Douglas fir trees, we found that a couple of things happened. One is that the Douglas fir dumped its carbon into the network and it was taken up by the ponderosa pine. Secondly, the defense enzymes of the Douglas fir and the ponderosa pine were 'up-regulated' in response to this injury. We interpreted that to be defence signaling going on through the networks of trees. Those two responses - the carbon transfer and the defense signal only happened where there was a mycorrhizal network intact."

This theory of trees communicating or interacting has found support beyond the realms of scientific and university research. A book by a German forester, Peter Wohlleben, entitled "The Hidden Life of Trees: What They Feel, How They Communicate - Discoveries from A Secret World", became a bestseller in 2018. He describes what he calls the "wood-wide web", saying that trees in every forest that is "not too damaged", are connected to each other (through the underground fungal system discovered by Simard).

Do short rotation plantation trees - such as Eucalypts grown in South Africa - also communicate with each other through their interconnected root systems? Maybe, maybe not - the jury is still out on this. But they are supplying us humans with the fibre and wood we need, thus saving their much older, natural brothers and sisters in the natural forests from the axe and the chainsaw. So in a way, they are still working together to maintain a balance.

Whether you believe these stories or not is up to you. But it cannot be denied that trees elevated mankind from cave-dwellers in our primordial past. They helped to feed us, clothe us, protect and shelter us. They gave us the means to explore, expand and evolve. They may be the way for us to help save our planet in the not-too-distant future. And if you stand quietly in a grove of tall trees, you might just hear them whisper to you... 🌲