

Large-scale greening in Niger: lessons for policy and practice

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**etfrn**

This article was submitted for inclusion in the forthcoming edition of ETRN News 60 - Restoring African drylands, due for release in December 2020



“The creation of five million hectares of new agroforestry parklands in Niger may be the largest restorative transformation in Africa.”

Introduction

By the mid-1980s, almost all the natural vegetation in densely populated areas in central Niger had disappeared, and this part of the country was characterized by near-continuous agriculture. Since that time, the need to intensify agriculture has motivated large numbers of smallholder farmers to increase the number of on-farm trees. This happened not through the planting of seedlings, but through the protection and management of woody species that resprouted naturally on smallholders' farmland. In this way, farmers contributed to a significant regeneration of new agroforestry parkland.

During a visit to Maradi Region in central Niger in 2004, it was clear that farmers had begun to protect and manage woody species over large areas of their farmland. This farmer managed natural regeneration (FMNR) had been actively promoted by several projects since the 1980s and had already been reported on. But surprisingly, no one had investigated the true impacts of this phenomenon. With this in mind, the authors decided to look into the scale of regeneration between 2004 and 2009, using satellite images and field visits.

During this time, it became clear that smallholder farmers in the regions of Zinder and Maradi regions and adjacent parts of Tahoua Region had protected and managed the natural regeneration of woody species on about five million hectares of farmland (Reij et al. 2009). This large-scale creation of new agroforestry parklands is most likely the greatest positive environmental transformation in Africa. Even more remarkable, it has occurred in a country that according to the Human Development Index Rankings of the UN has always been the poorest or second poorest country in the world (<http://hdr.undp.org/en/content/2019-human-development-index-ranking>)

Explaining the causes

Changes in rainfall and land management

Some people argue that increases in rainfall since the late 1980s triggered a process of greening in Niger and across the Sahel (Olsson et al. 2005; Hermann et al. 2005). This reportedly contributed to an increase in herbaceous species (mainly annuals) on sandy soils, but not necessarily to an expansion of woody vegetation cover. One thing is certain: the large-scale emergence of agroforestry parklands in central Niger is far beyond what would be expected from an increase in rainfall alone. Rainfall may have contributed to the process, but it does not explain it.

Smallholders in Maradi Region began to protect woody species regenerating on their farmland starting in the mid-1980s, a period characterised by severe drought. If rainfall were a determining factor, then northern Nigeria — with higher rainfall than southern Niger — should have had higher on-farm tree densities. However, the images below show that just across the border from Maradi and Zinder regions in Nigeria, the number of on-farm trees is much reduced. Thus, it appears that rainfall can contribute to the process of greening, but human management is a much more significant determining factor. The key species regenerating on farms in central Niger include *Faidherbia albida*, *Piliostigma reticulatum*, *Combretum glutinosum* and *Guiera senegalensis*. Farmers perceive that these species have a positive impact on soil fertility or on producing fodder or high quality firewood.

The urgent need to intensify agriculture

It is striking that on-farm greening in Niger occurred mainly in areas with higher population densities. In areas with few people, such as the border region between Niger and Burkina Faso,



Left: A village in southern Niger (Maradi Region) close to the border with Nigeria. Right: a village in northern Nigeria close to the border with Niger. Population densities and soils are similar, but the number of on-farm trees in northern Nigeria is significantly lower than in southern Niger. Photos: Gray Tappan

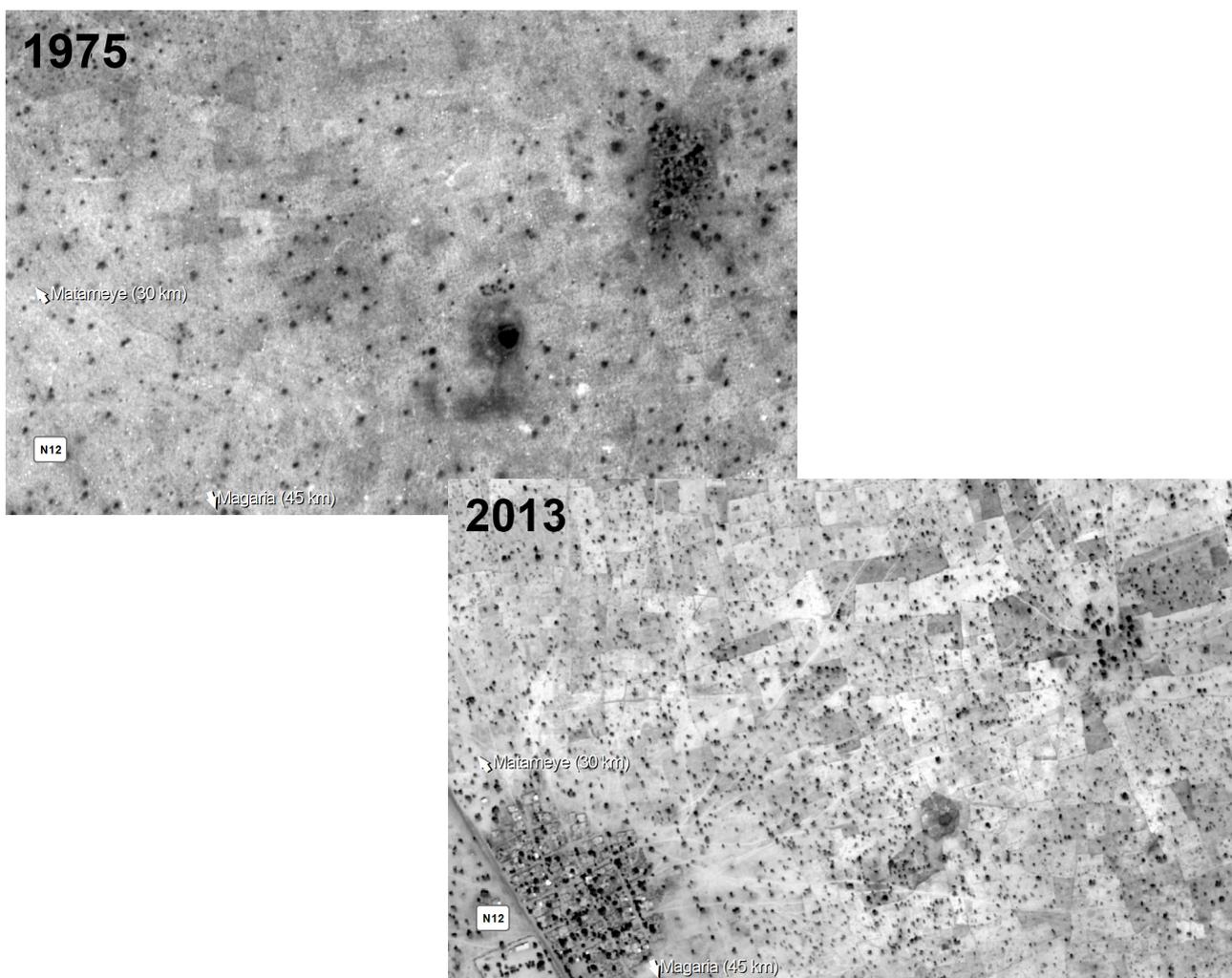
the vegetation continues to degrade. Population densities in southern Maradi and Zinder regions are >100 persons per km^2 and the large-scale greening in these area is a story of “more people, more trees,” as shown in the images on page 4.

Prior to 1985, standard farming practice involved clearing all bushes and cutting back regenerating trees and shrubs on cropland at the onset of the rainy season. The number of on-farm trees had declined to an all-time low, which meant that farmland was largely barren and exposed to the wind and sun. Women had to walk an average of 2.5 hours each day to collect firewood, and given its scarcity, the use of crop residues and manure as a source of domestic energy was common. Unsurprisingly, crop yields were low and declining soil fertility was a main concern of farmers.

Yamba and Sambo (2012) found that 58% of 70 household heads interviewed in Kantche district, Zinder Region, mentioned improving soil fertility as the main reason to increase on-farm trees.

Low costs and quick benefits

Protecting and managing naturally regenerating woody species is a low-cost technique, requiring only some labour for their protection, thinning and pruning. This process becomes easier still if farmers organize themselves at the village level and adopt bylaws for protecting and managing their new tree capital. This means that FMNR is not only a technique, which can easily be mastered by all land users, but also contributes to developing village institutions, which is a more complex and time-consuming process.



Left: A village in southern Zinder Region in 1975: on farm tree densities are low and the village is small. Right: The same village 38 years later: on-farm tree densities have increased. The village that existed in 1975 is smaller, but a new village has been built along the road. Source: CILSS (2016)

The common understanding is that when you plant a tree, the benefits will accrue for the next generation. However, in the West African Sahel, the natural regeneration of woody species produces benefits more quickly than that. By the first or second year emerging stems have to be thinned and pruned, yielding twigs and small branches for use as firewood and leaves for fodder or to enrich the soil. As soon as smallholder farmers observed this happening on the fields of fellow farmers, many hundreds of thousands of them in the Maradi and Zinder regions quickly adopted FMNR, and most did so spontaneously.

Another benefit of increasing on-farm tree numbers is that farmers created more complex and productive farming systems that are also more resilient to drought. In the 1980s, farmers often had to sow their crops several times after they

were destroyed by strong winds, which covered the crops with sand. When farmers increased the number of woody species on their land, they only had to sow a crop once as the vegetation helped block the wind. More woody species also meant more fodder production, so farmers could keep more livestock. An indication of increased resilience in Kantche District, with a high population density and high on-farm tree density, is that farmers produced a grain surplus of almost 14,000 tonnes in 2011. This was a year of serious drought, when the national grain shortage was estimated to be around 500,000 tonnes.

The start and spread of FMNR

Several stories exist about how FMNR started. One is that Australian agronomist Tony Rinaudo, who since 1980 had tried in vain to plant trees



A young and dense agroforestry parkland dominated by *Faidherbia albida* in Niger's Zinder region after the harvest. Two piles of crop residues can be seen between the trees. Photo: Chris Reij

in Maradi, discovered some green stems in a sandy field in 1983, emerging from stumps hidden just below the surface. His conclusion was that there was an “underground forest” of such living stumps that had been cut in the past but never allowed to resprout. The Maradi Integrated Development Project then offered food aid to farmers willing to protect the stems regenerating from these tree stumps in 1984 and 1985. These being drought years, thousands of farmers were willing to do so. A normal harvest followed in 1986, so food aid was discontinued; at least half the farmers again cut the young trees that they had protected, but others continued to protect them. Those who had cut their young trees quickly regretted it when they saw the positive impact on crops in the fields of those farmers who had continued to protect and manage the regenerating trees. Many farmers then quickly started all over again to protect the trees without any external incentive (Dieterich 2018).

A second story comes from Dan Saga village in Aguié district, Maradi Region. Several young farmers who had left as labour migrants to Nigeria returned too late in the season to clear trees and shrubs from their fields before sowing crops.

During harvest time, these smallholders observed that their yields were higher than those of fellow farmers who had simply cleared their fields “as usual.” The same thing happened the following year, and that really convinced their neighbours that it made good sense to increase the number of woody species in their fields (Pye-Smith 2013).

Changing perceptions of ownership of on-farm trees

Before 1985, the common view was that all trees belonged to the government. This was a legacy from the colonial period and was reflected in the country's 1974 Forest Code. But since the late 1980s, farmers began to perceive that they had a right to the trees on their own farms, a change that was catalysed by a national debate in 1984 about how to fight desertification. This perception led to increased participation by local communities in the management of their natural resources. This *de facto* ownership of trees did not mean, however, that farmers could freely manage or cut their on-farm trees as they pleased. They still required a permit from the forestry service to harvest “their” trees, or even to prune them. However, the 2004 Forestry Code enshrined the



The village of Ranawa (Maradi region) has organized a rural firewood market based on the sustainable management of new agroforestry parkland. Photo: Chris Reij

acknowledged rights of communities to their own trees, which they could manage and exploit with the approval and technical support of the forestry service.

The role of government

Forest service staff in Maradi and Zinder regions cooperated with greening projects, and began supporting FMNR at an early stage, although it took longer for senior national-level forestry agents to perceive its importance. For many years, their focus continued to be on tree planting. The past decade, however, has seen an increasing awareness at all levels of government about the importance of FMNR, and about the massive scale of the transformation in central Niger. From technical agents at the local level to regional governors, the Minister of Environment and even Niger's President, they are all aware of FMNR and its impacts, and they all now actively support it. A recent development is that on 30 July 2020, the President of Niger signed an implementing decree regarding FMNR that fully recognizes the rights of farmers to their on-farm trees and allows them to manage their woody species (thinning, pruning) without fear of being fined by forestry agents.

The role of researchers

A number of researchers from the National Institute for Agronomic Research (INRAN) and the University of Niamey have accompanied the process since the late 1990s. They became actively involved in supporting an IFAD-funded project in Aguié District, Maradi Region, which promoted FMNR and supported the building of village institutions. These researchers have since undertaken and supported a growing number of studies by masters and PhD students, producing increasingly convincing evidence of the multiple positive impacts of FMNR.

Lessons for policy and practice

Identify and analyse greening successes

Small and large greening successes can be found in every country, and can be used as sources of information and learning. More systematic efforts can also be organised to take stock of transformative changes and notable successes in restoring degraded landscapes, and to improve understanding of key enabling factors, positive impacts and significant outcomes. This kind of stocktaking is rarely undertaken, but the

increased availability of high-resolution remote sensing data, time-series analysis of imagery can help to quantify the extent and impacts of greening. More attention should also be given to analysing the cost-effectiveness of improved practices such as FMNR, and to the associated changes in crop yields, food security, poverty reduction, household resilience, water supplies, carbon stocks and other factors.

Develop a communication strategy

It is important to share information about existing successes as widely as possible in rural and urban areas to accelerate the adoption of FMNR as farmers listen to farmers working under similar conditions. This can be achieved through newspaper articles, TV documentaries and radio programmes, where land users (men and women) can share their greening experiences.

Mobilize and organize smallholders

Getting the right information to farmers about what works and why in land restoration is especially important. This information transfer can be accelerated by organizing farmer-to-farmer study visits to increase exposure to what those in other areas have already achieved. Working with farmer groups helps to increase participation and stimulate community-based actions that support the protection and management of woody species. Since 1986, farmers in central Niger have not received food aid or cash-for-work for tree protection and management. The multiple benefits they have observed provide sufficient motivation for them to invest their time and energy. Also, most villages have development committees that can help encourage the widespread adoption of FMNR and other improved practice. Restoring land successfully depends largely on putting responsibilities in the hands of land users and their communities.

Strengthen village institutions

It takes time to strengthen village institutions so they can effectively manage natural resources, including trees. But in most countries, it is left to each village to develop its own bylaws, which means that most will need to spend time learning

how to do this. Thus, informing villages about what has worked and where will help, and it would be useful to propose one or more models for sets of bylaws, which can be adapted by villages to their specific situations.

Strengthen smallholder capacities

It helps to give villagers some training in best practices for protection, thinning and pruning. If done effectively, this can rapidly produce increased benefits. Smallholders with these skills and experience can then organize themselves to provide peer-to-peer training for other farmers.

Create enabling policies and legislation

Governments have a vital role to play in developing enabling agricultural and forestry policies that will induce millions of smallholders to protect and manage trees on-farm and even off-farm. At present, agricultural development policies often ignore on-farm trees, and forestry policies tend to focus on planting trees, which can cost US\$500–1,000 per hectare. The implementing decree regarding FMNR in Niger mentioned above is an example of enabling legislation. When farmers perceive that they have a clear right to their on-farm woody species, they will invest in them.

Conclusions

Unless countries can manage to mobilize millions of land users to invest their scarce resources in protecting regenerating trees, the battle against land degradation cannot be won. These experiences from Niger show that hundreds of thousands of smallholder farm families have substantially increased tree cover on their farm land by investing in the management of on-farm trees. This has improved their production systems and their livelihoods. There is no reason to believe that similar success cannot be achieved in many more countries throughout African drylands and sub-humid area. The goal is to restore millions more hectares of degraded land by means of productive and resilient farming systems.

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This article was submitted for inclusion in the forthcoming edition of ETFRN News 60 - Restoring African drylands, due for release in December 2020, containing 25 articles plus interviews and boxes describing farmer-led, NGO, private sector, government and international initiatives. These highlight the roles of varied policies and stakeholder interests, and identify opportunities to encourage smallholder and community participation in scaling out successes and meeting national, regional and global commitments.

This article may undergo further editing prior to publication of the complete edition, and as such, could differ from the version presented here.

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Issue date: October, 2020

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Editors: Nick Pasiecznik and Chris Reij

Copy-editing: Patricia Halladay

Cover photo: Livestock in a high-density agroforestry parkland in southern Zinder (Niger). Photo: Chris Reij



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