A user's guide for practitioners in Uganda
Acknowledgements:

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About this guide book

Since its introduction to Uganda in 2012, the Farmer Managed Natural Regeneration (FMNR) approach has been spreading in Uganda, as a fast and affordable option for reforestation. The spread of the FMNR approach has translated into a loose network of organizations which have adopted and are promoting FMNR. This guide is a response to the demand from the members of the FMNR network (to which ICRAF belongs as a founder member), for FMNR knowledge materials which are specific to the Ugandan context.
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The area covered by forests and woodlands in Uganda has reduced at such an alarming rate over the years. By 2015, Uganda had only 1,829,779 Ha of forest (9% of the total land cover) out of the 4,880,484 Ha (24% of the total land area) that existed in 1990. It’s not surprising then that Uganda is considered among the top five countries in the world that had the highest net annual forest cover loss between 2000 and 2010.

The direct observable factors which have driven the country to this state of affairs are numerous and complex. The Uganda National REDD+ strategy (2017), highlights some of these as: Wildfires, wood extraction for fuel wood, charcoal, and construction, small holder agricultural expansion as well as large scale commercial farming.

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There have been reforestation and afforestation efforts in the country by both Government and non-state actors to be able to restore the forest/tree cover to the original 24% of total land area. But given the average annual rate of forest loss of 122,000 Ha, it’s obvious that the pace of restoration hasn’t caught up with the rate of deforestation and forest degradation. So what could be slowing down these efforts?

The challenges of tree growing in Uganda range from; limited access to suitable finance, poor governance of the Forestry sector, limited extension services among others. On-farm challenges include; termites, drought, fires, lack of seeds and seedlings among others. Farmer Managed Natural Regeneration (FMNR) is a cheap and replicable model which is implemented well, can address several of the on-farm challenges and contribute to increasing tree cover and re-greening Uganda.

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Farmer-Managed Natural Regeneration (FMNR) is the systematic regeneration of trees from tree stumps, seeds and roots. It’s based on the amazing gift of nature, which gives most of the indigenous trees an inherent ability to coppice or re-sprout after they have been cut down.

In some cases where the trees are cut so close to the ground, it may be difficult to differentiate the young shoots from weeds when the tree stump coppices or re-spouts. Farmers are encouraged to prune and protect the sprouts, or naturally growing tree seedlings which could be found on either cropland or grazing land.

Coppicing trees stumps have an extensive root system under ground, which continues to draw moisture and nutrients from the ground, for the sprouting shoots. This enables them to grow much faster than planted tree seedlings, which still have to establish its root system.

What the FMNR model does then, is to tap into this underground forest, by drawing the attention of landowners to this great opportunity that exists on their land, challenging them to change attitude towards growing indigenous trees and encouraging them to allow more trees on their farms. FMNR therefore is more of a social movement, than a technical one.
Background to FMNR

Farmer Managed Natural Regeneration was first introduced to the Maradi region of the Niger Republic in 1983, by a missionary called Tony Rinaudo from Australia. FMNR was borne out of the frustration with tree planting efforts which continuously became fruitless given the harsh conditions under which trees were being planted.

These conditions included;
i. Droughts where temperatures could go up to 40°C during the hot months
ii. Strong winds of up to 70 Km per hour
iii. Pests especially termites and locusts
iv. Sand blasting which desiccated crops and tree seedlings and/or even buried them
v. Trampling and browsing by livestock. It was common for herdsmen to move from one place to another with large herds of livestock, looking for pasture

Through the introduction of FMNR, an almost bare degraded region which could hardly support crop production either, was transformed into an oasis where farmers were able to triple their grain production, but also produce and sell wood worth $600,000 within a 12 year period.

Regeneration of trees or shrubs from stumps is not a new practice in Uganda. For generations, farmers in Uganda have had the practice of regenerating trees and/or shrubs from tree stumps. A good example are the farmers in Kibaale district, who commonly retain Markhamia sp. on farm, from which they keep harvesting poles for construction, while leaving the tree stumps to regenerate. Robusta coffee is managed in the same way within the banana coffee farming systems in central Uganda.

When the coffee shrubs grow tall and unproductive, they are culled off from the base, to allow new coffee sprouts to grow from the coffee stump. Similar examples can be given of Eucalyptus plantations across the country, which after clean felling of the mature trees, a new generation of plantation emerges from the Eucalyptus tree stumps that were left behind.

However, it should be noted that this regeneration has not necessarily been a systematic practice. Farmers simply do it as part of crop agronomical practices, or randomly as a way of keeping a few desired trees on farm. The FMNR model therefore helps to transform this random practice into an intentional approach towards increasing trees on farm and in landscapes.

FMNR was first introduced in Uganda by Tony Rinaudo in Arua district - Offaka and Anyiribu Sub Countries, at the invitation of World Vision Uganda in 2012. A group of about 30 farmers and Government officials who were trained by Tony soon became champions in promoting the model. By 2014, FMNR was being practiced in over 15 districts in Uganda.

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Farmer-Managed Natural Regeneration

The Tony Rinaudo story

This is a picture by Tony Rinaudo. He came across vast farm lands devoid of trees but with no source of seedlings. He embarked on FMNR in this particular site.

After one year of FMNR, Tony was able to manage sprouts and coppices.

This is how Tony’s site looked after three years of FMNR.

The Uganda Version

In Karamoja, vast areas are devoid of trees.

World Vision Uganda introduced FMNR and encouraged communities to nurture coppices.

A community group embraced the approach and was supported with new approaches and ideas. They fenced off the area to stop animals from destroying the sprouting stems. Two to three years later the area became cultivable with crops.
Box 1. Benefits of FMNR

FMNR contributes to:

- Increased biodiversity on farms, and grazing land as a result of the variety of indigenous tree stumps available for regeneration. Tree species diversity improves the micro-catchment for birds, insects and wild animals thereby creating healthy and productive agro-ecosystems.
- Efficiency in resource use. FMNR is a cheap option for restoring tree cover on-farm and degraded forested landscapes because it uses the trees that are already growing on the land. Chances of tree failure due to drought, pests and fires are minimal because existing trees species are usually well-adapted to these conditions. Hence it’s possible to achieve a high survival rate of trees at a very low cost.
- Quicker coverage of landscapes with trees, hence the accruing benefits of trees such as decreased wind speeds, soil erosion control, and recharge of the water table, among others. Because of its simplicity, FMNR is easily adopted by many farmers in a short time.
- A stable supply of fuel wood and other wood needs, given the multiple stems that are regenerated per tree stump on a continuous basis. A stable on-farm fuel wood supply in turn contributes to household food and income security, prevention of gender related dangers to women and children while collecting firewood, and better time usage for women and children.

Examples of FMNR benefits

A case of Betty from Nakasongola District

Betty (46 years) was recruited as a community champion and she received training on FMNR in August 2013. Within two years, she had implemented FMNR on ten acres of grazing land, which in turn improved the pasture for her goats and cattle, but also eliminated the predators that used to kill the kids. Her animals increased from 5 to 8 cows, and from 10 to 35 goats (excluding the 3 cows and 12 goats that she sold within this period).

She earned a total of approx. $800 from sale of goats, cows and firewood. With this money, Betty and her husband were able to cover school fees for her six children. “The biggest benefit from FMNR has been being able to educate my children” says Betty.

A case of Mr. Lopeikume of Kotido district

Lopeikume (69 years) was trained on FMNR in 2013 as part of the 30 champions for his sub county. He started putting his knowledge into action straight away. Two years down the road, this is what he had to say;

“Before Implementing FMNR, we needed 5 hrs, moving to the forest to look for poles, firewood, and vegetables. Now it takes us only an hour to get poles and vegetables, because we have regenerated the trees in our own farm. I also get some income from the sale of poles, fencing materials - 15,000 Ugx from sale of each pole from my farm and 5,000 Ugx through the sale of 15 pieces of firewood. We don’t need to move long distances to look for vegetables, poles and firewood everyday like we used to before we implemented FMNR”.

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FMNR is very easy, and does not require any special skills to implement. Anybody can do it, including children. The following five quick steps can be used to introduce FMNR on a farm;

Step 1. Do not automatically slash all tree growth, but survey your farm noting how many and what species of trees are present. You need to be extra observant, because some of the growths that you may dismiss as weeds, may actually be shoots of a tree stump that was cut very close to the ground. The leaves of small shoots may look slightly different from their mature relatives.

Also, look out for tree seedlings which are growing from seeds that could have been dispersed by wind, birds, animals (including humans) etc.
Step 2. Select the stumps, naturally growing tree seedlings or roots which will be used for regeneration. If you are doing this on cropland, care must be taken to allow for ample space between the selected stumps or seedlings (between 10 – 15 meters) so as to enable crops to get enough light when the shoots eventually grow into mature trees.

Step 3. Select the best (those which look healthier, and are straighter) three to five stems/shoots from tree stumps or roots which will be pruned and remove unwanted ones. This is called culling, and it allows the remaining shoots to grow faster and bigger in size due to reduced competition for light, nutrients and moisture.

In the case of naturally growing seedlings, weed around the desired ones, and mark them. Marking can be done by tying a bright colored material around the seedling, or simply putting a peg or a stake near the seedling. Marking prevents the seedling from being weeded out accidentally.

Step 4. If the remaining stems are still very young, tie them together with a string for support. In the process of culling off unwanted coppices/stems/shoots, the remaining ones are loosened from the stump, hence the need for support. Tying them together will also promote more straight growth.
**Step 5.** For best results, the remaining coppices/stems/shoots are pruned from time to time, and will increase in size and value each year until they are harvested. Pruning should be carried out with sharp tools, and should be done carefully to avoid damaging the young stems. Unwanted branches should be cut from underneath, rather than the top to prevent peeling of the bark. Each time one stem is harvested, another shoot/stem is selected to replace it. The uses of the coppices are enormous. They can be a source of firewood or poles for construction of houses. Or, you can also hung bee-hives on the stems to attract bees and join the apiary business.

**Don’t do this…..**

- Burning bushes kills regenerating trees.
- Debarking trees will not allow regeneration.
- Killing standing trees by way of setting fire on the is bad.
- Shifting cultivation does not allow natural regeneration.
3 Scaling up beyond the farm

If scaled up, FMNR can rapidly close the gap between deforestation and reforestation. FMNR should complement rather than substitute other re-forestation efforts. As indicated in section 1, FMNR is a social rather than a technical movement, hence the game changer at community level is facilitating attitude change, whereas at National level, it’s important to identify entry points and ensure integration of FMNR into programmes, strategies and policies.

The actions below, are suggested for consideration in creation of an FMNR movement at community, landscape or national level.

**Awareness creation**
For any relatively new development initiative, sensitization is central to unlocking potential for adoption. Sensitization of communities and stakeholders can be approached in many ways, but the approaches below have been tested and proven to be effective in rallying individuals and institutions behind FMNR.
Farmer-Managed Natural Regeneration

a) Community meetings or workshops are a good tool for introducing FMNR to key stakeholders. Such stakeholders could include; Cultural leaders, religious leaders, leaders of specific groups like pastoralists, people with disabilities, youth, women etc., local government departments of Natural resources production and education, Political leaders at district and sub county level, NGOs, CBOs, media among others. The purpose for these workshops or meetings is to secure a buy-in for FMNR and create a critical mass of people who can influence others to adopt.

b) Awareness about FMNR can also be done with the use of local radio stations, in local languages.

c) Community theatre in form of drama and song are powerful tools for mass awareness. Drama can be staged in strategic community locations to educate and entertain the masses. Care must be taken though, to attract the right crowd, people who own land and are able to adopt or leaders who are able to influence others.

Training Champions

Champions are individuals who get convinced about the potential of FMNR and are willing to promote it. Champions could be at community level i.e., farmers or community leaders who implement FMNR on their farms and use this as training ground for their peers, or at institutional level where trained technical staff of NGOs, Local Government, and MDAs as well as school teachers use the opportunities as their disposal to pass on FMNR knowledge and skills. Champions should be identified by their communities or institutions, for purposes of eliminating questions about their mandate. At community level, the roles of champions (see box 2) should be explained clearly, before any selection is carried out, and this should be based on a criteria that is agreed upon in a participatory manner.

Training of champions should include field visits to mature FMNR sites. This has proven to be a powerful tool for facilitating attitude change.
Establishment and use of community learning sites

These are areas that are put aside, to demonstrate FMNR and its integration with practices such as soil and water conservation, crop and livestock husbandry, bee keeping among others. Community learning sites are powerful result demonstration tools for facilitating attitude change towards FMNR among neighboring communities.

It’s best to identify a degraded site, which can best demonstrate the impact of FMNR as a restoration option. Before carrying out any activities on these sites, agreements should be made with land owners, to avail the land for a specific period of time. Management of the learning site, as well as sharing of the benefits from the site should be agreed upon before commencement of activities. Best results are achieved when the community learning site is attached to a farmer group for proper management.

Putting in place and/or strengthening structures for FMNR implementation and promotion.

These are important at community level for purposes of follow up on new adopters and ensuring accountability for set targets.

Box 2: Role of Community Champions

1. Implementing FMNR on their own farms, and serving as role models
2. Reaching out to peers and neighbours and sensitising them about FMNR
3. Transferring FMNR skills to willing farmers and following up to ascertain that its being carried out properly
4. Carrying out monitoring, to establish those who have adopted FMNR
5. Responding to calls to capacity building beyond their communities where possible

Serving as an FMNR is a voluntary responsibility, although where possible champions should be facilitated to carry out some tasks such as monitoring which may require them a good deal of travelling.

Existing organizational structures such as cooperatives, networks or farmer groups can be identified and trained to promote FMNR. Where they are nonexistent, new ones could be formed. Schools too should be considered as possible structures/institutions for FMNR scale up, since children are make excellent champions once they are trained (see last point on FMNR in schools).
Forming networks
As adoption of FMNR increases among institutions, it will be important to create networks which provide support for addressing any bottlenecks for further adoption, but also serve as platforms for sharing lessons and learning from each other.

Lobbying for a favorable environment for FMNR
Specific issues for lobbying should be arrived at based on champions’ feedback regarding the challenges that they face in promoting FMNR. Often in a community, once a few individuals begin regenerating trees, they face numerous challenges such as browsing of young trees by livestock, theft of trees, wild fires among others. At institutional level the challenges are; limited awareness which results into prioritization of tree planting over FMNR, promotion counterproductive practices such as uprooting of tree stumps to pave way for use of farm equipment such as tractors, among others. These issues should be taken up with the relevant authorities for redress before they cripple FMNR adoption.

Integration of FMNR into existing plans, programmes and strategies for Government
This should be part of the sustainability strategy as it ensures continuity beyond projects. It provides options for increasing tree cover among poorly funded local governments, departments and agencies. Integration of FMNR into policies, sector strategies and programmes provides an opportunity for its inclusion into budgets and hence implementation.

Strengthen tree based value chains
Farmers will be more willing to invest in FMNR if they know that they will earn a good income from it. FMNR can be complimented with tree dependent enterprises such as apiculture (in places where good bee forage trees have been regenerated), and grazing of livestock to increase the range of products that can be sold beyond wood. Additionally, steps should be taken to develop and/or strengthen value chains for wood, timber and other non-timber forest products such as fruits, medicinal herbs, among others. At a later stage and when communities are ready for it, considerations should be made to facilitating the establishment of certified markets.

Provide adequate follow up and encouragement.
Relatively new concepts such as FMNR invariably encounter numerous problems and it takes time for them to become normal practice. It is imperative that any other organization that introduces FMNR to any community, provides adequate follow up and encouragement during the formative stages of uptake. Farmers are often afraid of the effect of trees on their crops. Once this fear is allayed, and once they get exposed to areas where trees co-exist with crops, they are willing to adopt FMNR and to allow trees on their cropland.
Farmer Managed Natural Regeneration in Schools

As indicated earlier on, children are very good champions as they are persuasive and persistent when they are inspired to do something. Children can be targeted in schools (both primary and secondary) through school environment clubs. Non-school going children can be mobilized through village local councils and camp management for the case of refugee settlements, however follow up on their progress is a little difficult since they are not organized in any formal structure.

Training children on FMNR needs to be creatively done, through activities such as; drama, debates on FMNR related motions, competitions, communication/information materials such as talking compounds, posters, guides specifically designed for children among others. In order for FMNR to succeed, the school administration needs to nominate champion teachers, who are then trained as institutional champions. The teachers will be responsible to organizing learning events and supporting children as they implement FMNR at home and on the school premises, if the school has land.
Organizing music, dance and drama based on FMNR (as above) for both in and out-of school pupils.

In addition to school debates, organise essay competition to guide intellectual development of pupils centred around FMNR and conservation.

The talking compound signs on FMNR (as above) enhance learning.

Teaching and learning aids on FMNR are critical.

Demonstrating the importance of trees to pupils is key.

It is important to package information in formats that children will understand easily (as above).
BOX 2: COMMON QUESTIONS ABOUT THE FMNR MODEL

1. Which tree species?
Tree species for regeneration are decided upon by the farmers or land owners themselves. This decision is often dependent on the value that they attach to the species, uses, and experience regarding tree growth habits. Hence tree species choices will vary from community to community and from farm to farm.

2. What is the spacing for trees?
Different literature recommends 40 trees per hectare or 15 trees per acre. Since these trees are regenerated from existing tree stumps, there might be less control on spacing. However farmers can ensure that they choose (for regeneration) those tree stumps that have ample space for crops between them.

3. What if there are no tree stumps?
In some places, tree stumps may not be evident simply because the trees were cut close to the ground. In such cases, coppices may appear as bush or weeds. In other cases, there may be tree seedlings that are growing as a result of wind and bird dispersal of tree seeds. That’s why, there should be careful inspection of a field before it can be declared unsuitable for FMNR. In case there are no stumps, seedlings or even roots that can be regenerated, then tree planting can be considered, with tree species of farmers’ choice.

4. How about trees that do not coppice? What should be done for them?
The majority of the indigenous tree species have the ability to coppice, if allowed to do so. Hence farmers have a wide variety of indigenous species to choose from. However, in cases of tree species which are desired but cannot coppice, farmers can be taught how to raise them in tree nurseries, for planting.

5. Why not just plant trees?
FMNR presents an opportunity to tap from to tap into an already existing underground forest, without necessarily investing much, financially. But also FMNR addresses several of the challenges that lead to poor survival of tree seedlings such as drought and lack of tree seedlings. Tree planting would be the only option in areas where there are no tree stumps, or where the desired species do not exist on farm.
4 Suitability of FMNR in Uganda

FMNR can be practiced anywhere in Uganda, provided there exists tree stumps, roots or naturally growing wildlings that can be nurtured to regenerate into new trees. This said, it’s worth noting that there are parts of the country, where FMNR will be the most suitable option for increasing tree cover. Table 1 below, provides some of these.
Table 1: A description of Areas in Uganda where FMNR provides the best alternative for reforestation

<table>
<thead>
<tr>
<th>Areas</th>
<th>Description</th>
<th>How FMNR addresses the needs</th>
</tr>
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<tbody>
<tr>
<td><strong>Rangelands - Karamoja</strong></td>
<td>A region that is characterized by three agro-ecological zones namely; Pastoral (less 300 – 500mm of rainfall), Agro-pastoral (500 – 800mm of rainfall) and agricultural (800 – 1200mm of rainfall)(^6). The region is characterized by droughts, and severe dry spells, as well as the resultant water stress, which pose serious challenges in raising tree seedlings and watering of trees planting a challenge. Being a typically pastoral or agro-pastoral area characterized by mobile herding (^7), extra costs will have to be incurred so as to protect young trees from being browsed by livestock.</td>
<td>The extensive root system which exists beneath the tree stump is able to supply moisture for the shoots even in the driest spell. Hence there is no need to water the trees. FMNR encourages rotational grazing, where pastoralists restrict grazing to a section of grazing land, hence allowing the trees and grass in other sections to regenerate. Given that grazing is communal, this will have to be a community rather than an individual’s decision.</td>
</tr>
<tr>
<td><strong>Range lands – the rest of the Cattle Corridor</strong></td>
<td>This is a continuation from Karamoja, running diagonally across the country to the Ankole sub region in the South Western part of Uganda. In addition to the challenges such as long dry spells, coupled with water stress as experienced in Karamoja, the rest of the rangelands have termites which will destroy planted trees. The other challenge is the use fires as a rangeland management practice. All these make tree planting a very costly venture, not to mention browsing by livestock since grazing is the major land use in the cattle corridor as well. Grazing practices are a mix of pastoral and settled grazing on farms.</td>
<td>This part of the rangelands is characterized by slow growing tree species which if managed well under FMNR, coupled with clearance of invasive species, will develop into well managed woodlands that are very conducive for cattle grazing in even in dry seasons. The indigenous tree species in these areas are resistant to termites and can recover very fast after a fire. A good example is Kiruhura and Nakasongola districts, where land owners have adopted the practice and are slowly re-greening the rangelands.</td>
</tr>
</tbody>
</table>


\(^7\) Egeru et al. 2014.
| Severe degraded areas particularly fragile ecosystems as well as refugee settlements | These areas can be divided into two.  
  a) Rural areas which have a high population density and therefore a high wood demand which accelerates deforestation.  
  b) Fragile ecosystems which have been gradually degraded, leaving them devoid of any trees and prone to soil erosion and mud/landslides. These could be bare hills and mountain slopes in need of urgent restoration, faster than what tree planting alone can achieve. | FMNR offers a cheap and faster option for increasing tree cover in these areas.  
  With FMNR, it’s possible to achieve higher tree survival rates and because trees are grown from existing stumps, the limitations of access to tree seedlings are eliminated (see box 1).  
  If coupled with soil and water management practices, these areas can be restored even much faster. |
About the FMNR Network in Uganda

The FMNR Network was born out of the July 2014 national conference which was organized to scale up awareness and adoption in the country. The Network is a loose coalition of multi stakeholder organizations aimed at scaling up the FMNR model as a means of improving food, nutrition and income security in Uganda. Currently, 18 member organizations subscribe to the FMNR model from whom a task force comprising of 9 member organizations was formed in July 2014 to establish the Network. The task force is intended to provide strategic direction to the network and guide its operations to achieve its goals and objectives.

**Goal**: To improve livelihoods and household resilience for small holder farmers by 2020

**Vision**: Sustainable natural resource management for improved livelihoods.

**Mission**: To establish strong partnerships for up scaling farmer managed regeneration practice.

**Core values**: Commitment, Accountability, Passionate and Green life.

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About the ICRAF

The World Agro-forestry Centre (ICRAF) is a centre of scientific excellence that harnesses the benefits of trees for people and the environment. ICRAF is the only institution that does globally significant agro-forestry research in and for all of the developing tropics. Knowledge produced by ICRAF enables governments, development agencies and farmers to utilize the power of trees to make farming and livelihoods more environmentally, socially and economically sustainable at scales.

**Vision**: An equitable world where all people have viable livelihoods supported by healthy and productive landscapes.

**Mission**: To harness the multiple benefits trees provide for agriculture, livelihoods, resilience and the future of our planet, from farmers’ fields through to continental scales.