Waste is Gold
Turning Forestry Slash into Climate Value

From Botswana to Tairāwhiti

Thabiso Mashaba saw a possible resource where others saw only waste. This is the story of a regional problem looking for a solution

Meet Thabiso Mashaba

Thabiso Mashaba is a Botswana-born cultural & environmental economist, global social entrepreneur and co-founder of Slash for Cash in Tairāwhiti.

Through his global social enterprise, These Hands, Thabiso has worked alongside rural and Indigenous communities and people in refugee settlements. His work has seen him support grassroots innovators across 61 countries, including working with communities throughout Africa, Eastern Europe, Indo-Asia, and South East Asia.

He helps people use locally available materials and knowledge to develop practical technologies and sustainable businesses.

This remarkable record of community-led innovation led to Thabiso's selection for the prestigious Edmund Hillary Fellowship, an international network of entrepreneurs, investors and changemakers.

He brought that same ability to see possibility where others see problems to Tairāwhiti, and to the creation of Slash for Cash.





When Woody Residue Starts to Move

When Thabiso arrived in Tairāwhiti after Cyclone Gabrielle, he was struck by the woody debris on local beaches. Not all this material came from harvested forests, storm damaged trees and riverbank vegetation also contributed, but its scale revealed a major regional challenge.

After harvesting, branches and other woody residues may remain on the land. During intense rainfall, this material can move downhill into waterways, contributing to damage to land, roads, bridges and coastal areas. Heavy rain can also wash valuable topsoil from erosion-prone slopes.

Residues gradually decompose, returning carbon to the atmosphere, while their removal and disposal can be difficult and costly. Thabiso saw an opportunity to collect suitable forestry residue, transform it into biochar and return some of its stable carbon to the soil.

From experience to enterprise
Slash for Cash

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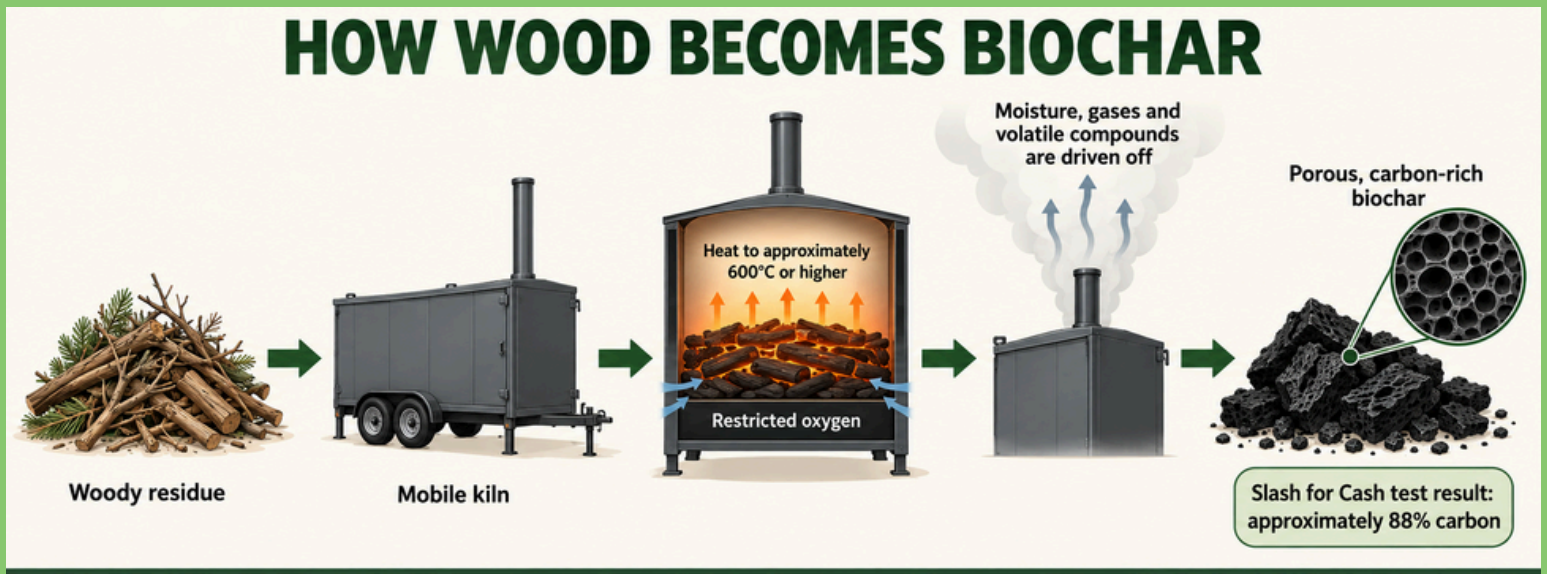
The idea for Slash for Cash was grounded in Thabiso's qualifications and years of practical experience. As an environmental economist, he understood the environmental and economic value hidden within natural resources.
Through his international work, he has helped many communities transform agricultural waste into useful products, rice husks in Thailand, coconut waste in Indonesia, and crop stalks and maize cobs in Africa.

When Thabiso saw woody debris in Tairāwhiti, he recognised another form of carbon-rich material that could potentially be transformed into biochar and used to support damaged soils.

He took the idea to Startup Weekend Tairāwhiti. Many people were sceptical, but several recognised its potential and joined his team. Together, they developed the concept and placed second.

The result gave others confidence in what Thabiso's experience had already shown him: waste can become a valuable resource when the right knowledge, technology and purpose are brought together. The team began turning the competition entry into a real social enterprise. Meet Slash for Cash.



Carbonisation is a form of pyrolysis focused on producing solid biochar.

Slash for Cash transforms woody residue into biochar through carbonisation, a form of pyrolysis focused on producing a solid, carbon-rich material.

Inside the mobile kiln, wood is heated to between approximately 350°C and 1600°C before its oxygen supply is restricted.

The high heat drives out moisture and burns off gases and other volatile compounds. This leaves behind a stable form of carbon called biochar.

PYROLYSIS OR COMBUSTION WHAT IS THE DIFFERENCE?

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Open Combustion occurs when wood burns with plenty of oxygen in an open environment. It releases heat and light, and much of the wood becomes gases, smoke , charcoal and ash.

Pyrolysis heats wood in a closed environment. Rather than burning completely, it starves the wood of oxygen, burning away gases or vapours, and forming a carbon-rich solid called biochar.

Slash for Cash uses carbonisation, a form of pyrolysis focused on producing biochar. Restricting oxygen allows more of the wood's carbon to remain locked within the solid material.

WHY BIOCHAR IS DIFFERENT

As the moisture leaves, a network of tiny pores opens within the material. These pores give biochar its large internal surface area and help it hold water and nutrients when added to soil.

When wood burns in an open fire, much of its carbon is released into the atmosphere and the remaining material may still contain volatile compounds. The controlled conditions inside the kiln are designed to remove these compounds while retaining more carbon in the solid biochar.

Testing of Slash for Cash's biochar found that it contained approximately 88% carbon.

A HOTEL FOR WATER AND NUTRIENTS

Thabiso describes biochar's tiny pores as "a hotel for nutrients." These pores create a large internal surface area where water and nutrients can be held and gradually made available to plants.

Biochar is generally alkaline, so it may help reduce the pH of acidic soils. In dense clay soils, its porous structure can create spaces for air and water, potentially improving aeration and drainage. It may also provide habitat for fungi, bacteria and other microorganisms that contribute to healthy soil. When biochar is mixed with nutrients before being applied, it can help create a slow release environment rather than allowing nutrients to be quickly washed away.

These properties are well established, but their effects vary according to the biochar, soil, climate and application method. Slash for Cash has observed promising plant growth after biochar was applied to a cyclone damaged orchard near Wairoa.

Planned forestry trials will compare treated and untreated soils to investigate whether Slash for Cash's biochar can improve water retention, soil activity and seedling establishment under local conditions.

What is a carbon farmer?

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"Carbon farmer" is Thabiso's term for someone who turns forestry residues into stable, useful carbon products. They collect suitable waste wood, convert it into biochar and return some of it to the soil. This work may help store carbon, improve soil and create employment within an extended forestry value chain.



Making fertilizer from biochar

Biochar smokeless briquettes



Together, the clips above show that a carbon farmer could recover suitable forestry residues, produce useful materials, return biochar to the land and create employment within an extended forestry value chain.

Testing the Claims

Early observations suggest that Slash for Cash's biochar may support plant growth, but Thabiso recognises that observation is not the same as scientific proof.
After Cyclone Gabrielle covered a Wairoa orchard with silt, biochar was applied around 54 plants while others were left untreated. Three months later, the orchard owner reported that the treated plants were growing while the untreated plants remained stunted. This was promising, but the comparison was informal and other factors may have influenced the result.
Slash for Cash hopes to work with university researchers, forestry nurseries, landowners and forestry businesses to conduct controlled trials. Treated and untreated plots could be compared by measuring plant growth, soil moisture, pH and biological activity.

These investigations will help determine whether Slash for Cash's biochar can improve degraded soils and support seedling establishment under local forestry conditions.

A soil scientist could establish matched plots with similar soil, slope, vegetation and exposure. Some plots would receive measured amounts of Slash for Cash biochar, while control plots would receive none. Replicating each treatment would make the findings more reliable.
Before and after application, the scientist could measure soil moisture, pH, nutrient availability, microbial activity and plant or seedling growth. Microscopy could be used to compare fungi, bacteria, protozoa and other organisms in treated and untreated soils.
Monitoring the plots over several seasons would show whether any changes persist and help distinguish the effects of biochar from differences caused by rainfall, soil conditions or plant health.

Looking Beneath the Surface

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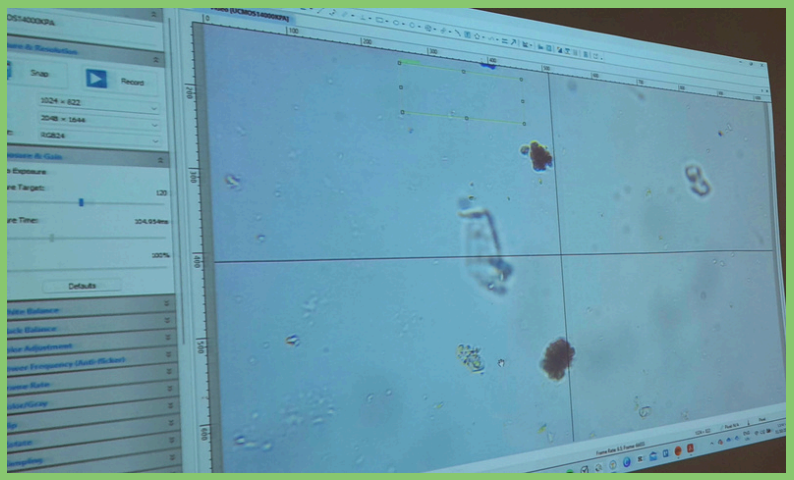

Thabiso has worked with a Tairāwhiti soil specialist from Radice Soil Solutions to examine soil samples with and without biochar fertilizer under a microscope. The images reveal particles and microscopic structures that cannot be seen with the naked eye.

Life Within Biochar-Treated Soil

These microscope images show soil samples treated with Slash for Cash biochar. A soil scientist from Radice Soil Solutions examined the samples and identified a diversity of fungi, bacteria, protozoa and other soil organisms.

These organisms form part of the soil food web. They help decompose organic matter, cycle nutrients and support the conditions plants need to grow. Biochar's porous structure may provide spaces where water, nutrients and microorganisms can be held within the soil.

The images provide an encouraging view of biological diversity within the treated samples. However, controlled trials comparing biochar-treated and untreated soils would still be needed to determine whether the biochar caused an increase in the abundance, activity or diversity of soil life.

A New Carbon Opportunity for New Zealand Forestry

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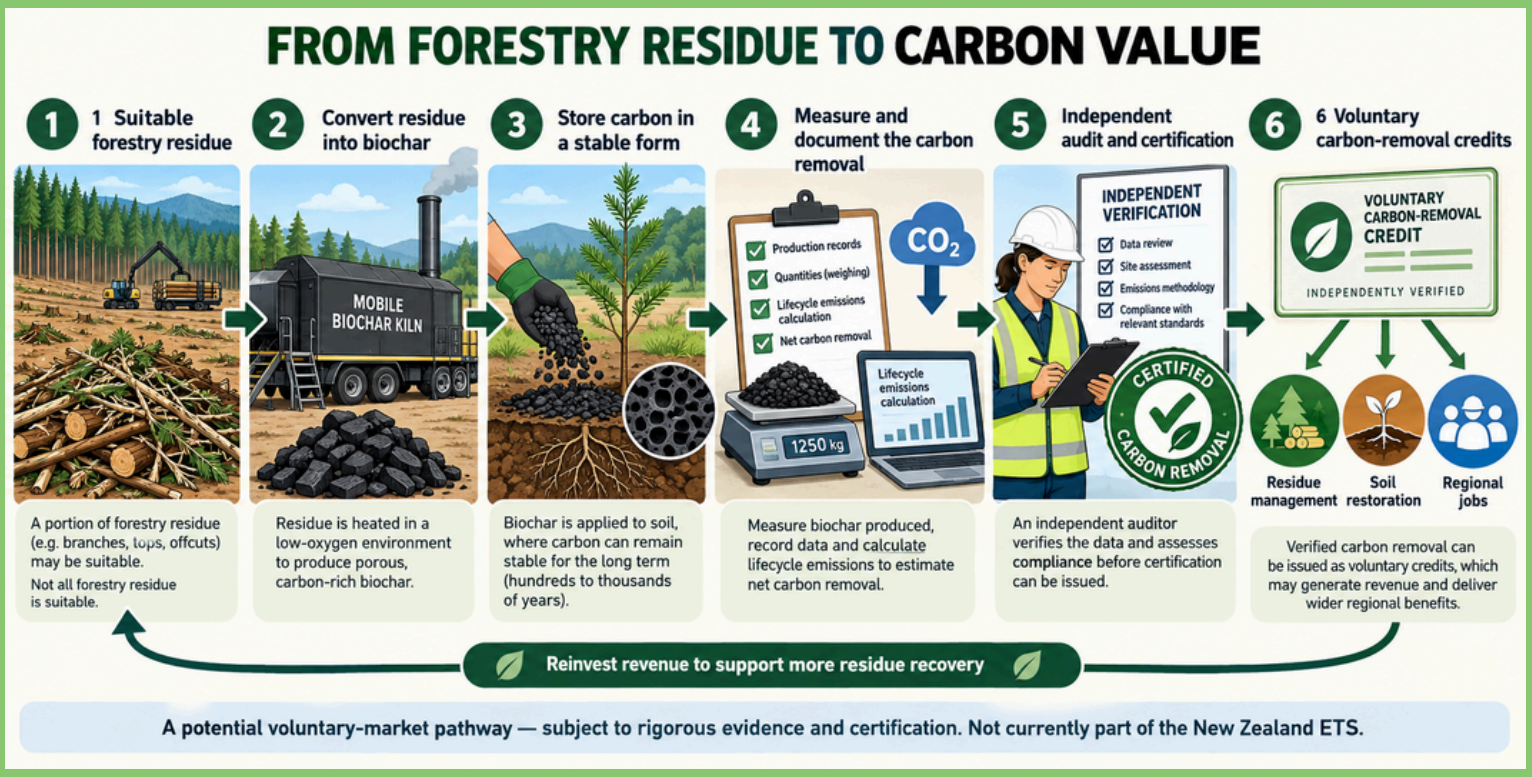
New Zealand's Emissions Trading Scheme recognises carbon stored in growing forests, but forestry residues are generally treated as a cost to be managed. Thabiso sees an opportunity to create value from this material after harvest.

When suitable residues are converted into biochar, some of the carbon captured by the trees is stabilised rather than being released through decomposition or burning. International voluntary carbon markets, particularly those developing in Europe, allow independently verified carbon removal to be sold as credits.

If the carbon stored in Slash for Cash's biochar can be accurately measured and independently certified, forest owners and landowners may be able to earn value from both their standing trees and their residual wood. Revenue could help fund residue recovery, soil restoration and new regional employment while encouraging better management of material that might otherwise remain on harvested land.

Realising this opportunity would require rigorous monitoring, lifecycle emissions calculations, independent auditing and an approved certification pathway. However, successful local trials could help New Zealand explore how verified biochar carbon might contribute to the country's wider climate goals and forestry bioeconomy.



Engineering a mobile solution

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At Startup Weekend Tairāwhiti, the judges warned Thabiso that processing forestry residue would require heavy machinery, a large plant and considerable investment. Instead of accepting that Slash for Cash could not begin without major funding, he asked whether the equipment could travel to the material.

That question led to the mobile kilns. Rather than transporting large volumes of bulky wood to a central processing plant, the kilns can be taken closer to suitable forestry residue. The wood is converted into lighter, more compact biochar before being transported back to the production base. This approach reduces initial capital and transport requirements and allows the business to begin at a smaller scale.

The challenge was finding an engineer who could turn the idea into working equipment. Supreme Engineering in Gisborne recognised its potential, helped develop the kilns and became a 10% investor in Slash for Cash. This partnership also provides ongoing engineering and maintenance support.

Slash for Cash currently operates three kilns and processes material in small batches. A 20-tonne order can take several weeks to burn, crush, mix, charge and deliver. Scaling production will require trucks, portable sawmills, larger crushers and mixers, and possibly larger mobile kilns.
Thabiso is also cautious about replacing people with machinery.
His aim is to increase production while creating employment, not automate every task that local workers could perform.



Science, safety and compliance

Turning an innovative idea into a viable operation requires more than building a kiln and producing biochar. Slash for Cash must demonstrate that its equipment, processes and products are safe for workers, communities and the environment.

One of its greatest challenges has been securing resource consent. Because the kiln releases gases and vapours, specialists modelled its likely air emissions and established operating distances from sensitive receptors.

Slash for Cash currently operates at least 1,000 metres from places such as homes, waterways, conservation areas, marae and wāhi tapu, and 1,800 metres from the Gisborne airshed. After a year of operation, actual emissions will be measured and compared with the modelled results.

As a Person Conducting a Business or Undertaking, or PCBU, Slash for Cash must also manage risks to workers and others affected by its activities. Its mobile kilns and future equipment must meet relevant engineering, transport and operational requirements.

Product testing is equally important. Briquettes were sent to SGS in Wollongong for assessment against international standards, while Scion tested slash-derived biochar for heavy metals and other substances. Some minerals and metals were detected, which can occur when wood has mixed with soil, river sediment or beach sand.

The measured levels of heavy metals were considered acceptable for production to continue.

This testing and compliance work provides the evidence needed to move from a promising concept towards a safe and credible enterprise.

Storing Carbon and Creating Value

As trees grow, they absorb carbon dioxide and store carbon in their wood. New Zealand's Emissions Trading Scheme recognises changes in the carbon stored in eligible forests, but forestry residues are generally treated as a management cost after harvest.
When residual wood decomposes or is burned, much of its carbon eventually returns to the atmosphere. Converting suitable residues into biochar stabilises some of that carbon in a form that can remain in soil for a long time.

Thabiso believes this could create additional value for forest owners and landowners. If the carbon stored in Slash for Cash's biochar can be accurately measured and independently verified, it may qualify for sale through an appropriate voluntary carbon-removal market. This is separate from the New Zealand ETS and would require rigorous evidence, auditing and certification.

WORKING WITH COMMUNITIES

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Thabiso believes meaningful change begins with listening. Before starting work in a new place, he takes time to understand its people, culture and priorities rather than arriving with a ready-made solution.

Through These Hands, he has worked alongside Indigenous, refugee and rural communities in Africa, Eastern Europe, Indo-Asia, and South East Asia. He says it is imperative to immerse himself in communities and build trust. In New Zealand, this process took about eight months before people felt confident that he would work respectfully alongside them.

Once trust has been established, Thabiso helps communities identify the resources around them and create their own pathways forward. His goal is not simply to introduce technology, but to support people to develop practical enterprises, secure employment and strengthen their financial independence.

Slash for Cash reflects this philosophy. Its environmental goals, recovering forestry residue, storing carbon and supporting soil restoration, are closely connected to creating local skills, livelihoods and opportunities. For Thabiso, the project will succeed when local people have meaningful work and the community is able to carry the enterprise forward.

The Challenge Ahead

Can Tairāwhiti turn forestry residue into a resource that restores soil, stores carbon and creates meaningful local employment?

Slash for Cash has moved from an idea developed at Startup Weekend Tairāwhiti to a small enterprise operating three mobile kilns. Thabiso believes it is now close to scaling, but significant questions remain.

The business needs further investment, additional machinery and strong partnerships with forest owners, landowners, nurseries and researchers. Local trials must determine whether its biochar can reliably improve forestry soils and support seedling establishment.

Emissions, product quality and carbon storage must be measured, while any environmental or commercial claims require credible evidence. The approach must also remain safe, economically viable and capable of creating meaningful employment.

Thabiso is inviting forestry organisations to begin with carefully monitored pilot projects so that everyone involved can learn what works under different site and soil conditions.

CURRICULUM LINKS

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This case study provides an authentic New Zealand context that educators can adapt across several curriculum areas.

Learning area	Relevant learning	How students could demonstrate it
Science	Chemical reactions; combustion and carbonisation; matter and energy; acids, bases and pH; ecosystems; microorganisms; soil, erosion and Earth systems; carbon cycling and climate; scientific investigation and evidence	Explain how restricted oxygen changes the products formed when wood is heated; investigate the effect of biochar on pH, moisture retention or plant growth; evaluate the strength of Slash for Cash's evidence
Technology	Identifying needs and opportunities; designing for a stakeholder and context; material properties; systems and processes; constraints; prototyping, testing and refinement; impacts of technology on society and the environment	Evaluate the mobile-kiln design; develop a design brief; compare mobile and centralised processing; propose improvements subject to cost, safety, transport and emissions constraints
Social Sciences	How people use and manage resources; environmental and economic decision-making; responses to hazards; entrepreneurship; regional development; employment; competing values and perspectives	Examine responses to forestry residue following Cyclone Gabrielle; analyse who benefits, who carries risk and how decisions affect communities and environments
Mathematics and Statistics	Measurement, rates, ratios, percentages, graphs, comparison of datasets and statistical investigation	Calculate biochar yields; interpret the 88% carbon result; compare treated and control plots; estimate production time, costs, residue volumes or potential carbon storage
English	Reading scientific and technical texts; evaluating claims and evidence; oral presentation; persuasive and explanatory writing	Write a scientific explanation, investment pitch, consent submission, evidence-based recommendation or public-information article
Te Ao Māori across the curriculum	Relationships between people, whenua and waterways; locally grounded knowledge; responsibilities to future generations; mana whenua perspectives and decision-making	Investigate local aspirations for damaged land and waterways, work with appropriate mana whenua knowledge holders, and compare different understandings of restoration and long-term responsibility

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WIDE TRUST

The Wood Industry Development and Education (WIDE) Trust is a charitable trust established in 2018 with the mission to support development and education in the forestry and wood industry sectors through the provision of grants and scholarships to New Zealand students and institutions.

FOREST GROWERS LEVY TRUST (FGLT)

The Forest Growers' Levy Trust collects the commodity levy paid on harvested wood material from forest growers and acts as the custodian of those funds. The Trust ensures the levy is invested in research, development, biosecurity, promotion and other industry-good activities that benefit New Zealand's plantation forest sector.