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Southern African Institute of Forestry

Delivering a professional service to forestry

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SAIF Calendar April 2021 : Photographer : Sean Sneyd : KZN Branch : "Homesdale Fires"

From the President's desk

Forest Plantations and Ecosystem Services

The natural environment provides humans with a large variety of resources with varied benefits and we call these, ecosystem services. Ecosystem services are derived from functioning ecosystems, including forests, grasslands and aquatic ecosystems to name a few. The effective functioning of a balanced ecosystem is vitally important for the maintenance of ecosystem services. This includes sustained supplies of clean water, clean air, weather patterns, pollination of plants, decomposition of waste for human mental and physical well-being. Any disruptions in the ecosystem balance can have detrimental effects on a variety of services utilized by man. Collectively, ecosystem benefits or services can be grouped into four broad categories. These include *provisioning* - the production of food and water, *regulating* - the control of climate and disease; *supporting* - nutrient cycles and oxygen production and *cultural* - the spiritual and recreational benefits.

What are the consequences of replacing natural ecosystems that provide great benefits to human societies? Many of the ecosystem services that are provided naturally are irreplaceable, or the technology necessary to replace these services is too expensive to be sustainable in the long-term. Thus, the role of both natural and replacement (man-made) ecosystems in maintaining these services becomes increasingly important. Tree plantations have had ambivalent roles with regards to ecosystem services.

Their production function has served in a very efficient way to meet the growing demand for wood products. However, where tree plantations have replaced native ecosystems (forests or grasslands), many ecosystem services have deteriorated. Where plantations were established on degraded or former agricultural land, many ecosystem services improved. The future development of forest plantations, both in terms of extent as well as quality and management has to be viewed in this context. There is growing evidence that plantations can effectively assume the provision of several ecosystem services, such as maintaining water and nutrient cycles, soil protection and the provision of habitat for biodiversity. In addition, the focus on ecosystem services in restoration efforts may complement socio-economic objectives such as poverty alleviation by providing job opportunities. This highlights the need to design plantations and landscapes containing plantations to accommodate the needs of local people for the range of ecosystem services they depend on.

Tree plantations already play a major role in the provision of timber and fibre such that around three per cent of the forest area, which is in productive plantations, provides approximately one-third of the industrial roundwood worldwide. To improve the role of plantations and to reduce the conflict surrounding their use, new approaches for plantation forestry, including an orientation towards ecosystem services remains an ongoing objective. Intelligent solutions for plantations should feature ecological restoration, with the aim of achieving optimum productivity in multiple products and services rather than maximum productivity of one product and should be characterized by closed cycles of nutrients and energy conservation. The plantations must also be economically profitable for investors or owners, and they should also provide economic benefits to local and regional economies.

These designer plantations need to mitigate unfavourable conditions by including novel mixtures of of native and non-native species with particular traits that favour specific ecosystem functions. Most measures suited to improving biodiversity in plantation landscapes also have positive effects on productivity. Through preservation of patches of native vegetation and the maintenance of landscape heterogeneity as well as the creation of stand structural diversity, are likely to benefit the cultural services of planted forests.

Energy is widely recognized as a crucial factor for health, education, and economic development. Biomass burning is currently the most widely used form of energy in many African countries. Biomass is the only source of energy for most households, especially the poor. The present pattern of wood consumption, however, is clearly not sustainable, and will soon result in irrecoverable damage to life-sustaining ecosystems. Here, decentralized and community-based plantations for both biomass burning and small-scale electrification schemes based on biomass from plantations can deliver affordable and sustainable power in rural areas and protect biodiversity and ecosystems without which development beyond a certain level is impossible.

Owing to their capacity to sequester atmospheric CO2, there has recently been much interest in using plantations in climate change mitigation strategies. Increasing the proportion of wood supply from fast-growing, sustainably managed plantations not only enables substitution of fossil fuels with bioenergy but also allows native forests to be set aside for conservation purposes. Plantations may thus substantially contribute to the protection of carbon stocks in old-growth forests. Plantations, however, may also be strongly affected by climate change with implications associated with the delivery of goods and services. Adapting plantations to climate change is another challenge. Compared to native forests with slow-growing, long-lived trees, this task may be more achievable in fast-growing plantations, where changes of species, provenances or varieties can be developed to adapt to climate-induced changes.

The increasing competition for land with a growing world population will necessitate a shift in management focus of existing and future plantations.

This will include a move from single or few goals such as efficient wood production, to a range of outputs. In the past, the dominant interests in societies often accorded little formal value to the non-timber ecosystem goods and services of plantation forests. Changing societal values, more progressive thinking about the potential roles of plantations, and the emergence of new forms of environmental governance regimes such as the Forest Stewardship Council (FSC) and the Programme for the Endorsement of Forest Certification (PEFC) have created policy environments which enable the provision of ecosystem goods and services from plantation forests.

Bauhus J, van der Meer PJ and Kanninen M (Eds). 2010. Ecosystem Goods and Services from Plantation Forests. Earthscan ISBN: 978-1-84971-168-5.

https://en.wikipedia.org/wiki/Ecosystem_service

in finding novel and new technology to improve the product we produce and existing processes. I am also involved in the collaborations with customers in the development of new products.
"I hope that one day I will be able to inspire a young women to end up enjoying science like I do."

The loss of a local legend

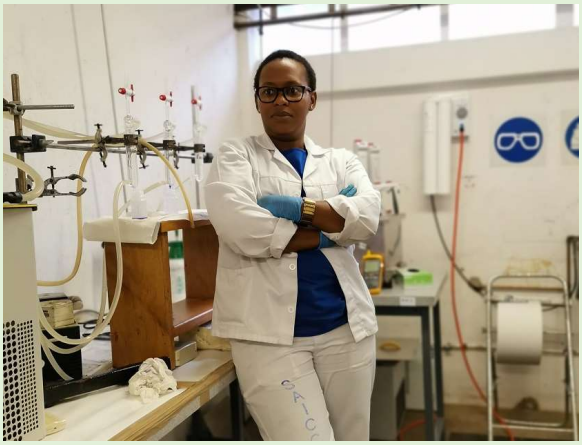
Professor Stefan Neser will be greatly missed by all. The archetypical iconic naturalist, Professor Neser played a fundamentally important role assisting FABI in developing biological control programmes for many forestry pests including the Eucalyptus snout beetle *Gonipterus* sp., the Eucalyptus bronze bug *Thaumastocoris peregrinus* and the Eucalyptus gall wasp *Leptocybe invasa.* With the biological control of *Leptocybe* being named in his honour as *Selitrichodes neseri.*

Women in Forestry Research (Part 2) : Sinazo Njamela

Sappi Technical CoE: Senior Chemical Technologist
Qualifications

- PhD Forestry and Wood Science

Research
I am a registered Candidate Natural Scientist that works for Sappi, one of the biggest Pulp and Paper Producers in the World. I am involved in the day-to-day running of our labs, which includes equipment checks to ensure lab equipment is in good working condition (as I am ISO 17025 competent) and the results we generate are reliable and credible. We perform laboratory tests on the pulp produced at our various mills to determine the quality and performance. I am also involved.



The Rob Thompson Column

Well brewed forestry

Some years ago, I led a student tour and at a point asked the group where paper comes from.

One (perhaps not so) bright soul answered confidently …"Makro". I've often thought about that incident and have come to realise that as ludicrous as the answer seems to us as salted forestry practitioners, the vast majority of the general population are likely to have similar limited insight into the processes resulting in the feedstock they feed to their hungry printers or rip apart when the Takealot delivery arrives.

Fortunately, as knowledgeable foresters, we all know that paper comes from "Waltons".

The practice of forestry, a combination of biotic, ecological, production and business processes, is certainly unique and a career therein, challenging and rewarding, requiring wide insight at times, into seemingly divergent disciplines. A hard lockdown hobby that I have continued to the present, has illustrated, in the most pleasant of ways, that foresters are not alone in dealing with complexity. Natural resource utilization tends to lead to interwoven processes wherein lie many parallels to those which we encounter daily in our industry.
Let me take you on a short journey to introduce you to the utilization of certain other natural resources with which I am sure many of you are inherently familiar.

It would be opportune to commence our journey with the question…"Where does beer come from?"
Yes. Yes…we all know the answer is "Tops" but do you know how its made?

The four ingredients of the amber nectar many of us hold dear are barley, hops, yeast and water. Barley, a grain with high sugar content (in its germinating stage) is grown on select well prepared sites. Hundreds of varieties of barley are available requiring ongoing high-tech selections and breeding programmes to come up with the right cultivar on the right site to produce the optimum amount of sugar.

Carefully nurtured through to maturity, the grain is harvested from the barley plant, most often mechanically, using machines of the ilk and magnitude that will cause any self-respecting harvesting forester or engineer, instantaneous machine-envy.

On a similar basis, tall vine growing hop plants are carefully bred and multiplied to provide optimal bittering, aromatic, and preservative qualities that make beer the magic elixir that it is. Hops are also very site-specific and interestingly, here in South Africa, the only place they grow is the George region. A mere coincidence that many South African forestry practitioners commence their careers from the George area after studying at Nelson Mandela University and no doubt sampling some of the local hops along the way? The universe works in many strange and splendid ways!

Do you notice the parallels with forestry tree breeding, silviculture and harvesting practices in all of the aforementioned?

Once harvested, the grain is sent to specialized maltsters who germinate the grain under a controlled watering regime. The germination process induces sugar production in the kernel. At a specific time, the germinated grain is kiln dried to kill off the developing shoot and to dry it out for long-term storage and further processing. The maltsters then expose the various cultivars of barley to different temperature regimes in order to effectively control-roast the grain and impart various levels of caramelized flavour to the grist, which at this stage is referred to as "malt". Each barley cultivar has its own unique "gravity point count" which maltsters optimize via the kilning process. Timing is critical with an optimally treated malt attracting high prices and global demand. In my mind's eye I see our saw milling and chip milling colleagues nodding their heads sagely in understanding of the intricacies of kiln temperature and moisture level control.

Never fear, I'm not leaving the pulp millers out, given that beer brewing incorporates what is essentially a digestion phase too. The gravity point count is the measure of sugar released by that particular processed cultivar once steeped in hot water for a protracted period, in a process called "mashing".

Certain cultivars are more sought after than others given the high sugar yield, in much the same way as some or our hardwood hybrids have optimal pulp yields. Sugar is critical to beer brewing in that this feeds the yeast which in turn creates the alcohol and carbonation of the final beverage. The gravity point count is similar to the Kappa number of the various timber species we use, indicating the associated pulping efficiency (pulp yield). By knowing the particular gravity point count or Kappa number, brewers and pulp producers can create recipes of various processed cultivars to attain particularly required styles or characteristics of final product.

The beer brewer retains the sugar after extensive steeping of the grain in water at around 65 degrees Celsius, in a liquid form called "wort", and discards the grain-fibre called "spent-grain". Conversely, the pulp maker discards the dissolved sugars and cell adhesives, and retains the fibre, called "pulp".

The wort is boiled for an hour or more, in order to sterilize the liquid during which time the hops are added according to specific boil-time regimes. Earlier hops add bitterness whilst later additions impart the aromatic and flavour characteristics. Every brewer has a closely guarded hop-addition regime adding what they consider the competitive edge to their final product. Forestry companies are known as well to punt the competitive edge of their particular products to consumers within a highly competitive global market.
The wort is taken off the boil at the designated time and cooled down rapidly in order to close down the hop activity (oil release) and prevent off-flavours in the final product. Cool wort is transferred to a fermenter tank, aerated and yeast is introduced or "pitched". Yeasts that are used are sourced from either of two main varieties – top fermenters (ales) working at higher temperatures and bottom fermenters (lagers) working at low temperatures. Specialized yeast is the catalyst to the production of beer in much the same way as specialized mycorrhizal fungal activity promotes softwood pine establishment and growth. The yeast feeds actively on the extracted sugars, producing in the process, alcohol and carbon dioxide.

A two week period generally sees the completion of the fermentation process, whereafter the beer is bottled with a tiny addition of sugar to facilitate bottle carbonation.

A maturation period ensues referred to as "bottle conditioning", after which the bottles are cooled to reduce residual yeast activity and provide a cool refreshing beverage…slightly bitter … never sweet!

Going back to the question that I asked that young student years ago. The University of YouTube provides an accessible and infinite insight into just as infinite an array of topics providing one with access to literally any information imaginable. One wonders therefore, why it is that there is such a dearth of knowledge about key elements that are critical to our wellbeing or are integral parts of our lives.

Why is it that people generally obsess with the irrelevant and spend little to no time on exploring that which would really add value to their lives and others? My challenge to you is to explore your interests at a deeper level and discover the elements that connect and weave into other seemingly unrelated disciplines.

Certainly my brewing hobby has brought home to me just how interconnected everything is and the various responsibilities that emanate therefrom. As an aside it has also provided me with a topic for an article which, I hope you have noticed, has made no direct reference to Covid-19, the persistent scourge that is on everyone's mind.

I hope that you enjoyed the break!

10,000 officers to protect South Africa's crops
Darryl Herron

After the National budget was announced by Finance Minister, Tito Mboweni, on the 24th of February, the Department of Agriculture, Land Reform and Rural Development released a document regarding the department's expenditure. In it was a plan to increase support to farmers by increasing the ratio of extension officers to farmer from 1:850 to 1:250. To do this, the department is thinking about recruiting an additional 10,000 extension officers over the next few years, as part of its "extension recovery services."

The agricultural and forestry sectors are important for the South African economy and its growth. Figures released by Stats SA on the 8th of December 2020 showed that the agriculture forestry and fisheries sectors' growth rate at the end of Q3 2020 was 18.5% and valued at R79.4 billion. In a time where many other sectors were taking a knock, agriculture and forestry were showing growth. Further along the value chain, the food and beverage manufacturing sector found itself in the top four of South Africa's 10 manufacturing divisions and collectively contributed 16.5% to GDP growth in the same quarter.

These sectors have and continue to be profitable. Their continued growth can support South Africa's plans for economic recovery and addressing the unemployment crisis. Already these sectors employ many South Africans, particularly in rural communities. As key contributors to South Africa's growth, agriculture and forestry need to be protected and supported by the government. This includes financing, assistance with infrastructure; implementation of policy and regulations that support growth and protect our natural resources, as well as capacity development. The recruitment of additional extension officers will help build capacity to better support growers.

Extension officers are trained to be intermediaries between research and growers. They act as facilitators and communicators, assisting growers in their decision making to ensure that appropriate knowledge is implemented to obtain the best results with regards to sustainable production and general rural development.

The need for additional capacity has long been recognised by the industry and as such a number of programmes to grow this capacity have already been started. The most recent is an internship programme based at FABI, which is funded by the South African Cultivar and Technology Agency (SACTA) and the South African National Seed Organization (SANSOR), and managed by the DSI-NRF Centre of Excellence in Plant Health Biotechnology (CPHB). The internship will equip talented young graduates with the necessary skills to help gain employment within, and support, the industry.

The CPHB has structured the internship with practical skill development in mind. FABI offers many services to both forestry and agriculture, including extension, access to a plant clinic, biocontrol and resistance screening. All of these services are backed by research being done within various research programmes linked to the institute, such as the Tree Protection Co-operative Programme (TPCP), Grain Research Programme (GRP), Macadamia Protection Programme (MPP) and the Avocado Research Programme (ARP). The interns will all work within these services; gaining experience as extension officers and diagnosticians, but also learning more about our biocontrol and resistance screening programmes.

The timing and base for this internship programme couldn't have been better. The need for quality graduates with practical skills and experience has never been so dire. FABI offers its interns an opportunity to work across multiple sectors within some of its world-class programmes and teams, an opportunity that few individuals get.

The CPHP internship programme might not be able to train 10,000 extension officers but it will contribute a number of well-trained individuals that possess the necessary knowledge and skills needed by the sector.

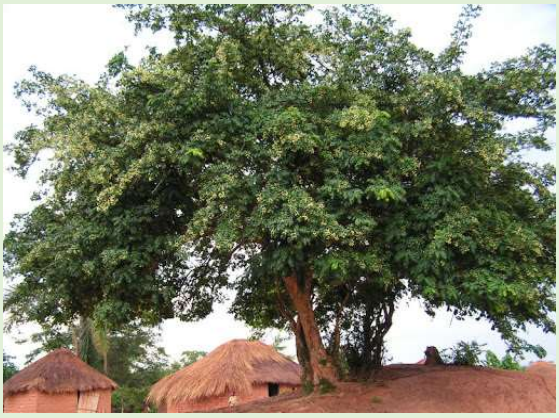
FABI
TreeHealthNet is an electronic newsfeed between researchers of the Tree Protection Co-operative Programme (TPCP) and the DST-NRF Centre of Excellence in Tree Health Biotechnology (CTHB) in FABI, and their industry, academic and public partners with an interest in tree health issues
tpcp CTHB

Tree of the week: *Ekebergia capensis* – Cape ash – Essenhout – Umnyamatsi

A beautiful large tree characterized with lush foliage and red berries which attract wildlife to the garden. Although classified as evergreen, the Cape Ash can be briefly deciduous in cold dry winters. Its distribution in South Africa stretches from Western Cape, Eastern Cape, KwaZulu-Natal, Mpumalanga to the Limpopo Provinces.

The Cape ash has a spreading crown, up to 8 m wide and the leaves are compound with a glossy, green colour. New growth has a reddish colour and appears in spring. In areas that have colder winters, the foliage turn yellow and then red before falling to the ground. The bark is rough light grey to almost black with few buttress roots at the base. E. capensis is often confused with the Wild plum however, the leaves of Wild plum are stiff and not drooping. They are also sickle shaped. Between September and November, this tree produces sprays of tiny scented white flowers. Male and female flowers are found on separate trees. The white blooms are followed by fleshy red fruits which are edible to both birds and mammals.

This fast growing tree makes a beautiful street tree. Ekebergia capensis can also be planted in gardens for shade. Its rounded canopy makes it a good climbing tree for kids. The tree grows well in both full sun and semi-shade conditions. The Cape ash can tolerate light drought conditions and very light frost. It is also sensitive to heavy frost hence it is only suitable for warmer areas of the Highveld not the cold ones.



Trees of the Year : List of Species : 2021-2025

(List Supplied by DEFF)

Cat 1: Common Tree

2021 : *Vachelia* (formerly *Acacia*) *karroo* : Sweet Thorn
2022 : *Dais cotinifolia*: (Pompon tree)
2023 : *Buddleja saligna* (False Olive)
2024 : *Searsia* (formerly *Rhus*) *lancea*
*Searsia leptodictya (*Mountain karee*)*
2025 : *Sideroxylon inerme (*White Milkwood*)*
Mimusops caffra (Red Milkwood)

Cat 2: Tree for Promotion

2021 : *Portulacaria afra* (Pork bush/ spekboom)
2022 : *Peltophorum africanum* (African black wattle)
2023 : *Bolusanthus speciosus* (Tree wisteria)
2024 : *Apodytes dimidiata* (White pear)
2025 : *Spirostachys africana* (Tamboti)

Cat 3: Tree of Appreciation

2021: *Warburgia salutoris* (Pepper bark tree)
2022 : *Alodendron dichotomum* (Quiver Tree)
Alodendron Pilansii (Giant Quiver tree)
2023 : *Leucadendron argenteum* (Silver Tree)
2024 : *Euphorbia sehukuniensis* (sekhukune euphorbia/ naboom)
2025 : *Widdringtonia cedarbergensis* (Clanwilliam cedar)

Vachelia karroo

SA researchers shortlisted in international forestry research award

South African researchers have made it to the global shortlist of the Blue Sky Young Researchers and Innovation Awards. They were selected from 14 candidates in the South African round.

The awards, launched in 2016 by the International Council of Forest and Paper Associations (ICFPA), aim to recognise, celebrate and promote innovations being developed in the global forestry sector.

Justin Phillips and Hester Oosthuizen both from the University of Pretoria, and Eddie Barnard from Stellenbosch University, go up against another 18 of their peers from around the world, with only three of the finalists earning cash prizes and the opportunity to present their work at the ICFPA's Global CEO Roundtable virtual discussion on **29 April 2021**.

"We are immensely proud of our finalists for making it this far, and demonstrating that South Africa can hold its own against the best in the world," says Jane Molony, executive director of the Paper Manufacturers Association of South Africa (PAMSA). "As a sector we constantly look for ways to support young people with an interest in science and technology and are proud of the career opportunities our member companies can offer them."

Furniture from paper sludge and cattle dip for killing ticks

Barnard is exploring the commercial viability of using technical lignin (a by-product from the wood pulping phase in pulp or paper making) and pulp and paper sludge (rejected, degraded, and spilled fibres and water from the pulping and paper making processes) to make composite materials.

Lignin has binding properties, which when combined with sludge, could be used to make construction materials such as a replacement for particle board. The use of lignin together with pulp and paper sludge could replace components that would otherwise be produced from fossil-based resources, and reduce associated waste, greenhouse gas emissions and disposal costs.

Eddie Barnard

Phillips has looked at how starch and nano-cellulose can be used as a carrier material for pesticide application in the agricultural sector. The insoluble solid active ingredient in the pesticide attaches to the carrier, which is water-soluble and allows for safer and more efficient and safe controlled release of the pesticide, especially in aqueous environments such as animal dipping for tick prevention.

Justin Philips

Cellulose is uniquely positioned to substitute many petroleum-based plastics, however it cannot be melt-processed and dissolved using common organic solvents. This is why **Oosthuizen** examined the efficacy of using choline chloride and ionic liquids, considered greener and less volatile, to make cellulose fluid enough to produce cellulose-based materials using existing polymer processing techniques.

Wood – a renewable alternative to conventional materials. As a sustainably farmed resource that stores carbon, wood is increasingly being used not only in the built environment for houses and high-rises, but also for its cellulose, lignin and sugars. These elements all have a role in helping the world find renewable and low-carbon alternatives to the likes of plastic, chemicals, steel and concrete.

"Two key advantages that commercially farmed trees bring are their renewability and their carbon storage," explains Molony. "The fact that trees are sustainably planted, harvested and replenished on the same land makes both wood and paper products renewable and efficient resources. For a low carbon future, it's tremendously exciting – especially when we look at the kind of research our young scientists are producing."

Hester Oosthuizen

We wish all three of them all the best for the competition !

10,000 officers to protect South Africa's crops

(Continued from Page 6)

Photo of CPHB Interns in front of FABI Building

Reminder : First Thursday Meeting

The **Forestry Department at Stellenbosch University** will host another lunch-time on-line session on the first Thursday of next month (May 2021).
The presentation will be done on Microsoft Teams

Contact **Simon Ackermann** : Chief Technical Officer – Forest Operation Research: Department of Forest and Wood Science : **e-mail :** ackerman@sun.ac.za OR
mobile:072 6948805 for more details

Special / Honourable Mention

The Southern African Institute of Forestry (SAIF) would like to extend their best wishes to two of our oldest, most loved and respected retired members who celebrate their birthdays in April namely Messrs. Georg von dem Bussche (13th o April) and Aat van der Dussen (26 April 2021) . God's richest blessings to both of you .

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VON DEM BUSSCHE G.	13 APRIL	DE WET A.	24 APRIL
DENISON N.P.	14 APRIL	HUNTER M.	25 APRIL
BRONKHORST A.	15 APRIL	NAIDOO R.	25 APRIL
TALBOT B.E.	16 APRIL	VAN DER DUSSEN A.	26 APRIL
GROBBELAAR W.M.	17 APRIL	VAN ZYL J.	26 APRIL
OLSEN G.J.	19 APRIL	RABIE J.T.	27 APRIL
MOSTERT N.	20 APRIL	PHILLIPS T.D.	29 APRIL

The Southern African Institute of Forestry

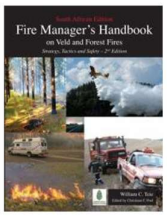
Handbook order form

The Southern African Institute of Forestry publishes three industry specific handbooks.

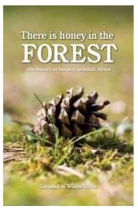
I would like to order:

☐ **South African Forestry Handbook**
Price: SAIF members: R400
Non members: R500

☐ **Fire Manager's Handbook on Veld and Forest Fires**
Price: SAIF members: R300
Non members: R400



☐ **There's Honey in the Forest**
Price: SAIF members: R100
Non members: R150



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