Kenya Institute of Curriculum Development

A Skilled and Ethical Society

RESTORING OUR ENVIRONMENT

Natural Regeneration

Junior School Learner's Booklet

World Vision

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Foreword

The Kenya Institute of Curriculum Development (KICD), in accordance with the provisions of the KICD Act No. 4 of 2013 (Revised 2019), is mandated to develop curricula and curriculum support materials that are responsive to the dynamic needs of society. Among the Pertinent and Contemporary Issues (PCIs) addressed through the Competency-Based Curriculum (CBC), currently being implemented by the Government of Kenya, are environmental conservation and sustainable development.

In line with this mandate, the Institute has collaborated with World Vision Kenya to develop a booklet on Farmer Managed Natural Regeneration (FMNR)—a practical and cost-effective approach to land restoration. This booklet is intended for learners in Junior School and introduces fundamental concepts related to environmental restoration, sustainable land use, natural tree regeneration, and community participation in conservation efforts.

The FMNR approach contributes significantly to the attainment of key global development targets, including Sustainable Development Goal (SDG) 13: Climate Action, and SDG 15: Life on Land, by promoting practices that rehabilitate degraded ecosystems, enhance biodiversity, and build resilience to climate change. Equipping learners with knowledge and skills in FMNR not only fosters personal development but also cultivates a generation of environmentally conscious and proactive citizens.

This booklet complements existing Information, Education and Communication (IEC) materials and is designed to enhance learners' understanding, competencies, and positive attitudes toward environmental stewardship and restoration.

The Institute conveys its sincere gratitude to World Vision Kenya for their steadfast support in advancing environmental education, as well as to all technical teams and stakeholders whose expertise and dedication contributed to the successful development of this vital resource.

World Vision Kenya acknowledges the role played by the Australian Government through ANCP and the generous support from World Vision Australia, the Korean Government through KOICA and the generous support from World Vision Korea, and the support by World Vision Hong Kong.

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Kenya Institute of Curriculum Development

1.0 Introduction

Land is one of the most important natural resources because it supports agriculture, biodiversity, and human livelihoods. Healthy land provides food, water, fuel, and other resources that communities depend on for survival. However, in many parts of the world, land is increasingly degraded due to unsustainable human activities and natural factors such as drought and climate change.

To address these challenges, land restoration has become an important strategy for improving degraded landscapes. One particularly effective approach is Farmer Managed Natural Regeneration (FMNR), where farmers protect and manage naturally growing trees and shrubs on their farms. This method is cost-effective, environmentally friendly, and helps improve soil health, crop yields, and biodiversity.

This booklet aims to provide information about the causes and effects of land degradation, the importance of land restoration, and practical approaches such as natural regeneration and Farmer Managed Natural Regeneration. It is intended to raise awareness and guide the learner, communities, and stakeholders on sustainable land management practices that can restore degraded land and improve livelihoods.

Reflection Questions / Activities

1. ***Think–Pair–Share:*** Why do you think land is described as "one of the most important natural resources"? List two ways your family or community depends on land.
2. ***Personal Reflection:*** Have you ever seen an area that looks degraded or unhealthy? Describe what you noticed and how it made you feel.
3. ***Quick Journal Activity:*** In your own words, explain why restoring land is important for future generations.

FIND

PRUNE

UTILISE

FMNR
Steps

GROW

PROTECT

2.0 Land Degradation

Land degradation is the decline in quality and productivity of land due to human and natural causes. It leads to the loss of soil fertility, reduction of vegetation cover and exposed to soil erosion. This makes it difficult for the land to support crops, animals and natural ecosystems. When land is degraded, it cannot provide enough food, water or habitats for living things. Land degradation is a serious environmental problem in many parts of the world.

2.1 Causes of Land Degradation

There are natural and human causes of environmental destruction. Such as: deforestation, overgrazing, unsustainable farming practices, soil erosion, urbanization and infrastructure development and climate change and drought.

2.2 Effects of Land Degradation

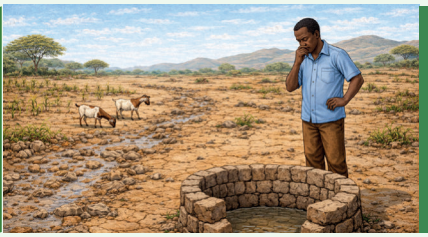
Land degradation has serious environmental and socio-economic consequences:

Reduced Agricultural Productivity – Poor soil quality leads to lower crop yields.

Loss of Biodiversity – Plants and animals lose their natural habitats.

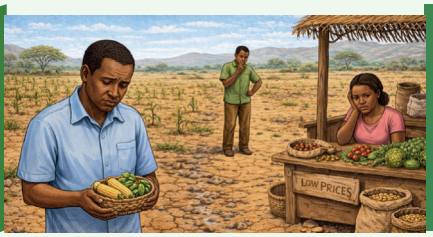
Food Insecurity – Declining food production increases hunger and poverty.

Water Scarcity – Degraded land cannot retain water effectively.



Increased Desertification – Productive land gradually turns into desert.

Economic Losses – Farmers and communities lose income due to poor harvests.



Activity 2: Land Degradation

1. **Cause & Effect Chart:** Identify two human causes of land degradation in your community and describe one effect of each.
2. **Group Discussion:** How does land degradation affect food availability in homes and schools?
3. **Observation Activity:**
   a) Take a short walk around the school or your home area and identify any signs of land degradation (e.g., bare soil, erosion). Record your findings.
   b) Which cause of land degradation do you think is the most common in your region? Explain why.
   c) Create a simple poster showing one cause of land degradation and how it can be prevented.

3.0 Land Restoration

Land restoration is the process of improving degraded land so that it can become healthy and productive again. It helps the land regain its soil fertility, vegetation and ability to support plants, animals and people. Restoring land also makes it suitable for farming and a better place for communities to live. This can be done through methods such as afforestation, reforestation, natural regeneration, farmer managed natural regeneration and soil and water conservation practices.

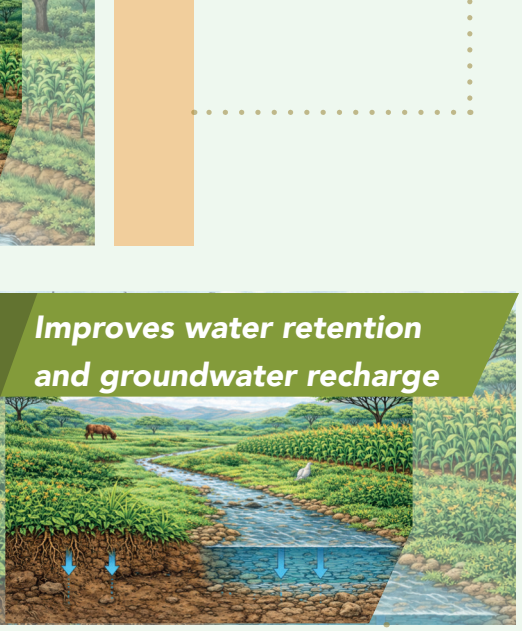
3.1 Importance of Land Restoration

Land restoration is important as shown in the following illustration.

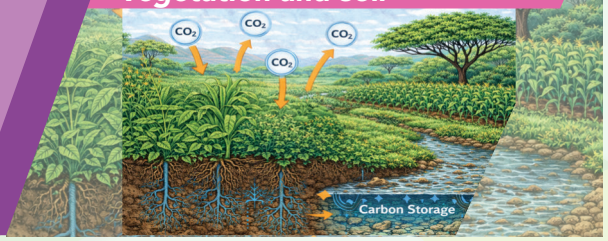
Enhances food security and livelihoods

Reduces soil erosion and desertification

Improves water retention and groundwater recharge



Mitigates climate change by increasing carbon storage in vegetation and soil



3.2 Methods of Land Restoration

There are several methods of restoring degraded land. They include;

- Afforestation and reforestation
- Natural regeneration of vegetation
- Farmer Managed Natural Regeneration (FMNR)

3.2.1 Afforestation and Reforestation

Afforestation is the planting of trees in areas that previously had no forest cover.

Reforestation involves replanting trees in areas where forests have been cut down or destroyed.

3.2.2 Natural Regeneration of Vegetation

Natural regeneration of vegetation is the process by which trees and vegetation grow without being planted by humans. It occurs when existing tree stumps, roots and seeds in the soil sprout and regrow.

Activity 3: Land Restoration

1. Why do you think restoring land is more beneficial than leaving it degraded?
2. Discuss with your peer which restoration method you think is easiest for your community to adopt and why.
3. Create a simple pledge on how you can support land restoration in your community.

4.0 Farmer Managed Natural Regeneration (FMNR)

4.1 Introduction

Farmer Managed Natural Regeneration (FMNR) is a sustainable land restoration technique utilized to protect and manage naturally growing trees and shrubs on their farmland. FMNR can be practised by farmers, foresters, learners, communities and any other players in environmental protection. Instead of planting new trees, farmers select and nurture shoots from existing tree stumps and roots. FMNR has become an effective approach in restoring degraded landscapes while supporting agricultural production especially in dry areas.

4.2 Steps in Farmer Managed Natural Regeneration

FMNR encampasses 5 distinct steps

Step 1: Find: Survey the land and identify species of tree stumps, seedlings and root sprouts.

A person observing sprouts from stumps.

Step 2: Select and Prune:
Select species, stumps and healthy shoots to regenerate. Prune off the unwanted shoots.

Pruning a growing tree to grow straight.

Step 3: Protect: Protect the regenaration site from damage by animals and human beings while they are growing.

Fencing the trees for protection

Step 4: Manage: Manage the growing stems by pruning, supporting the stems to grow upright and maintaining tree density when needed. We can also weed out invasive plant species to reduce their spread among the desired trees and shrubs.

Supporting a tree to grow straight

Step 5: Utilise: Sustainably harvest and use products of the trees or shrubs for the intended purposes.

4.3 Vegetation Suitable for Natural Regeneration

The vegetation that commonly regenerates naturally includes:

a. Indigenous trees and shrubs
b. Grasses and herbaceous plants
c. Trees that grow from existing stumps or root systems
d. Species that produce seeds easily dispersed by wind, animals, or water.

4.4 Benefits of FMNR

Farmer managed natural regeneration has the following benefits:

1. Environmental Benefits

FMNR has the following environmental benefits

a. It allows regrowth of different types of trees, enabling restoration of indigenous species.
b. It conserves biodiversity by allowing survival of different species of plants and animals.
c. It controls soil erosion by increasing vegetation cover.
d. It increases soil fertility for crop production by producing organic matter and fixing nitrogen.
e. It helps in reducing carbon iv oxide in the atmosphere, which is one of the causes of global warming. It also produces oxygen which is beneficial to living things.
f. Vegetation plays a role in the water cycle and improves water infiltration in the soil. This enhances natural water resources.
g. Trees provide shade for animals and act as wind breakers.

2. Socio-economic Benefits

a. Some trees, herbs and shrubs have medicinal value. Examples, neem tree and moringa.

b. Pruned branches of trees and shrubs provide a sustainable source of wood fuel.

c. Leaves, barks and pods supply fodder for animals.

d. Some products such as fruits and leaves provide food for human beings.

e. The harvesting, use and sale of products such as honey, fodder, firewood, charcoal serves as a source of income and livelihood.

f. FMNR increases vegetation cover thereby reducing conflicts that arise from competition for natural resources.

g. Trees are a source of raw materials such as poles and timber for construction, tannin, resins among others.

Harvesting firewood sustainably

Social economic benefits: Enjoying the fruits

Enjoying refreshing wild fruits

Harvesting fodder under FMNR farmland

3. Cultural Benefits

a. Some communities hold worship and religious ceremonies in forested areas. Example, Kaya forest for Mijikenda community, Agikuyu prayers under mugumo tree, and various sacred shrines.

b. Trees are used to predict weather patterns through behaviours such as shedding and sprouting of leaves and blooming of flowers.

c. Trees provide shade, creating a comfortable environment for social gatherings.

Holding gathering under a tree shade

Activity 4: Farmer Managed Natural Regeneration (FMNR) Reflection/ Activity

1. **a)** How is FMNR different from tree planting?
   b) How can FMNR improve the environment and livelihoods?
2. **Identify and adopt** a regenerating material (stump, roots, wildlings, branches) within the school community. Apply FMNR steps to manage its regeneration process.
3. **Personal Action Plan:** Write an action plan you personally can take to help restore degraded land.

5.0 Conclusion

Land degradation is a serious environmental problem that threatens food security, biodiversity, and livelihoods. However, through effective land restoration methods such as afforestation, reforestation and Farmer Managed Natural Regeneration, degraded land can recover and regain its productivity. Promoting sustainable land management practices is essential for protecting natural resources and ensuring a healthy environment for future generations.

It is important that we all take responsibility for restoring our environment by adopting sustainable land restoration practices such as Farmer Managed Natural Regeneration (FMNR).We can achieve this by working together as individuals and communities, to regenerate degraded land, protect biodiversity, and secure a healthier, more productive environment for present and future generations.

Appendices

Appendix 1: Case Studies

Case Study 1:

Magunga Primary School Story.

Introduction

Another success story is from Magunga Primary School, Suba South Sub-County, Homa Bay County. The Regreening Homa bay FMNR project team took the first initiative in 2022 to pilot the implementation of FMNR in schools. 27 school eco club patrons were mobilized and further trained on the technique. The action plan thereafter was to train the eco-club members to implement FMNR in their schools.

Figure2: The club FMNR site after restoration.

Figure 3: The current Magunga Primary FMNR site.

Figure 1: Magunga primary eco club identifying the young trees regenerating in their FMNR site,

During routine monitoring visits, check on the status. Some good progress is seen taking place. A visit to Magunga Primary School on the FMNR site shows that, truly, the technique is the best way to restore our environment compared to the planting technique. The patron in charge of the club narrates how important the model is. This is what he had to say, *"We used to pluck the twigs in the school compound and use them as brooms to sweep the classrooms. All the young seedlings emerging from either tree stumps or seeds were being slashed in routine compound cleanliness. Our soil was so loose with minimal ground vegetation cover; as a result, there was massive soil being carried away due to erosion. And when we got trained on FMNR, we immediately trained our environmental club pupils. They identified a site within the school and allowed the trees to regenerate as an experiment with the technique. We, therefore, started seeing some changes in the area identified as the regrowth was becoming so fast as compared to the planted trees during the same period. Today, our school has seriously transformed the FMNR site as the soil movement has reduced, and as a result of the training, the pupils no longer use twigs to clean the classrooms. The trees are growing very healthy. We thank World Vision for coming up with this idea, it has helped us, and we believe it will be a game changer to even the entire community."*

Case Study 2:

From Tree Loss To Thriving Regeneration

Figure 1: Peter inside his grass storage house, displaying hay harvested last season from his FMNR plot.

In Munathi Sublocation, Kalulini Village, Peter Muteti Mwilu, a lead farmer and grandfather of six, is quietly transforming his land and inspiring his community through Farmer-Managed Natural Regeneration (FMNR).

Peter's turning point came in 2024 when he received training in FMNR (Farmer-Managed Natural Regeneration). Before the training, he had invested in fruit farming on one acre of land, planting 50 mango trees and 4 soursop trees. Unfortunately, due to harsh climatic conditions, all 50 mango trees dried up, leaving only the four soursop trees surviving. What seemed like a failure at the time became the very turning point that reshaped his approach to farming and strengthened his determination to succeed.

Figure 2: Peter standing on his FMNR farm beside a naturally regenerated acacia tree, a testament to the land's restoration.

After embracing FMNR, Peter dedicated the same one acre to natural regeneration, protecting and managing the land instead of clearing it. In time, many indigenous young seedlings began to emerge naturally from the soil sprouting from long-hidden roots and seeds that had lain dormant for years. With careful nurturing, these seedlings are now growing to well-established trees. What was once a struggling plot has transformed into a thriving landscape of indigenous growth, restoring biodiversity and bringing renewed life to his farm.

The regeneration of trees has significantly improved pasture availability. With better pasture, his cows now produce more milk for home consumption. He no longer spends KES 20,000 every dry season on purchasing livestock feed; a substantial saving that now supports domestic needs. With healthier cows, he produces more manure. In 2025, he sold manure worth KES 10,000. By applying manure to his crops, he harvested 5 bags of cowpeas and 1 bag of maize higher yields compared to previous seasons. What was once a struggling acre of land has become a productive, income-saving system.

Figure 3: Peter's regenerated land, now covered with healthy pasture growth as clear evidence of successful natural regeneration.

FMNR has also restored the ecological balance on Peter's farm. The environment is greener and the air cleaner. Birds have returned, creating a natural habitat. The trees provide shade for his family. Indigenous trees offer multiple benefits, wild fruits, medicinal value, and sap that supports beekeeping.

Through support from World Vision, Peter received one beehive and underwent beekeeping training. Inspired by the results, he added another hive using his own resources. Together with other FMNR farmers, he has formed a local beekeepers' group for knowledge sharing and mutual support. The regenerated trees now provide nectar and sap, strengthening his beekeeping enterprise.

Figure 4: Peter's healthy, well-fed cows thriving on pasture from his regenerated land.

Peter's impact extends beyond his farm. As a lead farmer, he has organically influenced 15 replicates within his locality. They meet regularly through a merry-go-round savings group, where they also discuss FMNR activities and share experiences. One of his replicates is his wife, Jacinta, who has set aside her own piece of land to practice FMNR. Together, they are modelling household-level transformation showing that regeneration begins at home.

Peter's journey demonstrates how FMNR restores degraded land, reduces household expenses, diversifies income, strengthens community networks, and improves environmental health. From failed mango trees to thriving indigenous regeneration, his story is a testimony that with the right knowledge and commitment, restoration leads to resilience.

Case Study 3:

Musa Chelelgo: From Job Hunter to Sustainable Farming Champion through Farmer Managed Natural Regeneration Training

Scan for FMNR link

By Hellen Owuor, Communications Specialist (CRIFSUP), World Vision Kenya

Musa and his wife sell honey produced in their apiary to earn extra household income. The family is greatly benefitting from applying FMNR and other innovative techniques such as holistic pasture production to enhance their farm and earn an income.

"For years I struggled to get a job but after World Vision trained us on FMNR [Farmer Managed Natural Regeneration] in 2013, I implemented the approach on my farmland. Now I can say, I am proudly self-employed and able to sustainably provide for my family. Everything I need is on this farm." says Musa Chelelgo.

In just a span of two years post-adopting FMNR, Musa started to see the fruits of his labour, putting an end to his persistent quest for work.

Residing in Kiambogo, Nakuru County with his wife, affectionately referred to as Mama Rono, and their children, Musa is not only a farmer but a fervent advocate for FMNR. He has diligently divided his farm into multiple sections, utilising FMNR alongside other innovative techniques

such as holistic pasture production and Climate Smart Agriculture.

His one and a half acre of FMNR land boasts regenerated trees, offering picturesque views and a refreshing environment, much to Musa's delight, especially with the morning serenades of birds serving as a daily wake-up call for his children's school preparations.

The all-grown trees were once smalls shrubs. All it took for Musa to have this mini-forest is pruning and management of the area. None of the trees were planted. ©World Vision Photo/Hellen Owuor.

The transformation is evident: what were once feeble shrubs now stand tall as Acacia trees, offering shade and comfort to both the family and their livestock.

Musa's aspiration of having his own mini-forest has become a reality through FMNR. Comparing to the blue gum trees he previously cultivated, he acknowledges receiving far greater benefits from the revived native Acacia trees.

"The Acacia trees provide firewood, giving my wife extra time to tend to the vegetable garen.. Furthermore, our children get enough time to rest, study and complete assignments instead of going to fetch firewood after school." Musa explains.

Musa's son, Peter, splitting firewood. Peter graduated from college in the year 2022. Musa used proceedings from selling firewood to pay for his son's tuition fees. ©World Vision Photo/Hellen Owuor.

This firewood not only serves household needs but also generates an added income. Through this, Musa has managed to fund the education of his eldest son, Peter, in college, with his other three children attending secondary school.

Moreover, the blossoming trees attract bees to Musa's apiary, resulting in a bountiful honey harvest. The couple's venture into apiculture brings additional income, selling 1 kilogram of honey for 1,000 Kenyan shillings (USD 6.92). Their initial harvest alone produced a remarkable 20 kilograms.

The Acacia trees are a source of nectar for bees in Musa's apiary. ©World Vision Photo/Hellen Owuor.

World Vision's comprehensive training also equipped Musa with skills in pasture management. He now cultivates Boma Rhodes grass on a dedicated acre, providing ample feed for his livestock and storing surplus. The seeds too, serve as another source of income when sold.

The thriving livestock, another testament to Musa's diligence, further boosts the family's income. With a herd of 40 sheep and milk-yielding cows, the farm's returns are multifaceted.

Musa's farmland produces sufficient pasture for his livestock. He stores the surplus for use in times of drought. ©World Vision Photo/Hellen Owuor.

Given the periodic droughts in the region, the family's foresight is evident in their water reservoir, capturing rainwater for irrigation. This aids the growth of an array of produce including bananas, cassava, oranges, avocados, and vegetables.

Musa and his wife, Mama Rono watering plants at their vegetable garden. ©World Vision Photo/Hellen Owuor.

Mama Rono adds her perspective, "Before learning about FMNR I didn't see the need for trees. I would have easily opted to clear the farm and plant crops instead but now I am seeing the economic benefits of these trees. We have to protect them."

Musa's success story underlines the vast potential FMNR offers in providing sustainable, diverse income avenues for families, empowering them to face rising living costs and the challenges posed by climate change.

Musa is among the participants from Nakuru and Baringo counties who were trained by World Vision on FMNR and other restoration techniques during the implementation of the East Africa FMNR pilot project that began in October 2012. This project was funded by the Australian Government through the Australian NGO Cooperation Program (ANCP).

Appendix 2: FMNR Photos

Appendix 3: FMNR Links

Scan the code or click on the links to watch more on different FMNR videos.

Empowering Women Through **FMNR**	Transforming Youth Livelihoods through **FMNR**	Inclusion of Persons with Disability	FMNR and Climate Smart Agriculture (CSA)
https://www.youtube.com/watch?v=XGgGKOSXd3c	https://www.youtube.com/watch?v=vnj7B1QjoVI	https://www.youtube.com/watch?v=Q2cJ0NSOKpA	https://www.youtube.com/watch?v=RPEfN0LgEok

Appendix 3: List of Contributors

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