TREES

JOURNAL

Rethink and Restore

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International Tree Foundation
Founded 1922

CONTENTS

Cover photo: Nana Kofi Acquah

AN INVITATION TO RETHINK AND RESTORE

We start this volume of *Trees Journal* in the soil. Merlin Sheldrake, author of *Entangled Life: How Fungi Make Our Worlds, Change Our Minds and Shape Our Futures* (Random House, 2020), explores the intricate relationships between algae, fungi, bacteria, plants, animals and great swathes of life. He reveals myriad interdependencies between species, and invites us to rethink boundaries. Where one creature begins and another ends is not so obvious after all. In fact, the boundaries we see in nature may be imagined more often than not, and with destructive consequences for the ecosystems within which we live.

We move through soil into roots and trees. The role of trees in creating and restoring healthy soil is examined by Professor Roger Leakey. If we incorporate trees into agriculture (agroforestry) at scale, we can restore the health and productivity of our land and create just, sustainable economies in food and other forest products for millions of people. Development specialist Mark Kebo Akparibo offers an example from Northern Ghana. By helping a community rethink their approach to farming, degraded soil and farmland was restored, biodiversity loss reversed, and the local economy strengthened.

In part two, our attention turns inward. We look at personal relationships with nature, and how communities relate to the landscapes they call home. We begin with one of our longest-standing

members, Noelle Leigh MBE, who reflects on what trees mean to her: "Trees feed my soul. Trees speak to me, not in words but in feelings".

Lucy Jones, author of *Losing Eden: Why Our Minds Need the World* (Penguin, 2020) helps us to understand why nature is so important to our mental health and even to our sense of hope. Is it possible, Lucy asks, that "we need ancient and awe inducing trees to be a compassionate and caring society?" There is evidence to suggest it is. By rethinking our relationship with the living world, we come closer to our true natures.

Like Lucy, Raymond Huber is drawn to the beech tree. An author of children's books and a teacher, Raymond shares his thoughts on trees as beings – tree beings. Raymond invites you to befriend a tree, just as International Tree Foundation (ITF's) founder Richard St Barbe Baker, Jane Goodall, and many others have.

Slowly but surely, communities are beginning to take their rightful place at the centre of forest restoration and tree planting. ITF's Sam Pearce describes how an Oxford community saved hundreds of trees from dying during the driest UK spring on record. This community created the green space in which these trees will grow for generations to come.

"A culture is no better than its woods". To conclude part two, Forestry Consultant Alistair Yeomans echoes W. H. Auden's concern. There is, however, a way to help renew the UK's woodland culture: the UK Tree Charter, published in 2017 on the 800th anniversary of the Charter of the Forests. Its ambition is to "place trees and woods at the centre of national decision making, and back at the heart of our lives and communities." Across the world, people are rethinking their relationship with forest and woods – we encourage you to take a look.

ITF was founded in Kenya, as Watu wa Miti, in 1922. Our Kenya Programme Manager, Teresa Gitonga, introduces part three – restoration. With only 7% tree cover, Kenya is now one of the least forested countries in Africa. The Kenyan Government has committed to restoring 5.1 million hectares of degraded landscape by 2022. Teresa sets out six principles needed for ambitious restoration projects to succeed.

Ricardo Romero, ITF's Programme Manager knows what a difference these principles can make. Many times has he seen how their careful application can transform a community's relationship with nature, from exploitative to regenerative. The potential of trees in farming and landscape restoration is vast. With the aid of data from around the planet and advanced computer modelling, Crowther Lab is helping the global restoration movement to understand and fulfil this potential. Working with thousands of organisations around the world, including ITF, Crowther Lab partnered with Google to develop Restor – a digital platform available to everyone to help accelerate ecosystem restoration. Farmers, gardeners, governments, businesses, researchers, and NGOs are invited to use this tool to better inform their planting and conservation decisions. As the UN Decade on Ecosystem Restoration gets under way, Restor will help us all accelerate the pace of change.

To close this volume we turn to Paul Hanley, author of Richard St. Barbe Baker's biography, Man of the Trees (2016). Richard St. Barbe Baker was a visionary and his life story is inspiring, for he dedicated it to restoration and peace, knowing that neither is possible without the other.

"*Vision building builds hope.*
Hope, a commanding hope, is an essential ingredient in a transformative movement."
(Paul Hanley, 2020)

This volume of Trees Journal is a hopeful invitation to rethink our relationship to nature – to the soil beneath our feet, to our food, ourselves, each other, and our home. Imagine what we can achieve by the end of the UN Decade of Ecosystem Restoration if we accept this offer.

By James Kemp, Editor

Part 1

THE SOIL

INTIMATE RELATIONSHIPS AND IMAGINED BOUNDARIES

By Merlin Sheldrake

If you put fresh, fine roots in a dish of water, you'll see fine fungal filaments – or hyphae – stringing off them. If you boil roots, stain them with a dye, and mount them on a slide, you'll see fungi winding along and branching into delicate feathery lobes within plant cells. It's difficult to imagine a more intimate set of poses. By means of this relationship, plants are able to obtain minerals foraged by the fungi in the labyrinthine rot-scapes of the soil. In return, plants supply fungi with energy rich carbon compounds – sugars or lipids – produced in photosynthesis.

Both plants and fungi use the other to extend their reach, and have done so for hundreds of millions of years: it was only by partnering with fungi that the algal ancestors of land plants were able to move onto the land. This makes mycorrhizal associations – from the Greek *mykes*, meaning fungus, and *rhiza*, meaning root – a more fundamental part of planthood than fruit, flowers, leaves, wood, or even roots. Today, more than ninety per cent of all plant species depend on mycorrhizal fungi, which lie at the base of the food chains that sustain much of life on Earth, including our own. The significance of this ancient alliance is difficult to overstate.

Fungi aren't restricted to plant roots, however. All plants form relationships with fungi that live in their leaves and shoots, known as foliar endophytic fungi. These symbionts protect plants from pathogens and herbivores and increase their tolerance to a range of stresses, from heat to drought. If you harvest a grass from salty coastal soils and grow it without its fungal endophytes, it won't be able to survive in its natural habitat. The same goes for grasses growing in hot geothermal soils. In a series of dramatic experiments, researchers swapped the fungal endophytes that lived in each type of grass so that coastal grasses were grown with hot geothermal fungi and vice versa. The proclivities of the grasses switched. Salt-loving grasses could no longer survive in coastal soils but thrived in hot geothermal soils. Hot geothermal grasses could no longer grow in the hot geothermal soils but thrived in the salty coastal soils.

Plant traits, in other words, may be more than 'plant' traits. In fact, what we call plants can be thought of as algae that have evolved to farm fungi, and fungi that have evolved to farm algae. Eat a plant, drink a wine, and we taste the outgrowth of fungal relationships. Cultivate plants – in a plant pot, flower bed, garden or city park – and we cultivate fungal relationships.

Still, the plot thickens. Fungi themselves depend on the bacteria and viruses that live within them: their microbiome. The presence or absence of a single virus can turn a fungus from a deadly pathogen of plants into a beneficial symbiotic partner. And bacteria that live within mycelial networks can enhance fungal growth, stimulate their metabolisms, produce key vitamins and even influence the relationships of mycorrhizal fungi with their plant partners. One species of mycorrhizal fungus, the thick-footed morel (Morchella crassipes), goes so far as to farm the

"The view of plants as autonomous individuals with neat borders is causing destruction."

Photo: Hanna-Katrina Jedrosz

bacteria that live within its networks: the fungus 'plants' bacterial populations, then cultivates, harvests and consumes them. There is a division of labour across the network, with some parts of the fungus responsible for food production and some for consumption.

Advances in the microbial sciences have deepened and expanded the notion of the individual and transformed swathes of biology – the study of living organisms – into ecology – the study of the relationships between living organisms. The implications are far-reaching. A large study published in 2018 suggested that the 'alarming deterioration' of the health of trees across Europe was caused by a disruption of their mycorrhizal relationships, brought about by nitrogen pollution. In viewing soils as more or less lifeless places, industrial agricultural practices have ravaged the underground communities that sustain us and all that we depend on. There are parallels with much of twentieth-century medical science, which considered 'germ' and 'microbe' to mean the same thing. Of course some soil organisms, like some microbes that live on your body, can cause disease. Most do quite the opposite. Disrupt the ecology of microbes that live in your gut, and your health will suffer – a growing number of human diseases are known to arise because of efforts to rid ourselves of 'germs'. Disrupt the rich ecology of microbes that live in the soil – the guts of the planet – and the health of plants too will suffer.

Plants' intimate relationships with their fungal associates evolved to deal with the challenges of a desolate and windswept world in the earliest days of life on land. Together, they evolved a form of agriculture, although it is not possible to say whether plants learned to farm fungi, or fungi learned to farm plants. Either way, we're faced with the challenge of altering our behaviour so that plants and fungi might better cultivate one another.

It's unlikely we'll get far unless we question some of our categories and loosen the grip of some of our certainties about how we divide the world. The view of plants as autonomous individuals with neat borders is causing destruction. The word ecology has its roots in the Greek word oikos, meaning 'house', 'household',' or 'dwelling place'. Plant bodies, like those of all other organisms – including our own – are dwelling places. Can we think about a plant without also thinking about the mycorrhizal networks that lace outward from its roots into the soil? If we follow the tangled sprawl of mycelium that emanates from its roots, then where do we stop? Do we think about the bacteria that surf through the soil along the slimy film that coats roots and fungal hyphae? Do we think about the neighbouring fungal networks that fuse with those of our plant? And – perhaps most perplexing of all – do we think about the other plants whose roots share the very same fungal network?

Merlin Sheldrake is a biologist and author of *Entangled Life: how fungi make our worlds, change our minds, sand shape our futures.*

AGROFORESTRY

Profiting from Trees
By Roger Leakey

"Establishing a wide array of useful and beneficial trees in degraded farming systems could provide a pathway to a better life."

The concept of sustainable development is based on the wise use of five forms of capital – human, social, natural, environmental and financial. The term 'profit' is generally applied only to the benefits derived from financial capital, but in fact is equally applicable to all five forms of capital. Here we consider how trees can deliver all these different types of profit.

Trees are typically under-recognized in society. Although generally seen as attractive features of our woodlands and landscapes, and as a source of wood, they appear to be static and omnipresent. This means they're often seen as something of little value, or even as a hinderance to progress. In reality, they are keystones in ecological systems teeming with life and performing environmental functions crucial to both us and our planet.

A tree creates a 3D layer over the landscape (both above and below-ground) which provides niches to be colonized by millions of organisms of hundreds of different species from the smallest microbe to the biggest mammal. These organisms have intertwined lifecycles and food chains that regulate crucial processes like the nutrient, carbon and water cycles in the soil and the atmosphere. These interactions also regulate the ecological balance between desirable and undesirable species.

Trees also produce an incredibly wide range of products and we, as the apex predator and top herbivore, have grossly mismanaged our consumption and use of these products. We have not been living with nature – indeed much of our lifestyles has worked against nature – making us the top polluter and environmental vandal. We must therefore acknowledge that we have failed miserably in our prime role at the top of ecological systems, falling far short of our responsibilities. Indeed, we haven't even looked after our own species! – and, as a result, have a divided and dysfunctional world in which modern farming and the clearance of trees is a major cause of the failures of tropical agriculture to both adequately feed and support the lives of billions of people.

How agroforestry can help to create a better world

Trees deliver environmental services and supply of thousands of useful products. Establishing a wide array of useful and beneficial trees in degraded farming systems could provide a pathway to a better life, freeing subsistence farmers from abject poverty, hunger and malnutrition. This is the basis of the concept of 'agroforestry' which has been developed over the last 40 years and is especially important in the tropics and sub-tropics where mechanical farm operations are not common practice.

There are an infinite number of ways to integrate trees into farming systems in different configurations, mixtures and densities. These create a wide array of landscape mosaics delivering a wide range of environmental, social and economic benefits, or 'profits'. The following basic principles apply:

"it is the restoration of highly vulnerable soil microbe populations that is especially important""

1. Harnessing environmental benefits

A mature tree regulates the environment and microclimate below the canopy and within the soils. By creating numerous niches for colonizing microbes, invertebrates, insects, amphibians, reptiles, birds and mammals, soils are enriched and restored to ecological health, with beneficial impacts on soil structure, water holding capacity and organic matter content. Additionally, through their life cycles and food chains, these organisms also perform the balancing trick that regulates the populations of injurious and beneficial species. Early in this succession it is the restoration of highly vulnerable soil microbe populations that is especially important as they 'kick start' many of the vital processes healthy and functional ecosystems rely upon. As we will see later, all this is also important for wildlife threatened by habitat loss.

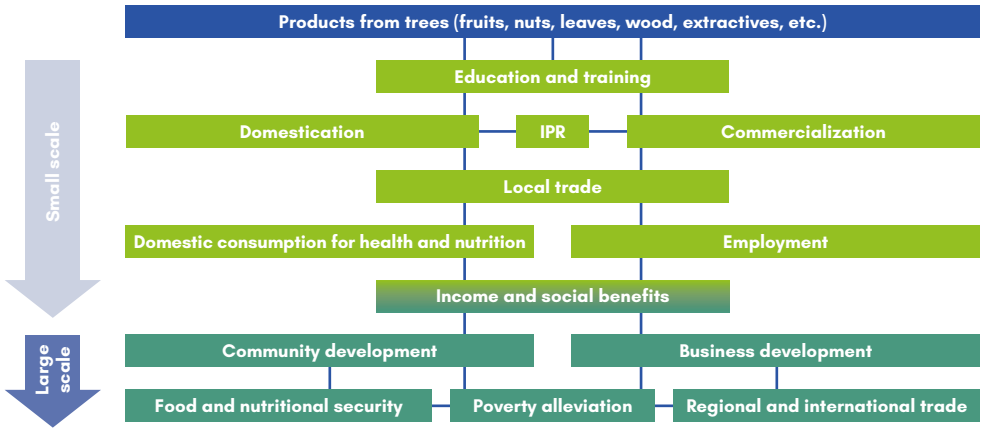
In the context of the above, agroforestry practices aimed at rapidly restoring the fertility and health of seriously degraded soils by planting tree/shrub species of the pea/bean family (Leguminosae – colonized by nitrogen-fixing bacteria) can increase crop yields by two to four fold. In parallel with promoting these soil bacteria, beneficial fungi colonize plant roots, sending filaments out into the soil, helping plants to scavenge for other nutrients. Unfortunately, however, a natural solution to the restoration of phosphate, potassium and trace elements soil deficiencies is not possible, so we need to generate income from these farms to enable the farmers to purchase inorganic fertilizers. The wide range of marketable tree products from agroforestry trees have the potential to be a huge source of this locally available income.

2. Capturing the benefits from tree products

Throughout the world there are tree species whose products have been used and/or consumed by hunter-gatherers to meet their day-to-day needs. Many of these products are highly nutritious and culturally important foods and medicines which typically are marketed locally and informally. Some 20,000 species produce edible products and to date agriculture and horticulture has only domesticated a few hundred of these – leaving enormous opportunity to cultivate others. Over the last 25 years, agroforestry research has encouraged smallholder farming communities to start domesticating some 50 of these species by selecting elite individual trees with high quality characteristics.

Elite trees can be identified and then multiplied up in the homestead using simple and well known horticultural techniques, that do not require piped water or electricity. The benefit flows from all this on-farm crop domestication provide incentives for farmers to engage and adopt these initiatives. This grassroots approach to crop domestication has been called 'Social Modification' to distinguish it from the high-tech laboratory approach of Genetic Modification.

As with domestication, a start has been made to add-value to these products by processing them locally for wider and year-round trade. This is being done in ways that benefit the farmers by recognizing their rights over traditional knowledge. Further work is, however, needed to protect their intellectual property. This develops the local economy in ways that generates income for the farmers allowing them to buy essential inputs such as artificial fertilizers. It creates new local businesses and employment, which in turn stimulates trade and improves the livelihoods in both rural and urban populations. This provides the foundation for long-term benefits for education, health and poverty alleviation, resulting in nationally-important new local industries that are not vulnerable to unscrupulous export/import regimes.



Capturing the benefits from tree production

Outcomes and Potential Impacts

When the short-term and local impacts described above are aggregated through the scaling-up and geographical expansion of projects, it becomes clear that, if promoted by national and international policies and adopted by Development Agencies and Donors, they would address many of the Issues targeted by the Sustainable Development Goals. For example, by rehabilitating soils and agroecosystems, degraded farmland can again become highly productive and so able to feed the rural population. This removes the need to clear existing forests and establishes trees in farmland that both recreate wildlife habitat and sequester greenhouse gases in the woody biomass and soil carbon, so mitigating climate change.

As private property, agroforests are much less vulnerable to renewed clearance than publicly or nationally owned natural forests. They therefore deliver a very practical and sustainable option for the reduction of greenhouse gases, and the other benefits discussed above.

Furthermore, increasing the tree-based benefit flows from human and social capital has potential to mitigate the social injustice that lies behind the rise in illegal migration and indeed in social conflict at the national and regional level. Already, at the national level there is evidence that agroforestry based on domesticated indigenous trees leads to rural youths seeing a brighter future in their villages rather than being drawn to urban areas to seek employment. Further extrapolation therefore suggests that all of the above benefits from trees are a plausible path to planetary health and social justice at a global level.

How can we ensure an increased flow of benefits from trees?

Sadly, the capacity of trees to deliver multiple benefits is not well recognized by policy makers and development agencies. Here we have seen that planting trees in agroforestry systems can indeed deliver a complete package of 'profits' from natural, social, environmental, human and financial capital. Combined, these maximize the outcomes for wildlife and the planet, as well as engendering food and nutritional security, poverty alleviation, social justice and peace in local human populations. One key remaining challenge is, however, the gaining of recognition from policy and development agencies of the capacity of trees to deliver these multiple benefits.

We live in a divided and dysfunctional world of 'haves' and 'have nots', but trees in agroforestry systems can bring about positive change. Maximizing the five profits from trees, therefore, could free subsistence farmers from abject poverty and from subjugation by the social injustices that flow from failing agricultural policies.

Prof. Roger Leakey is a crop physiologist / tree biologist who has worked in forestry and agroforestry aimed at helping to reverse deforestation and desertification in the tropics.

For more information, visit: www.rogerleakey.com

Photo: Nana Kofi Acquah

THE PRACTITIONER'S PERSPECTIVE

Restoring climate resilient landscapes for people in Northern Ghana

By Mark Kebo Akparibo

Photos: Nana Kofi Acquah

In Northern Ghana, trees have unique cultural and economic significance, and are inextricably linked to the livelihoods of rural populations. Sacred groves are a common sight in most rural communities. These groves are usually patches of primeval forest and are protected as abodes of deities, with unique spiritual significance to specific communities. In Northern Ghana, sacred groves have remained an ancient part of nature conservation and are usually under the care of traditional land owners locally called 'Tindaana".

Indigenous tree species such as shea (*Vitellaria paradoxa*), Parkia (*Parkia biglobosa*) also known African Locust Bean, and Baobab (*Adansonia digitata*) have very important cultural and spiritual significance. For several generations trees and their products have been integral to traditional cuisine. Baobab tree leaves, for example, are widely used for the preparation of soup. Parkia tree seeds are processed into a local spice called '*Dawadawa*'. The Shea tree is an important economic resources, as processed shea butter produced from the shea kernel is in high demand nationally and internationally especially for the cosmetic and confectionary industries.

Introducing social forestry

I work with the Community Self-Reliance Centre (COSEREC). We are a local non-profit organisation working with grassroots community organisations and rural populations in the Upper East Region of Northern Ghana. A big part of our work involves sustainable natural resource management.

Key to our approach is the use of social forestry principles in our work. Social forestry refers to the management of forests mainly for the benefit of local communities. There are various types of social forestry programmes, including homestead agroforestry, strip plantation, block plantation, plantation on homestead area, marginal lands, forest land, and on fallow lands. The aim of social forestry is to grow trees to meet the increasing needs of people for timber, fuel wood, food and medicinal products, with a view to reducing pressure and over dependence on traditional forest areas. In short, social forestry conserves forests AND provides for local communities.

Among communities COSEREC work, agroforestry is one of the preferred types of social forestry because it can be seamlessly integrated into traditional agricultural practices. Agroforestry is shown to provide practitioners with immediate to medium term benefits, including income from sale of tree fruits, and a reliable supply of compost to contribute to improved nutrient cycles and water retention. Essentially, agroforestry is a great replacement of traditional monoculture farming practices thus moving farmers from single commodity to multiple commodity value chains.

Restoring forests and biodiversity for local economies

Our work in Northern Ghana over two decades has provided a unique perspective to community-led forestry interventions in the face of climate change. Forests and their diverse biological resources play a significant role in community livelihoods and the promotion of biodiversity. However, with growing demand for forest resources, land use change and growing pressure on ecosystems mainly due to increasing populations, these resources are dwindling at an alarming pace. Threats to biodiversity have become a critical issue that requires urgent attention.

It is in light of the above that at COSEREC we have identified and are actively pursuing community led agroforestry interventions as one of the key avenues for restoring biodiversity. This includes the identification and provision of practical skills to help farmers and their community groups integrate trees on farms. We emphasise the role of trees in improving nutrient cycles and by extension agricultural productivity.

These interventions are already yielding good results. In the village of Gundoog located in the Nabdam District of the Upper East Region, we have been collaborating with Fuseini Bugbun for four years. Fuseini is helping to transform the landscape around the Gundoog and neighbouring villages. A model agroforestry system around the Fuseini's homestead has become a great showcase which attracts visitors from across Ghana, including notable researchers from the University for Development Studies. Fuseini's farm also attracts international volunteers seeking practical experience in agroforestry.

Photo: Nana Kofi Acquah

"I have long held the view that trees remain the most important factor of our human existence, hence we should do all in our power to ensure their continued existence"

Fuseini Bugbun

The evidence for biodiversity restoration as a direct result of our work with Fuseini is clear, as seen in the return of various species of birds, flora and fauna. A significant development is that this model agroforestry system now supplies a wide range of medicinal plants used by members of the Gundoog community and neighboring villages for various traditional medicinal remedies.

In a bid to expand these gains COSEREC recently partnered the International Tree Foundation. Together, we will provide and expand critical tree nursery infrastructure and expand our community led agroforestry interventions to eight communities in the Nabdam and Bongo Districts of the Upper East Region. There is a great deal more we can do together.

Mark Kebo Akparibo is a Development Professional and Non-Timber Forest Products development specialist with over a decade's experience working in the Northern Savanna Ecological Zone of Ghana. He has received a number of national and international recognitions including the Mandela Washington Fellowship (2015), Tony Elumelu Entrepreneurship Programme (2017), and the Earnest Fellowship on Human Rights Protection (2017) in recognition of his sterling contributions in the area sustainable environmental management interventions in Northern Ghana.

Part 2

PEOPLE

TREES FEED MY SOUL

By Noelle Leigh MBE

Trees feed my soul. Trees speak to me, no not in words but in feelings.

If I'm feeling sad they give me joy, if I'm feeling anxious they calm me.

If I'm feeling tired they give me strength. If I am in need I will do a 'Tree Meditation' that is, feeling into the tree deeply and becoming one with it until I lose all sense of me. This may take some time or it may be quick, but these are sacred times and rewarding.

Trees have feelings and I had proof of this a few years ago.

There is a very special little garden at Hampton Court east of the old Yew trees and hidden behind a hedge. The garden is called The Twentieth Century Garden and is full of many beautiful trees and shrubs. I visit it frequently and find it a very peaceful and happy place. However, on one occasion I found that there was an atmosphere of sadness and heaviness and I couldn't make out why.

After sitting there for a while I decided to go and look at the view over the Long Water with its lovely avenues of old lime trees, but it was a scene of disaster, all the trees had been cut down and there were trunks and branches all over the place, it was horrific! Standing there I realised why there was an atmosphere of sadness in the Twentieth Century Garden, the trees had felt the awful destruction. I was later told by the gardener that the trees were very old in fact apparently some were already dead at the far end, and it was time for new young trees to their place!

It was proof to me that trees do have feelings and it is important for us to honour them and appreciate them. They give us so much.

THE RESTORATIVE POWER OF TREES

By Lucy Jones

Photo: Gemma Brunton

I realised the importance of trees to my own mind and wellbeing when one was taken away from me. I was recovering from a period of ill health when a pear tree outside my bedroom window in a flat in Hackney, East London, was concealed for six months by thick, ugly scaffolding. It was a beautiful tree – incandescent in spring, glowing green like kryptonite. The branches would bud and they'd burst into curds of blossom, short-lived like a Perseid. When the winter days lost their bite and the world stretched and yawned, I would check back each morning for new nubs soon to crack open, push forward and begin again.

You see, the tree had become a symbol of hope and change. It filled the sash window I slept next to and I loved to watch its changing raiment and activity. I found a kind of emotional stability in its routine and fastened my hope to it.

I only understood quite how much I had grown to rely on it when the tree was blocked from view. What happened next made me realise the extent of my psychological need for the natural world. Within days, I felt a rising tension. I tried to peer around the lattice of metal bars to glimpse its vital green, to see how it was getting on, as if it were a drink that could quench my thirst. My emotional reaction freaked me out. Could a tree – or the lack of one – really have such a strong psychological impact?

After years of disconnection from the natural world – living a typically urban life in London, moving from one building to another, with little time or interest in my wider environment – I suddenly found that spending time with the rest of the living world, with trees and birds and insects, became a powerful therapy during recovery from an episode of clinical depression.

"It is incredible to think how much we don't yet know about these intelligent, beautiful beings."

I began to research the mechanism by which feeling connected with the living world can affect our mental health which turned into my book *Losing Eden: Why Our Minds Need the Wild*. Trees, of course, were major protagonists in many studies I came across. In short, the evidence shows that the nearby presence of trees is associated with better psychological health.

Today, I live in a town in the countryside, and my favourite nearby place to sit is underneath a huge, sprawling beech tree in an urban cemetery. I have grown to feel a kind of kinship with this tree.

Following my years of research, I now know some of the reasons why I am drawn to the beech and always feel restored and calmer after visiting it. I often sit at the root, watching my young children make houses for fairies in the roots, or scratch into the soil with sticks. I pick up handfuls of soil and roll it around my hands, sniffing the humus and wondering whether I might be ingesting *M. vaccae*, a bacterium found in the soil, that stimulates the brain to create more serotonin (the happy chemical) and increases stress resilience. I breathe deeply, knowing that studies show that phytoncides, the chemicals released by trees, decrease production of stress hormones. I spend some time looking at the leaves, beautifully lined, and starting to yellow, and consider their fractal nature. Fractal, in this context, means a self-repeating pattern of a shape that varies in scale, and the pattern is found everywhere in nature, from ferns to lightning, pineapple to snowflakes. Scientists have found that viewing fractals provokes brain activity which suggests a relaxed and focused state which could reduce stress levels. These days, I do not consider it a luxury or simply a 'nice' activity to hang out with my beech. Instead, it is an essential part of staying sane and well, just like taking exercise or eating a balanced diet.

As the years pass, I find I want to spend more time in the presence of old trees. The effect of this is hard to explain through data or in a lab. It is, shall we say, the metaphorical or even mystical potency of a relationship with beings that are hundreds years old. Recently, I have become interested in looking for visible root crowns, and thinking about the subterranean depths of the human mind mirroring that of the outside world. I'm learning to look underneath leaves for spangle galls, or caterpillars, or butterfly eggs. The more I watch and look, the more wonder and awe is revealed.

There are few beings more awe-inspiring than an ancient tree. The relatively new science of awe tells us, again, that experiencing awe and wonder has measurable effects on our bodies and minds. A study from the University of Toronto, Mississauga, found that awe promotes healthier levels of cytokines, an inflammation biomarker. Research from California, has found that people were more ethical, kind and generous after feeling awe. Is it possible that we need ancient and awe-inducing trees to be a compassionate and caring society?

We are just starting to scratch the surface of understanding how trees communicate with one another, and how they live social lives. I am only just scratching the surface of my own tree-blindness, finding ways of getting to know my favourite trees more deeply. It is incredible to think how much we don't yet know about these intelligent, beautiful beings. Which, of course, makes it all the more urgent that we move into a new world where trees are properly protected, conserved, respected and loved.

Lucy Jones is the author of *Losing Eden: Why Our Minds Need the Wild* (Allen Lane).

"Greta is an inspiration because she embodies so much of what I want to instill in my daughters. She gives me hope that the youth of tomorrow will be willing to stand up and make a difference and that they know they are worth a future worth fighting for. My oldest daughter is six and joined nature club and already knows about Greta. She said girls can help save the world and that lots of grown ups need to pitch in so when she's old enough, she can keep fighting. She inspires my daughter, and that's the most inspiring thing for me as a mother."

Michelle Carstarphen, Texas, USA
Winner of ITF *I am Greta* documentary competition

TREE BEINGS

By Raymond Huber

"Richard came to see trees as beings, and he inspired people around the world to plant trillions of trees. He showed what's possible when one person acts out of love for the planet."

I love beech trees. A walk in a beech forest makes me happier, healthier, and more in touch with nature. Beech trees feature in my new book, *Tree Beings*, about people who love trees. Dr Jane Goodall writes (in the Foreword) about her favourite beech tree:

"Ever since I was a child I have loved trees. The trees in our garden all had names and personalities. I did not think of them as inanimate objects, but as living beings. I had a special tree in our garden, a beech tree up whom I used to spend hours. I named him – not very imaginatively – Beech! I read books up there, or I just sat, feeling somehow closer to the birds and nature. My special tree being." (*Tree Beings*, 2020).

Jane would climb her tree and read Tarzan and Doctor Dolittle, and dream about living in the jungle. Her dream came true later when she lived in a rainforest for years and made far-reaching scientific discoveries.

Richard St Barbe Baker spent over 70 years traveling the world, encouraging people to love trees. Like Jane, he also got to know an ancient beech tree near his childhood home. He'd visit the tree if he'd had a difficult day:

"Standing by the friendly beech, I knew that in my heart that my troubles and my grief were but for a passing moment. I would imagine that I had roots digging down deep into Mother Earth and that all above I was sprouting branches. I would hold that in my thoughts for a few moments and then come back with the strength of the tree." (*My Life, My Trees*, 1970).

Richard came to see trees as beings, and he inspired people around the world to plant trillions of trees. He showed what's possible when one person acts out of love for the planet.

We don't usually think of trees as beings, but they do have a presence that attracts us. Simply walking in a forest changes our body chemicals, making feel calmer and healthier. Trees also appeal to our imagination. Beech trees appear in Grimm's fairy tales, where young characters travel through a dark forest and learn how to face challenges.

Trees have their own kind of intelligence too. In *Tree Beings* I tell the story of the scientist, Professor Suzanne Simard, who found a forest 'internet'. Trees in forests are connected by an underground network of fungi. In beech forests, for example, trees can use the fungi to send food, water, and messages to each other. They can share food with trees that don't have enough, and also send messages to warn of insect attack.

Trees are the oldest living things on the planet. They give homes and food to wildlife; protect and enrich the soil; recycle fresh water; clean the air; and fight climate change. If you befriend a tree (as Jane and Richard did) you might begin to feel that it's a being too.

Raymond Huber is a children's author and editor.

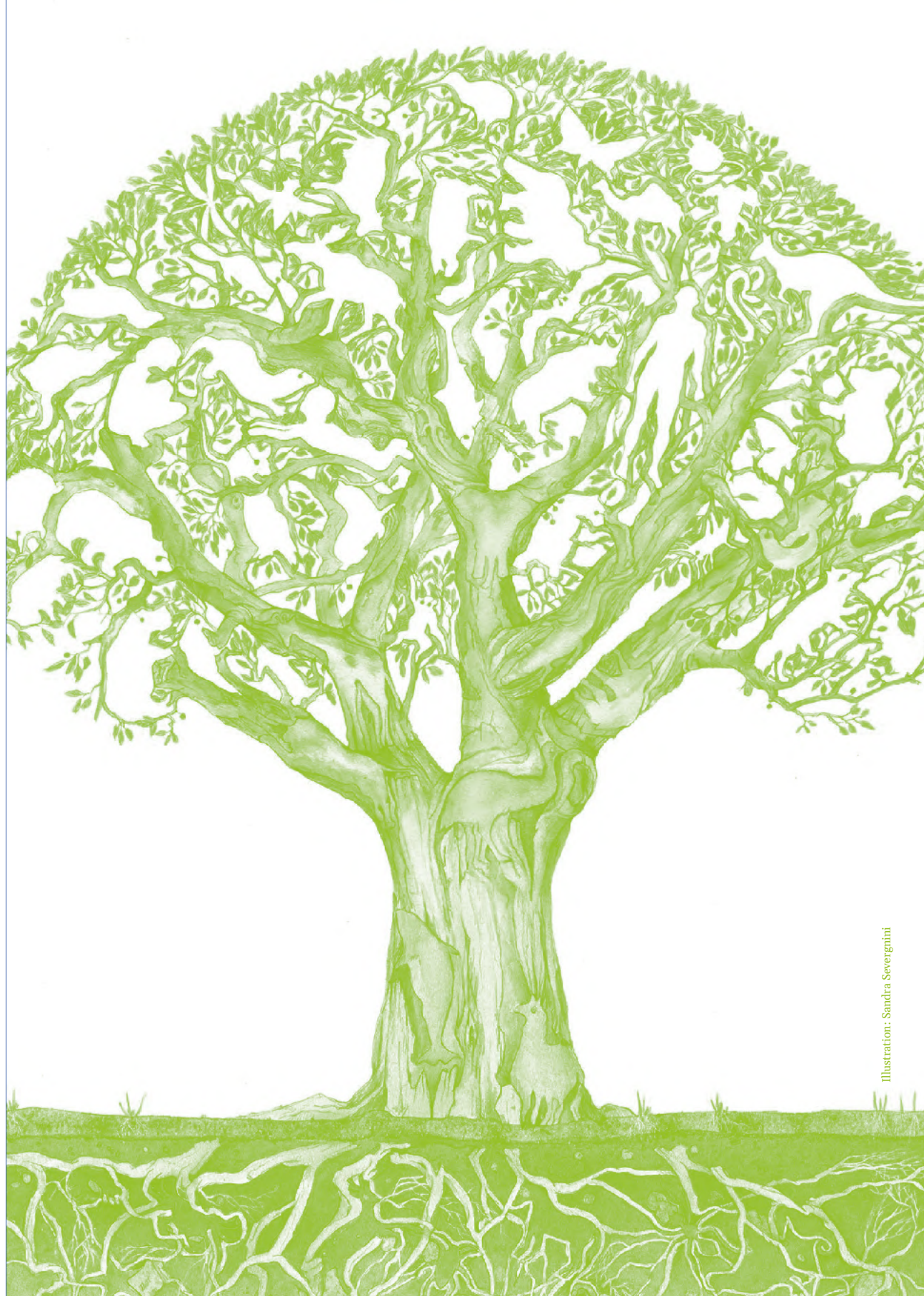


Illustration: Sandra Severgnini

WHY COMMUNITIES ARE ESSENTIAL FOR TREE PLANTING SUCCESS

A story from Rose Hill, East Oxford

By Sam Pearce

I am standing on the edge of a community playing field in Rose Hill, East Oxford. It's a beautiful evening in late September and I'm here to meet a local tree planter. Katharine Owen is the tree planting coordinator for the Rose Hill & Iffley Low Carbon community group. In 2019, Katharine and her colleagues were awarded funding from ITF to help plant a native woodland in the heart of their community – 682 saplings of Oak, Birch, Whitebeam, Hazel and Cherry. One year on and these trees – along with the community that planted them – are flourishing.

Last time I was here it was winter, a cold morning, with the mist refusing to lift off the fields as we tramped about in wellies and thumbed in small oaks with oversize waterproof gloves. Stepping back from our work, the muddy field edge was dotted with bamboo canes and pale green spiral guards above the brown-green grass.

The scene could hardly be more different today: the sun is shining, groups of children are playing on the football field, shrieks of laughter are coming from the playground. Young parents, dog walkers, elderly couples, all are out enjoying the early evening sun. Katharine takes me over to where the saplings are now competing with the long grasses, sending small tufty branches skywards out of the top of the tree guards. She explains "Since they've stopped mowing this bit of the field, this place has become a real haven for wildlife, insects and wildflowers".

A halcyon evening. But this fine weather has its downsides. The prolonged good weather we have all enjoyed this summer in the UK has meant testing times for small trees and tree planters alike. With only shallow roots, young trees need a regular supply of water or they can quickly dry out. The UK has just experienced its driest spring on record, and for months this risked wiping out our newly planted woodland before it had even got going.

All hands on deck

In response to this, and in defiance of the hot dry weather, Katharine and her team of volunteers have been organising regular tree-watering sessions. This is serious work. There's over 500 small trees here and each one needs a couple of litres of water. How best to get 1000+ litres of water to where it's needed?

The answer is a combination of watering cans, water bottles and wheelbarrows. Geoff's offering of his garden hose for public use. Locals have been coming out to support the watering in their free evenings and all this hustle and bustle has in turn has created more interest. Some local teenagers were curious enough to get chatting to find out what all the fuss was about. Even some troubled community members who admitted to vandalising some of the young trees, have now got involved in the project.

Without the community, the vast majority of these trees would have died before the summer had even begun. Without the community, we may as well have not come out with our spades and enthusiasm that cold November morning.

With this sense of community ownership, tree survival rates have been good, 90% at the last count. Local people have come together for a common good and been inspired enough to give up their evenings. They can look forward to the future, being able to watch the small trees slowly form a woodland.

A model for UK tree planting

Across the UK and the world, we are poised on the edge of a tree-planting revolution. Governments – including the UK's – have pledged massive planting targets for the coming decade. This is fantastic news, but it is important to think about where those trees are to be planted, and by whom. Trees aren't just about capturing carbon and meeting targets: they're also habitat for our beleaguered native wildlife; they can be an excellent source of food, fruits, and livelihoods; the learning opportunities for children are endless here. Lastly, they can be a vital refuge for our own troubled minds to wander in and relax.

All of which is why we at ITF advocate a community approach to tree planting – multiple small-scale projects across the country, designed and managed by the communities that will care for – and benefit from – the trees they plant. If this was scaled up, a whole generation of school children could grow up knowing first-hand the value of trees in the landscape.

One small piece of the jigsaw

Rose Hill is no social paradise. Until 2015, this area was in the top 10% most deprived areas of the UK. Though the area is gradually improving, with land being such a premium in Oxford, even this recreation area is being eyed up for development. But not without a fight from this community: they are about to start their latest tree planting project with ITF support, here in the recreation ground – a community orchard of 52 fruit trees, a project that bespeaks the multiple benefits trees can bring. What's more, it's run by the community, in the community, for the community and the benefit of all. We wish them every luck.

ITF runs an annual UK Community Tree Planting Programme, where we invite community groups to apply for funding for tree planting in their local areas. You can find more information on our website, or give us a call.

Sam Pearce is ITF Programmes Development Officer

'ARE WE OUT OF THE WOODS?'

By Alistair Yeomans

As a forester this saying has always confused me. It equates being in a forest with trouble. I have heard it used recently for the prospects of people recovering from illness, i.e. they are not out of the woods yet. The irony is, that during the coronavirus lockdown, I yearned to be in the woods.

Sir David Attenborough recently said that humans have overrun the planet. As a forester my instinct, and along with many others, is to reach for more trees. Before I do, and with 30 years' experience working with trees, I would like to reflect on what humankind's dominance has meant for woodlands in the UK.

I started my career in Ayrshire, where Robert Burns, the 18th century poet and farmer lived. Here, upon ruining his fellow mortal's "housie" with his scythe, Burns famously apologised to a mouse – as "man's dominion, has broken nature's social union". This heartfelt apology is worthy of immortalisation, as it denotes humanity's self-appointed position as governor of the natural world.

"A culture is no better than its woods" is often quoted in forestry circles. It's the concluding sentiment of W H Auden's mid-20th-century poem "Woods". Auden's reflection on "primal woods" being "reduced to patches owned by hunting squires" stands out in his indictment. Both poems emphasise humanity's grip over the natural world. The latter lamenting our treatment of forests, and in doing so holding a mirror up to society.

"Woods" touches upon ownership and land-use. Whether land is owned privately or publicly it is the area of land that is altered, how it is used and for how long, that contributes to ecosystem fragility or resilience. Resilient landscapes are more likely to withstand environmental change. Biodiversity is key to resilience. And the UK has become one of the most nature-depleted countries in the world.

This leads us to a critical concept – stewardship.

Environmental stewardship

Rachel Carson's *Silent Spring* (1962) inspired the US Environmental movement. She also inspired social psychologists to devise the New Ecological Paradigm (NEP) scale. NEP measures an individual's pro-ecological world view. By answering fifteen questions, this questionnaire helps explain the differences between people's attitude towards the natural world. The scale covers the fundamental principles of ecosystem governance and is relevant to legal mechanisms, such as earth jurisprudence, as well as approaches to ecological restoration, e.g., afforestation or rewilding. In short, the NEP scale reflects our attitudes to environmental stewardship.

In England, we learnt something about how society values woodlands in 2010, when the government proposed selling off the public forest estate. The government were promptly forced into a U-turn by the ensuing public outcry. And yet, the Independent Panel on Forestry report in 2012 revealed the poor condition of many woodlands, urging "society to value woodlands for

“The trees encountered on a country stroll
Reveal a lot about a country’s soul.

A small grove massacred to the last ash,
An oak with heart-rot, give away the show:
This great society is going to smash;
They cannot fool us with how fast they go,
How much they cost each other and the gods.
A culture is no better than its woods.”

W. H. Auden

the full range of benefits they bring”. The report concluded with a vision of a woodland culture for the 21st century.

To help achieve this vision, professional foresters have the UK Forestry Standard, which sets legal requirements and voluntary guidelines for sustainable forest stewardship. The Standard is impressive in its scope, and new social, ecological, and silvicultural knowledge is incorporated periodically. However, there is still much work to be done. In 2020 many UK woodlands remain neglected, in poor ecological and silvicultural condition.

The UK Tree Charter: A woodland culture for the 21st Century

How do we include all people in this woodland culture? As Kenyan environmentalist and Nobel Prize winner Wangari Maathai said, “you cannot protect the environment unless you empower people, you inform them, and you help them understand that these resources are their own, that they must protect them.”

In 2017, the UK Tree Charter was published with the ambition “to place trees and woods at the centre of national decision making, and back at the heart of our lives and communities.” Over eighty organisations were involved, and the Tree Charter was launched with fanfare. It covers the breadth of forest stewardship superbly, from habitat restoration to forestry’s role in a low carbon green economy. There is a website where anybody can sign up to the Charter’s ten principles. Surely the Charter promotes both Maathai’s wisdom and is the bedrock of a vibrant woodland culture?

After three years, c. 155,000 people have signed the Charter, approximately 0.002% of the UK’s population. Many of us have opined about a reconnection with nature during CV19 lockdown, at a time when many forestry organisations have turned their attention to tree planting schemes for carbon sequestration. So, I ask myself, have we foresters dropped the ball on the Tree Charter? The Charter’s aim is to be at the centre of national decision making, so surely, for example, it should serve as a powerful influence in the case against the removal of ancient woodland for HS2?

In 1845, Thoreau went into the woods “to live deliberately, to front only the essential facts of life.” After months of coronavirus lockdown, I suggest that we all do something deliberately – read the Tree Charter. Sign up if you agree. Perhaps even tweet about it [#treecharter]. If social media can swing elections, then let us forest folk sound off with a cacophony of tweets and create a woodland culture for all.

Part 3

RESTORATION

THE FUTURE OF LANDSCAPE RESTORATION IN KENYA

By Teresa Gitonga

Photo: Globe Gone Green

Landscape degradation in Kenya

Africa faces a big deforestation challenge. Between 2010 and 2020, 3.94 million ha of forest were lost annually. The highest yearly loss on record. And with only 7% forest cover, Kenya is one of the least-forested countries in Africa.

According to the United Nations Environment Program (UNEP), deforestation in Kenya's Water Towers deprives our economy of six billion shillings a year and threatens more than 70% of the country's water supply. UNEP data also tells us that Kenya's water towers and forests contribute more than 3.6% to GDP. The economic benefits of forest ecosystem services are more than four times higher than the short-term gains of deforestation.

Publically, Kenya is committed to restoring 5.1 million ha of degraded landscapes by 2022. By 2030, greenhouse gas emissions from the forest sector should be 50% less than today, and land degradation neutrality should have been reached by then too. Despite these commitments and many forest restoration initiatives, deforestation and forest degradation still happens at an alarming rate.

In the recent past we've lost great swathes of our biodiversity, and many native trees are extinct. More are threatened. Rivers that used to be permanent are now seasonal or have dried up. And every year erosion results in the loss of millions of cubic metres of soil, shrinking agricultural productivity and threatening food sovereignty for thousands of communities. Women, in particular, often now need to travel many kilometres for water and fuelwood, reducing their time available for education and other work.

How to restore our landscape

Landscape restoration will succeed if and when the benefits reach the people most vulnerable to the impacts of climate change, such as rural communities. If Kenyan landscape restoration is to succeed, then it needs to work to the following principles.

1. Cooperate and plan

Today, restoration stakeholders don't cooperate. Landowners, farmers, national and subnational governments, scientists, the private sector, and NGOs are all running in their own direction with little collaboration. We need a nationally coordinated effort with a common agenda. A mass restoration movement.

Currently, this goes against the traditional wisdom of many NGOs and government agencies, accustomed as they are to waving their own flags as high as they can. When it comes to restoration, competition is a problem. It would be much more effective if we worked together, with local communities at the centre of all interventions.

2. Increase tree diversity

Progress on preventing the extinction of threatened species has been slow. Despite the huge interest in tree planting in Kenya, most of the trees planted are exotic species and only a small share are native. Collaborative efforts and shifting investment to Kenya's native and threatened trees, can help ensure Kenya's tree diversity is secure for the long-term.

3. Gender plays a key part in successful restoration

Studies show that restoration initiatives impact women and men's rights and wellbeing as well as relations between men and women in different ways. Research also shows that women tend to make better natural resource management decisions when they are included in conservation practices and when they receive the skills and training to inform their efforts.

Despite the important role that women can and do play in landscape restoration, gender integration remain a complex goal. Inadequate budgets for gender mainstreaming coupled with limited staff training in gender issues is slowing progress. As is the limited numbers of women in leadership of forest projects to articulate women's needs and desires in the forest sector. Gender insensitivity by policy makers and professionals in the forest sector remains hard to change.

Women in Kenya contribute up to 80% of the labour required for food production, yet women are not empowered as decision makers regarding

"Ensuring restoration activities generate financial benefits to community members is critical for incentivizing continued participation."

the optimal use of these lands. Approximately 75% of this rural population derives their livelihood from agriculture. It is therefore critical that all landscape restoration initiatives:

- Solicit the inputs from both women and men in order to ensure the restoration initiatives are aligned with community members' development priorities and enhance their wellbeing.
- Seek the consent of both men and women when implementing activities on their lands.
- Each planned restoration initiative conducts a context-specific gender analysis.

Ensuring restoration activities generate financial benefits to community members is critical for incentivizing continued participation. As financial benefits from certain restoration options can take a long time to materialize, providing alternative livelihood options or income sources is critical for allowing community members to absorb financial and/or labour costs incurred by restoration.

4. Get restoration financing to the right people

Restoration finance mechanisms are difficult and expensive to access. Instead, Funds are usually invested far away from the communities who do the heavy lifting and where restoration action happens.

Financing regimes need to be accessible to grassroots communities. Which does not mean a lack of rigor, rather that restoration finance rules should adapt to the rural context, rather than apply procedures designed for affluent urban settings.

Restoration finance should also be long term. Currently much of the finance available, particularly in the form of grants and loans, is short term, i.e. one to three years. Planning and executing effective restoration at scale can take at least a five years, including tree care for at least three years after planting. This is more time than most grants allow.

5. Put communities at the centre of restoration

It is critical that all restoration initiatives involve communities at every stage. Community input and consent ensure that restoration initiatives are aligned with community members' priorities and wellbeing. In other words, that they are sustainable.

Some of the most effective restoration work is happening in the grassroots, far away from the negotiation tables. So restoration finance must facilitate community engagement, and create opportunities for employment and genuine involvement across energy, agriculture and agroforestry sectors, for example. Effective restoration places local communities at the centre.

6. Effective monitoring and evaluation requires technology and people

It's critical to have a good national monitoring and evaluation (M&E) systems. Today, technology makes effective M&E of restoration projects quite easy. Many institutions including Environmental Systems Research Institute and Crowther Lab have developed remote sensing and mapping tools. And we at ITF rely on technology for planning and prioritizing areas for restoration. But, tools are not enough – participatory methods and evaluations on the ground are critical too. Remote sensing and on the ground evaluations complement each other.

Conclusion

If donors, NGOs, politicians and other stakeholders embrace these principles, then degraded landscapes can be restored, and quickly. Like many countries, Kenya can improve livelihoods, increase the supply of water for domestic, industrial and irrigated agriculture, conserve biodiversity, and maximise environmental and social resilience to climate changes. But, there is no time to wait.

Teresa Gintonga is ITF Kenya Programme Manager

A WORLDWIDE, COMMUNITY-CENTRED APPROACH

By Ricardo Romero

There are currently various ambitious global goals for forest conservation and restoration. One such example is the Bonn Challenge, which – having been recently endorsed by the United Nations Decade on Ecosystem Restoration – is a global aspiration to undertake forest restoration on 350 million hectares of land by 2030. Another example is the Trillion Trees campaign coordinated by the international NGO sector, which has a vision for a trillion trees to be restored, saved from loss and better protected around the world by 2050.

At present, there are about 500 million small farms in the Global South, which comprises the majority of the world's poorest people. The degradation of ecosystems affects the wellbeing of about 3.2 billion people, and the resulting loss of species and ecosystem services costs about 10% of annual global gross product.

In areas with high population density and intensive land use, mosaic restoration opportunities encompass larger areas and utilize a combination of interventions that are spatially mixed with agricultural and other land uses. Mosaic restoration opportunities are widespread and comprise 80 percent of the opportunities within tropical regions. These interventions can include agroforestry; increasing tree cover on farms through planting or assisted natural regeneration; protective forests on steep slopes and riverbanks, or assisted natural regeneration in patches, corridors, or buffer zones. In this context, smallholder reforestation promises to be an important use of land for the provision of both environmental and human benefits in the tropics.

After some decades of international public policy advocating for the intensification of agricultural production, the world has seen a massive adoption and implementation of monocultures, plantations and industrial agriculture and forestry systems. Sadly, this industrial model has proven to be very inefficient, and has created environmental tragedies (such as biodiversity loss, land degradation, deforestation and water pollution) as well as inequalities and social injustices around the world. Under current population densities, some traditional production systems, such as slash and burn, are not viable. However, other traditional techniques such as crop diversification, agroforestry, cover crops, crop rotations and associations, mulching and composting are viable and more efficient than the industrial models based on external synthetic inputs, homogenization and land concentration. It's clear that there are no silver bullets, but a combination of approaches respecting local contexts and people are better than a ubiquitous industrial model.

Planting trees on farms and integrating them into production systems increases fertility, controls soil erosion, diversifies risks, sinks carbon, increases food security and improves the livelihoods of millions of rural households. Trees are not mutually exclusive from successful farming. On the contrary, they are one of the best options to create wealth in rural contexts. During my professional career I have worked with and studied hundreds of smallholder farms, and I have witnessed families losing their entire crop yield (in a bad season) whilst continuing to harm the environment – as well as their own health – using the industrial model. I have also had the privilege of working together with hundreds of

smallholder farmers that have chosen to diversify their farms and include trees in their production systems. I have seen whole communities transform their relationship with nature from exploitation to nurturing and lift themselves out of poverty.

Evidence of the ways in which smallholder livelihoods influence, and are influence by, this transition have been increasingly recognised. However, decisions on public policies that can facilitate, incentivise or discourage growing trees and transition to sustainability are often taken far away from the target areas and with the communities impacted by such decisions. The lack of consultation with local communities and the lack of use of local knowledge in decision-making processes often leads to the wrong decisions, in which subsidies and incentives are allocated to production systems that are harmful for the environment and create poverty.

ITF has a long-standing tradition of supporting communities' initiatives, as well as involving the local people, their interests and wellbeing – which, in turn, has given ground to impactful, sustainable projects. It is together that we can restore and protect our forests. Transitioning to production systems that include trees – and including the local communities' interests, knowledge and wellbeing – are vital if we are to create a better chance of conserving the environment and creating economic opportunities for some of the world's poorest populations.

HOW SCIENCE CAN BOOST THE GLOBAL REFORESTATION MOVEMENT

By The Crowther Lab

As the climate and ecological crises accelerate, we desperately need to ramp up our efforts to stop the damage, and start the repair. But good news is coming from the global restoration movement: scientific insight, on-the-ground knowledge and political will are now aligning like never before, and the movement might well be finally gaining the momentum needed to start turning the tide.

A planetary emergency

Humanity is facing a double threat. On the one hand, burning fossil fuels is fast warming our planet and destabilizing the climate that allowed human civilization to flourish. On the other hand, ecosystems, on which we depend for food, water, local climate, health, shelter... have been badly damaged worldwide, and some are already showing signs of collapse. And of course, these two threats make each other worse. This is a planetary emergency. We need to act now on many different fronts simultaneously. Here is where and how the ecosystem restoration movement steps in.

Trees can help

Protecting and restoring ecosystems is a solution at the intersection of both the climate and the ecological crises. While the benefits might at first seem more obvious in terms of biodiversity, healthy ecosystems are also key to combat climate change. Plants grow by capturing carbon from the atmosphere – and when they die, part of this carbon gets stored in the soil. Restoring vegetation and soils worldwide can therefore help us remove some of the excess carbon we have put in the atmosphere. But how much exactly?

The global tree restoration potential

Two years ago, our team set out to estimate how much of the Earth could naturally support trees, outside of already existing forests, and urban and agricultural areas. We built machine-learning algorithms and trained them on millions of data points, collected by scientists all around the world. We looked at the potential for tree restoration in places that were formerly closed-canopy forests, but also in places like grasslands or wetlands which might, in their healthy state, have as much as a 10 percent tree cover. The results were staggering: in total, we found the potential for an additional trillion trees, that would, taken together, cover an area as large as the U.S. And that could sequester up to 30% of the excess carbon that currently exists in the atmosphere as a result of human activity (note that the oceans and the biosphere have taken up about half of human emissions). Our results attracted considerable media attention, and motivated the launch of the worldwide Trillion Tree Campaign in support of the UN Decade on Ecosystem Restoration.

"Nature based solutions must be founded on rigorous ecological principles."

How to do it right?

But ecosystem restoration is like any good idea – there are many ways to mess it up. That is why earlier this year, a group of civil society experts and business leaders aligned on four "Together with Nature" principles, to guide nature-based solutions to climate change.

1. Cut emissions

In order to stabilize the climate, society's priority should be to quit burning fossil fuel as soon as possible. Planting trees should not be seen as a way to "offset" new emissions: ecosystem restoration is about repairing the damage already done, not neutralizing further damage.

2. Conserve and protect existing ecosystems

Intact soils, forests, grasslands, shrublands, wetlands and aquatic ecosystems are vital repositories of carbon and biodiversity. Protecting our last remaining strongholds of nature is critical. It is always harder to restore an ecosystem than to prevent it from being degraded in the first place.

3. Be socially responsible

It is critical that restoration projects uphold the rights and leadership of local communities and indigenous people. It has also been shown repeatedly that restoration can only be sustainable when it brings local communities social, economic and ecological benefits.

4. Be ecologically responsible

Nature-based solutions must be founded on rigorous ecological principles. Biodiversity is vital for healthy ecosystems that are more productive, resilient and beneficial.

Evidence-based restoration

While these principles set clear guidelines for what is desirable, the best way to apply them still needs to be figured out. We at the Crowther lab are ecologists, so our particular mission in this is to figure out what works best from the point of view of the ecosystem being restored. Which tree species should be restored, and in what combinations? There is more to biodiversity than trees – so can we for instance also inoculate degraded soil with fungi? Can this in turn help the trees go faster? These questions we try to answer by partnering with restoration projects on the ground, that can set up experimental plots to test hypotheses. For instance, an experiment has just been started this year both in the Yucatan peninsula of Mexico, and in Cynghordy in Wales, the latter in partnership with The Carbon Community.

Optimizing the learning process

So far, restoration projects have been learning through a lot of trial and error. But we're running out of time. Can we optimize this process, to let the whole movement learn in real time from every success and every failure? Can we make sure all the relevant ecological data is accessible easily to everyone engaged in restoration projects? To enable this, the lab has just launched Restor: a digital platform to let everyone access ecological data from any site on Earth, monitor the progression of restoration projects, and share information within the human ecosystem of restoration projects, scientists, funders, and the public.

Ready to restore nature's biodiversity

To avoid planetary disaster and to repair the damage that we have already done, we need action, we need tools, and we need each other – on a grand scale. And the restoration movement now has all that. Can we count you in?

www.restor.eco

CAN WE SUSTAIN NATURE AND CIVILIZATION?

Richard St. Barbe Baker's "Yes"

By Paul Hanley

In the 1920s, Richard St Barbe Baker was among the first proponents of what we now know as "sustainability." His early advocacy of this concept seems prescient, but Baker's decade in northern Africa, from 1920-29, had afforded him a preview of environmental conditions we are all too familiar with today. In both Kenya and Nigeria, Baker observed—and would soon warn the world about—accelerating deforestation, eroding biodiversity, desertification, a changing climate, and mass migrations of displaced people. What was happening in Africa, he realized, could sweep the planet.

Though his job title in Kenya and later Nigeria was "Conservator of Forests", Baker quickly learned that his actual work was facilitating the exploitation of the land and its people. Baker believed it possible, instead, to achieve a harmonious, sustainable relationship with nature, while increasing prosperity. He proposed novel efforts to rally the indigenous population to adopt sustainable farming methods. Not a strict preservationist, his approach was to develop agrifood systems that maintained ecological functions while increasing yields and income.

"Vision building builds hope. Hope, a commanding hope, is an essential ingredient in a transformative movement."

For Baker, *the* key to sustainability was, of course, trees. Conserve those we have; replant those we have harvested; and incorporate them in farming systems. In schemes small and local or grand and global, he proposed reforestation and forest farming as a kind of ultimate solution to environmental and social ills. This approach was typified by projects ranging from *Igi Oki*, a smallholder-focused agroforestry approach in Nigeria, to the Sahara Reclamation Project, starting with a Great Green Wall to stop the desert's southward expansion.

We see in Baker's analysis and prescriptions for Nigerian forestry and farming the elements of contemporary approaches to sustainable development: the need for grassroots, farmer-focused initiative; agroforestry and agroecological methods; the formation of producer-consumer cooperatives, North-South alliances, and fair trade arrangements; wealth redistribution in the form of profit-sharing; a central role for education; cultural and ecotourism; and a redefinition of prosperity itself.

Baker's then radical views did not endear him to the authorities. No longer welcome in the Colonial Service, he travelled the world in the 1930s and 40s, preaching the gospel of tree planting and building one of the first international environmental NGOs, the Men of the Trees.

In the 1950s, he refocused on North Africa and the Sahara, believing that the great desert was man-made and could be restored. Its restoration would add the equivalent of a new continent to the world, he argued, providing a new resource for an exploding post-war population. But success would require nothing less that the redeployment of the world's armed forces as tree planters.

It would be impossible to have a sustainable relationship with nature if humanity was embroiled in conflict, Baker argued. Our real enemy was the accelerating process of environmental destruction—the worst example being desertification. Fighting that enemy would be a "One World Purpose". Restoring the desert, Baker proposed, would become the means of building unity; unity was the key to peace; and peace would release humanity's capacity and resources to restore the planet.

He realized that if we did not do this soon, it would be too late. In his New Earth Charter, a document that preceded the Earth Charter by some 40 years, he warned:

This generation may either be the last to exist in any semblance of a civilised world or it will be the first to have the vision, the bearing and the greatness to say, "I will have nothing to do with this destruction of life, I will play no part in this devastation of the land, I am determined to live and work for peaceful construction for I am morally responsible for the world of today and the generations of tomorrow."

Visionaries are by definition ahead of their times, and many of Baker's schemes failed from lack of support. Yet today, we see the elements of his prescription for Earth healing verified by environmental science, adopted in principle by international agencies and governments, and carried out in practice by individuals and organizations, including the International Tree Foundation.

Vision building builds hope. Hope, a commanding hope, is an essential ingredient in a transformative movement. Perhaps, then, Baker's enduring contribution will be his own story: how one person, thus every person, can play a meaningful role, whether large or small, in building a sustainable, peaceful, and just civilization.

Paul Hanley is the author of the biography *Man of the Trees: Richard St. Barbe Baker, the First Global Conservationist* (University of Regina Press, 2016) and *Richard St. Barbe Baker: Child of the Trees* (Bellwood Press 2020), a short biography for middle school children.

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In 1952, Richard St Barbe Baker set off to drive across the Sahara.
His vision was to plant a 'green front', to contain and ultimately regreen the Sahara.

About International Tree Foundation

ITF was founded in 1922. We are tree planters, farmers, foresters, ITF members and supporters, community organisers, entrepreneurs, scientists and teachers. We share a vision of a world in which trees and forests flourish and their vital role in sustaining planetary and human well-being is valued. If we come together, we can realise this future. But we have no time to waste.

We work every day to plant and grow trees, restore and conserve forests, and strengthen community and ecosystem resilience.

Join ITF. Join the restoration movement.

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