

FARMER MANAGED NATURAL REGENERATION - NIGER

Farmer Managed Natural Regeneration (FMNR) is the systematic regeneration of living and sprouting stumps of indigenous vegetation which used to be slashed and burned in traditional field preparation. The naturally occurring seedlings and / or sprouts are managed and protected by local farmers. Most suitable are species with deep roots that do not compete with crops and have good growth performance even during poor rainy seasons. In the case study area the three most valuable species – as perceived by land users – are *Faidherbia albida*; *Piliostigma reticulatum* and *Guiera senegalensis*.

The ideal density, when grown with cereal crops, is between 50 and 100 trees per hectare. For each stump, the tallest and straightest stems are selected and side branches removed to roughly half of the stem height. Excess shoots are then removed. Regular pruning of any unwanted new stems and side branches stimulates growth rates. Farmers are encouraged to leave 5 stems / shoots per tree, cutting one stem each year and letting another grow in its place. On removing a shoot, the cut leaves are left on the surface where they reduce erosion and are then eaten by termites, returning the nutrients to the soil. The remaining shoots continue to grow, providing a continuous supply of wood. From the first year, firewood is collected from trimmings. From the second year on, cut branches are thick enough to sell. A more intensive form of FMNR is to profit from every stump sprouting on the land. This option allows idle land to become a productive resource during an otherwise unproductive eight-month dry season. FMNR is a simple, low-cost and multi-benefit method of re-vegetation, accessible to all farmers, and adapted to the needs of smallholders. It reduces dependency on external inputs, is easy to practice and provides multiple benefits to people, livestock, crops and the environment. Tree layout will need to be carefully considered if ploughs are used for cultivation.



SLM measure	Vegetative and management
SLM group	Agroforestry
Land use type	Mainly annual cropping
Degradation addressed	Deforestation; Wind erosion and sedimentation (increased wind speed, dust storms); Water deficiency; Sand dune movements
Stage of intervention	Mainly rehabilitation, partly mitigation
Tolerance to climate change	Tolerant to climatic extremes (e.g. droughts, temperature increase, rainfall decrease, etc.)

Establishment activities

1. Select 50 - 100 stumps per hectare for regrowth during the dry season.
2. Select the tallest and straightest stems and prune side branches to roughly half the height of the stem (using sharpened axe or machete and cutting upwards carefully).
3. Remove excess shoots, leave the cut leaves on the surface.
4. Prune any unwanted new stems and side branches (each 2-6 months).

All activities carried out manually.

Maintenance / recurrent activities

1. Cut one stem (per tree) each year and let another grow in its place.
2. Once the stems selected for growth are > 2 meters high, they can be pruned up to two thirds.
3. Prune any unwanted new stems and side branches (each 2-6 months).

All activities carried out manually.

Note: Farmers in different countries have developed a range of management practices which best suit their needs and thus differ from the present case study.

Labour requirements

For establishment: low

For maintenance: low

Knowledge requirements

For advisors: medium

For land users: medium

Photo 1: Mature FMNR system in Maradi, with millet and a tree density of around 150 trees/ha.

Photo 2: New tree sprouts in front of the farmer, harvested wood in the background. Note the proximity of the crop (millet) to the tree without detrimental effect.

Photo 3: Re-sprouting tree stumps and roots: the basis of FMNR.

Photo 4: Typical FMNR farm after harvest of millet.

Photo 5: After just one year the numerous stems are growing vigorously and straight. Ideally, one or two are harvested from the clump each year, always leaving new regrowth to replace them. (All photos by Tony Rinaudo)

Case study area: Maradi, Niger



Establishment inputs and costs per ha

Inputs	Costs (US\$)
Labour: 2-3 person-days	6
Equipment / tools: see below	0
Agricultural inputs: none	0
TOTAL	6
% of costs borne by land users	100%

Maintenance inputs and costs per ha per year

Inputs	Costs (US\$)
Labour: 1-2 person-days	4
Equipment / tools: see below	0
Agricultural inputs: none	0
TOTAL	4
% of costs borne by land users	100%

Remarks: Main costs are in the form of labour. One man could prepare one hectare in 1–3 days, depending on tree density (labour is undertaken by the farm owner and rarely through paid labour). No inputs used; no extra tools needed, tools are available on-farm (hoe, axe, machete etc). Maintenance costs depend on tree density also and could require 1–2 days/year/ha.

Benefit-cost ratio

Inputs	short term	long term
Establishment	positive	very positive
Maintenance	positive	very positive

Remarks: Annual income from selling wood: US\$ 140 (from the 6th year after implementation). By some estimates, total benefit per hectare (incl. wood sales, increased crop yield, increased livestock productivity, wild foods and medicines etc.) are in the order of US\$ 200/ha, compared to an investment in labour US\$ 10-15.

Ecological conditions

- Climate: semi-arid
- Average annual rainfall: 150–500 mm (variable)
- Soil parameters: low fertility, very low soil depth, drainage and organic matter content
- Slope: mainly flat, partly undulating
- Landform: mainly plains
- Altitude: 200–300 m a.s.l.

Socio-economic conditions

- Size of land per household: 1–5 ha (average production area)
- Type of land user: small-scale; very poor and poor land users
- Population density: 11 persons/km²
- Land ownership: individual, generally untitled
- Land use rights: individual
- Level of mechanisation: mainly manual labour, partly animal traction
- Market orientation: mixed (subsistence and commercial)
- FMNR can be practiced by any farmer, even the poorest. No external

Production / economic benefits

- +++ Increased wood production (production value increased by 57%)
- +++ Increased income
- +++ Increased crop production (at least doubled)
- ++ Reduced workload: no annual clearing / burning of trees
- ++ Increased livestock production (nutritious pods as fodder)

Ecological benefits

- +++ Increased soil cover and increased biomass: increased tree density on farmland (from 30 to 45 trees/ha average)
- +++ Windbreak effect: deposition of rich, wind blown silt; improved micro-climate
- +++ Increased organic matter from leaf fall and trimmings
- +++ Increased soil fertility (dung; livestock spends more time in fields with trees)
- +++ Increased biodiversity; creation of habitat, food and shelter for predators of crop pests
- +++ Increased drought-tolerance: regenerated trees are indigenous and generally have mature root systems

Socio-cultural benefits

- ++ Increased food security: edible leaves / fruits; bridge food shortages
- +++ Improved quality of life: reduced wind speeds and dust; shade is available; barren landscape is returning to a natural savanna
- +++ Increased disaster risk reduction: FMNR acts as an insurance policy

Off-site benefits

- +++ Urban populations benefit from cheaper, sustained wood supply and reduced incidence of dust storms

Weaknesses → and how to overcome

- Scarce presence of live tree stumps → alternatively broadcast seeds of indigenous species (reduced short term benefits; high mortality rates).
- Cultural norms and values: 'a good farmer is a clean farmer' (= no trees) → work with all stakeholders to change norms.
- Land (including trees) is treated as common property during dry season; damaging and removing trees on other people's land occurs → create sense of ownership of trees: (1) encourage communities to develop rules that respect property; (2) local forestry authorities granting informal approval for farmers to be able to reap the benefits of their work.

Adoption

The technology has first been implemented in Maradi region, Niger in the early 1980's. Spread has been largely spontaneous, with minimal external assistance. The area covered today by trees from FMNR is estimated to be more than 50,000 km² in Niger.

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