

# Looking to the world's oldest natural material for positive climate action

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**F**or decades, the South African forestry and forest products sector has lobbied government for recognition as a value chain that provides renewable, carbon-storing and climate-friendly solutions through its planted forests and harvested wood products. Now, with both a carbon budget and a carbon tax, South Africa's climate legislation is ambitious, and industry must up the ante to meet it.

The advancement of technology and industry has seen us innovate with materials such as cement, metals and plastics, but over time we have developed an overreliance on these materials. Land, water and air pollution has resulted from unsustainable and unchecked agricultural practices, manufacturing, consumption and waste disposal.

Speaking at a side event of the 2021 United Nations Climate Change Conference (COP26), Angela Graham-Brown of the World Business Council on Sustainable Development said there are three key levers of impact for effective climate action: decarbonization by reducing operational emissions; sequestration/storage by increasing carbon removal; and substitution by growing demand for bio-based materials, such as harvested wood products.

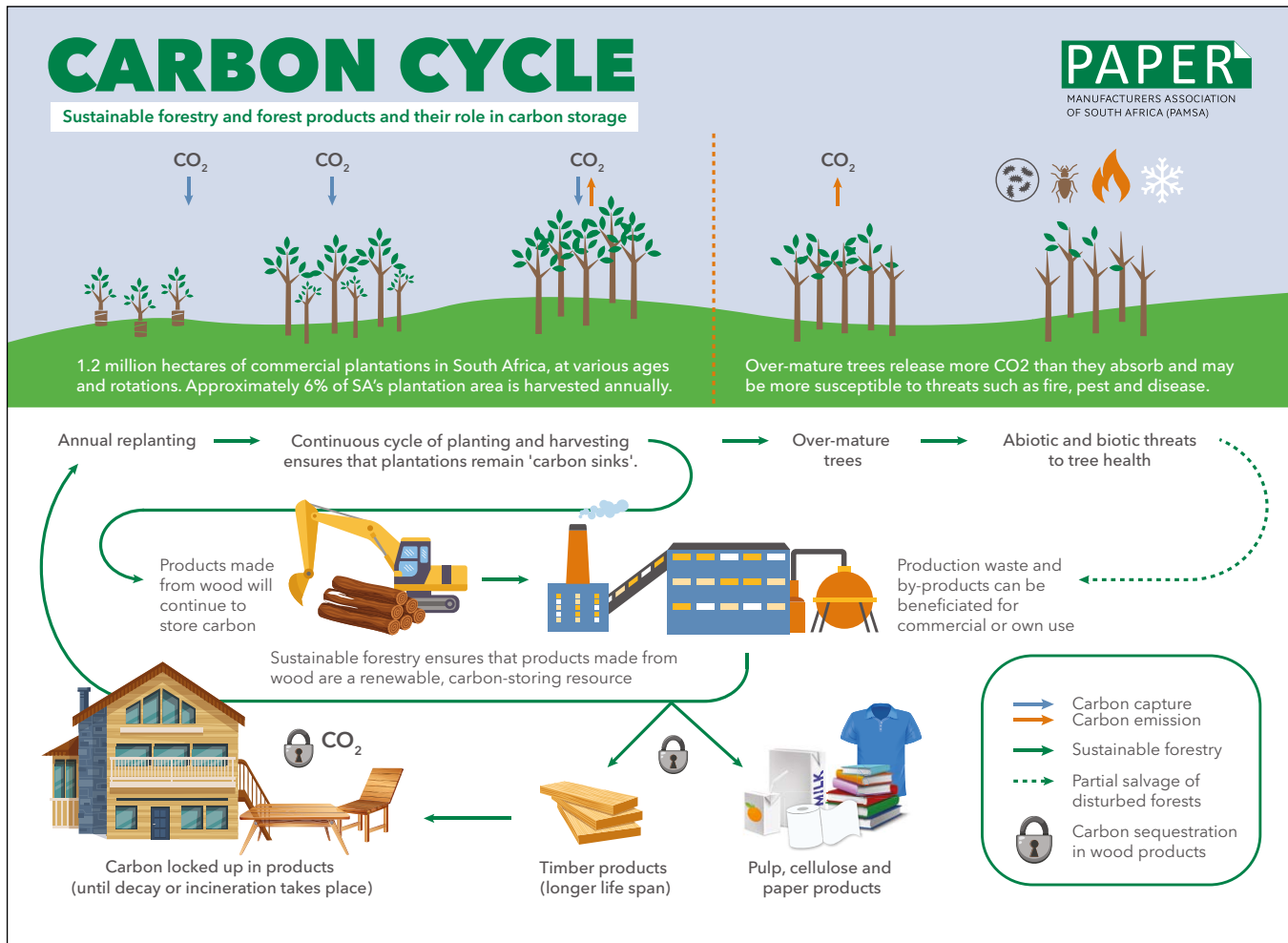
While the uptake of wood-based products in traditional and new markets may seem novel, wood has been with us for time immemorial and the bioeconomy we strive towards is not new.

Trees absorb carbon dioxide from the atmosphere, converting carbon into food stores while giving us back the oxygen.



Image: Mondi South Africa

Trees are planted, grown and harvested in rotation, which ensures there are trees of different ages growing and storing carbon



This biodiversity action area managed by Mondi South Africa overlooks Lake Merthley plantation, a prime example of a new generation plantation

For eons, humans have used trees and their by-products of wood, bark, fruit and leaves as fuel, food, fibre, medicine and, more recently, an array of processed and manufactured goods.

The report titled *Forest Products in the Global Bioeconomy: Enabling substitution by wood-based products and contributing to the Sustainable Development Goals* launched at COP26 by the Food and Agricultural Organization of the United

Nations confirms that renewable wood-based products can help combat climate change and achieve the UN Sustainable Development Goals. The publication explores the role of selected forest products in the bioeconomy and considers market factors such as future supply and demand dynamics and implementation gaps in forest product value chains.

Most of us know that paper comes from wood — even the fibres in recycled paper came from a tree at some point in their lives. For decades, the South African timber, pulp and paper manufacturing sectors have made everyday products out of wood, including paper, packaging, furniture, storage, housing and hygiene.

As the digital age and consumer habits have evolved, the demand for printing and writing paper has steadily declined over the last 15 years. However, wood is now finding application in novel products and emerging technologies, augmenting its value, decreasing the carbon and water footprint of products and processes, reducing pollution and waste generation through recycling and waste-to-energy, and improving circularity.

Two exciting forest product categories are engineered wood products such as cross-laminated timber for construction and wood-based textile fibres such as viscose and rayon. Some wood-derived products like cellulose are already in circulation in everyday life — in food, pharmaceuticals and cosmetics. This ever-versatile natural building block is used



Image: Sappi

Dissolving wood pulp (DWP) is a purified cellulose pulp suitable for subsequent chemical conversion into a range of products



Image: Sappi

Wood and its components, along with process waste from pulping and papermaking, offer viable alternatives to fossil-fuel based materials

as a binder, emulsifier and filler. It's in yogurt, cheese, ice cream, lipsticks and vitamins, and it's completely safe.

Through partnerships with universities and the South African Department of Science and Innovation, a number of local projects are exploring renewable alternatives to fossil-based materials in products like plastic, membranes and films made from cellulose, and dust suppressants from lignin. We have students developing biodegradable fruit fly attractant sheets from nanocellulose, and controlled release fertilizer coated with cellulose, starch and diatomite

(silica). There is even opportunity to harness the larvicidal properties of plant-based oils and encapsulate them in a starch-nanocellulose matrix for malaria prevention.

South Africa is a tree-poor country compared to others in Central Africa, Europe and South America. It is home to a mere 500,000 hectares of indigenous forests, roughly 0.4 per cent of the total land area. For this reason, wood for structural timber, pulp and paper comes from cultivated pine and eucalyptus trees grown in commercial timber plantations and planted forests. The commercial planting of trees in the early 1900s helped preserve indigenous forests which otherwise would have been eliminated for fuel, furniture and fibre.

The myth that timber production causes deforestation<sup>1</sup> does not hold water in South Africa. Trees are planted, grown and harvested in line with international certification standards and local legislation. Only six per cent of the country's total plantation area — 1.2 million hectares — is harvested annually. The same area is replanted with new saplings — often at a ratio of two trees for each one harvested. This means there is a constant supply of carbon-capturing trees for productive purposes for years to come.

Thanks to collaboration, research and improved data, plantations are now better designed, and management regimes help reduce their impact on water, soil, ecological networks and biodiversity. Sustainable forest management like this must balance environmental, economic and social needs. The small-scale timber grower industry is a significant player with some 20,000 small growers operating in the country. South African programmes like Sappi Khulisa and Mondi Zimele provide rural communities with seedlings and provide training to their vast network of small growers who sell timber back to the mills.

Depending on the species, planted trees take seven to 10 years to reach commercial maturity. Some believe that planted trees should stay in the ground indefinitely, however forestry experts such as Dr Jacob Crous, who leads a land management programme at Sappi Southern Africa, and Dr Peter Holmgren of the Center for International Forestry Research disagree. Crous is well versed in the history of local industrial forest plantations and their carbon capabilities. He asserts that sustainable intensification protects natural forests and creates a larger carbon pool.

Traditional tree breeding is a relatively slow process, but thanks to sustainable intensification more trees can be planted on less land, thus preserving grasslands, protecting natural forests and creating a larger carbon pool. Storing carbon in harvested wood products is better than storing it in older plantations as the latter are at greater risk of release back to the atmosphere due to pests, disease and other disturbances.

Holmgren, an advocate of active forestry and specialist climate change adviser, believes that there is a structural problem to the way the circularity of the forest bioeconomy is considered. Forests — or land sectors — are viewed in isolation of the rest of the economy and cut off from their value chain. "We can miss a lot of opportunities in climate policy because of this divide, and the policies end up being fragmented and incomplete," he says.



Images: Forestry South Africa



Sustainably managed tree plantations can help to reverse biodiversity loss

To maximize carbon sequestration and storage in both trees and products, we need to go full circle: plant, grow, harvest, make, replant. Repeat. Holmgren notes that it is harvesting wood that makes everything possible and not enough attention is paid to this fact. He maintains that active forestry with an efficient value chain gives us two major climate benefits: stable and increasing storage of carbon in forest and products, and reduced fossil/process emissions as wood-based products displace fossil-based alternatives.

With deforestation and illegal logging continuing to impact biodiversity and contributing around 12 per cent of global greenhouse gas emissions, forestry certification, assurance and chain-of-custody schemes are paramount in halting damaging forestry practices.

More than 80 per cent of South Africa's plantations are certified by the Forest Stewardship Council, and recently, the Programme for the Endorsement of Forestry Certification (PEFC) was opened to South African timber growers through the Sustainable African Assurance Scheme, a non-profit organization that develops and manages the local PEFC standard.

The South African forestry landscape is a synergistic mosaic of planted trees and conservation spaces, as cited in New Generation Plantation's *Life in the 'green deserts'* following a study in collaboration with the International Union of Forest Research Organizations' working group. Even the smallest

of critters benefit from forestry's circular economy when post-harvest residues are left behind as a mulch for the next generation of trees. Bark, limbs, leaves and small parts offer sustenance and refuge for creatures that aid in the decomposition of organic matter, which in turn attracts birds and other predators.

Another myth is that fast-growing exotic species of eucalyptus and pine are water hungry. Just like other plants, these trees take up water from the ground. Much of this goes back into the water cycle through transpiration. The forestry industry's water use is legislated through the water licensing process. With forestry recognized as a streamflow reduction activity, companies pay for the rain that plantations use.

Compared to irrigated agricultural crops which use over 60 per cent of available water, the forestry industry is one of the most efficient water users at approximately three per cent and has established a number of key partnerships to protect the water it shares with other land uses and communities.

Nearly three decades ago, Mondi pioneered a landscape approach to freshwater ecosystem stewardship with the South African arm of the World Wildlife Fund. The WWF-Mondi Water Stewardship Partnership is a wetland conservation programme which extends beyond the boundaries of Mondi's plantations to include the agricultural sector and small forest growers.

Further along the chain, pulp and paper mills demonstrate responsible water stewardship with various closed-loop processes using resources such as water, energy and chemicals more efficiently — often more than once. Process water is reused and recycled, lost fibre is recovered and reused, and spent chemicals are recovered for energy production. Even bark is used to power boilers, producing steam that generates electricity. Recycling water can also help reduce energy consumption by recovering the heat content of water to improve energy efficiency.

These step-changes in silviculture and manufacturing have seen us use more of the tree, ensuring little goes to waste. The circular nature extends to our products through the recycling of office paper, magazines, books, cardboard boxes, newspapers and more. These products are repulped and made into corrugated boxes, tissue, cereal boxes and moulded protective packaging that comes back into our homes, and which we use and recycle, further extending the time that carbon stays locked up.

According to a study conducted by Graz University of Technology in Austria, fibre-based packaging material can be recycled at least 25 times without losing its mechanical or structural integrity. With a four-year average recovery rate of 70 per cent and the second-most recycled material in South Africa, this is good news for a sector that understood seven cycles to be the limit.

The forest products sector is the epitome of a circular bioeconomy and it is abundantly clear that it is well-placed for driving greener economic recovery and demonstrable climate action. This centres on sustainably managed tree plantations and responsibly harvested wood products which not only address growing demand for renewable materials, but absorb and store carbon, reverse biodiversity loss and conserve shared resources.