

Building the Great Green Wall supports the three Rio Conventions

And trees are the mortar



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This is the fifth document in K4GGWA briefs series aimed at practitioners, policymakers and researchers who want to see more trees in the Sahel. It explains the benefits of regreening by assisted natural regeneration, whereby land users select, protect and manage trees and shrubs that regenerate naturally on their land or community land and how this supports all three of the Rio Conventions.

Key messages

- Enabling land users to regenerate trees and shrubs on farmland and common land helps support implementation of the three Rio Conventions – the UNFCCC, UNCCD and CBD, and simultaneously helps achieve many of the UN Sustainable Development Goals.
- Sahelian farmers who protect and manage woody species provide a service to polluting companies and countries across the world by sequestering more carbon than they emit.
- More trees and shrubs mean more leaf litter, which helps maintain and improve soil fertility, as well as reducing erosion, thus preventing land degradation and desertification.
- Increasing the number of trees and shrubs over millions of hectares provides additional shelter and food for tens of millions of migratory insect-eating birds overwintering in the Sahel.

The three Rio Conventions

Addressing climate change, biodiversity loss and land degradation requires an integrated response, such as Conventions emerging from the 1992 Rio Earth Summit that align efforts on ecosystem restoration, sustainable land management and nature-based climate solutions (Box 1).

Increasing the number of trees on farms and community land is key to achieving the goals of the three Rio Conventions. Trees help land users adapt to climate change, and also sequester carbon above ground in their biomass and below ground in their root systems (UNFCCC). In many cases, land users who increase the number of on-farm trees also increase the number of different tree species (CBD). And where the natural regeneration of trees and shrubs as well as insects and birds who live in them has transformed landscapes at scale as in parts of Niger, Mali and Ethiopia, land degradation and desertification have been reversed (UNCCD) (Reij et al. 2020).

The UN Framework Convention on Climate Change

The effects of farmer managed natural regeneration and adaptation to climate change shows that more on-farm trees creates a microclimate favourable to crop growth. Tree shade reduces soil temperatures, which in turn reduces evaporation. Farmers in drylands who practise farmer managed natural regeneration do so, in part, to avoid exposing their crops to scorching sun.

Farmer managed natural regeneration also mitigates climate change and practising farmers across the Sahel render the world's carbon polluters a service, as they sequester carbon in their biomass above ground, below ground and in leaf litter as well as in the soil which is essential for maintaining and improving soil

fertility. How much carbon is sequestered depends on tree species, age and density. A study in an agroforestry parkland in Mali with older trees found they sequestered 40 tonnes of carbon per hectare per year (Fané et al. 2022), whereas in Niger's Maradi and Zinder regions where most trees are younger, above-ground carbon in two species (*Faidherbia albida* and *Bauhinia aegyptiaca*) was only 3.4 to 14.6 tonnes per hectare per year.

Box 1. The three Rio Conventions

- **The Framework Convention on Climate Change (UNFCCC)** aims to stabilize greenhouse gases at a level that prevents dangerous impacts on the climate system. It supports implementation of the Kyoto Protocol and the Paris Agreement, facilitates negotiations, manages data and promotes climate action through scientific assessments, technology cooperation and inclusive engagement of all.
- **The Convention on Biological Diversity (CBD)** conserves biodiversity, sustainable use and equitable benefit sharing from genetic resources. It helps address threats to biodiversity and ecosystem services through scientific cooperation, incentives, tools, technology transfer and the active involvement of Indigenous Peoples, local communities, youth, women, NGOs and the private sector.
- **The Convention to Combat Desertification (UNCCD)** unites governments, scientists, policymakers, the private sector and communities around a shared vision and actions to mitigate impacts of land degradation and advance land stewardship to provide food, water, shelter and economic opportunity to all people in an equitable and inclusive manner.

Source: Adapted from <https://rioconventions.org/>



Vegetation turns down the heat. The photo illustrates that even a small increase in surface cover helps reduce soil surface temperatures.

Photo: Tony Rinaudo

The UN Convention on Biological Diversity

On-farm natural regeneration initially includes a limited number of woody species. Which species regenerate depends on the root systems and the seed stock in the topsoil. Over the years, the number of species may increase because livestock and birds spread seeds, and because farmers plant trees that they want to have but that do not regenerate naturally.

A recent study in Niger's Maradi region showed a small increase in the diversity of trees over five years (2019–2024). In areas with 300–400 mm mean annual rainfall, the number of species increased from 29 to 33, and from 42 to 43 in areas with 400–500 mm rainfall (Samaila Abdou et al. 2026). The growing number of on-farm trees in parts of the Sahel also helps biodiversity in unexpected ways, as trees provide shelter and food for tens of millions of overwintering insect-eating birds (Zwarts et al. 2023), with birds preferring specific trees such as *Acacia tortilis*, *Balanites aegyptiaca* and *Faidherbia albida*. Interestingly, in both Niger's Zinder Region and the Peanut Basin in Senegal, *Faidherbia albida* is a dominant species in natural regeneration. Farmers know this species has a positive impact on soil fertility and its leaves and pods are excellent fodder for livestock.

Yacouba Sawadogo: The man who stopped the desert

Yacouba Sawadogo may be the only African smallholder with an obituary in the New York Times (22 December 2023). He became famous after a documentary about his life and work in 2010¹ made him known globally and formed the basis for a number of international awards: UNCCD's Global Drylands Champion in 2013, the Right Livelihoods Award in 2018 and UNEP's Champion of the Earth award in 2020. Yacouba increased the size and depth of traditional *zai* planting pits to restore degraded land with a hard soil surface, and added organic matter to the pits. By concentrating more water and soil fertility, 300–400 kg of millet or sorghum per

hectare could be harvested in a year of low rainfall and up to 1,500 kg could be harvested in a year with good rainfall, on land where nothing could grow previously (Kaboré and Reij 2004). The manure used in pits also contained tree and shrub seeds. Trees regenerated when farmers chose to protect and manage seedlings, such as in Burkina Faso's Yatenga region and Niger's Tahoua region. Yacouba also sowed woody species in his planting pits, creating a forest on what was once barren land with more than 60 species. This makes it likely to be the most biodiverse farmer managed forest in the West African Sahel.

The UN Convention to Combat Desertification

In several parts of the Sahel, farmer managed natural regeneration has already metamorphosed landscapes at scale, as in Niger where about 6 million hectares have been regreened (Abasse et al. 2023). This is one of the largest positive environmental transformations in Africa in recent decades. In Mali, about 0.5 million hectares of new agroforestry parkland emerged on the Seno Plains. In addition, farmers practising assisted natural regeneration have rejuvenated some of the 6 million hectares of old agroforestry parklands in southern Mali. In Senegal, regeneration is emerging at scale at the western edge of the Peanut Basin. In Ethiopia, several million hectares of agroforestry parkland are found south of Addis Ababa, but the scale and dynamics have not yet been adequately studied (Pasiecznik and Reij 2020).

Lessons for both policy and practice can be drawn from all these examples in the Sahel, and should be promoted globally. These landscape level transformations have not occurred because of tree planting projects, but because millions of benefit-driven smallholders have observed the multiple impacts of protecting and managing natural regeneration of trees and shrubs. Governments and their funding partners could make a significant difference by supporting this process, including through the introduction of policies and legislation stimulating land users to voluntarily invest in growing trees.

¹ <https://www.youtube.com/watch?v=QUAXBgYm1Ko>



Farmer innovator Yacouba Sawadogo in the biodiverse forest he created on barren land.

Photo: Chris Reij

Farmer managed natural regeneration and the Sustainable Development Goals

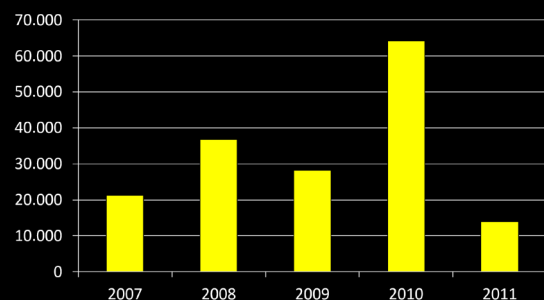
Land users who increase the number of trees on their farmland or on community land contribute to Sustainable Development Goal 1 (No poverty) and 2 (Zero hunger). An increase in agricultural production of 10% reduces rural poverty by 6% to 9% (Irz et al. 2002). In addition, increasing the number of on-farm trees can increase cereal production by 30% or more (Abasse et al. 2023), which reduces rural poverty by at least 20% (Irz et al. 2002). And in the West African Sahel, 1000 households continuously practicing farmer managed natural regeneration results in an increase in gross income of USD 72,000 per year (Binam et al. 2015). By integrating trees, crops and livestock, farmers also create more complex, productive and drought-resilient farming systems. For example, 2011 was a drought year across the Sahel. But in Kantché district in Niger's Zinder region, with its high on-farm tree and population densities, there was a grain surplus of about 13,000 tonne (Figure on the right: Benefits of agroforestry). Farmer managed natural regeneration also contributes to several other Sustainable Development Goals, such as SDG 3 (Good health and well-being) and SDG 13 (Climate action).

Conclusions

Promoting farmer managed natural regeneration supports the implementation of each of the three Rio Conventions – UNFCCC, UNCCD and CBD – and the UN's Sustainable Development Goals, thus illustrating the synergy between these conventions. By rebuilding vegetation, assisted natural regeneration addresses many problems simultaneously. It helps restore degraded land, improves food security, and increases biodiversity, as well as the availability of fuelwood, timber and fodder for local communities. Trees sequester carbon, making the growth of more trees a key climate change mitigation measure. By improving soil fertility and reducing soil surface temperature, farmer managed natural regeneration also helps farmers adapt to climate change. This is truly a win-win-win situation.

Benefits of agroforestry: Grain surpluses

Annual grain surplus in Kantché department (Zinder, Niger)
Metric tons



Source: Yamba and Sambo. 2012

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Benefits of agroforestry

Source: Yamba and Sambo 2012.

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Goats in a *Faidherbia albida* parkland in Zinder, Niger. The millet has just been harvested.

Photo by Chris Reij

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