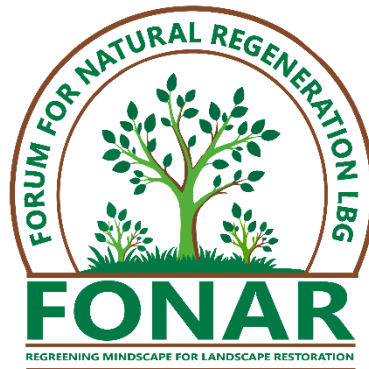


**A COMPREHENSIVE MANUAL FOR INTEGRATING FARMER MANAGED
NATURAL REGENERATION, CLIMATE CHANGE AND ENVIRONMENTAL
EDUCATION INTO BASIC SCHOOL CURRICULUM**



EMPOWERING TEACHERS AS ENVIRONMENTAL CHAMPIONS

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NATURAL REGENERATION, CLIMATE CHANGE AND ENVIRONMENTAL
EDUCATION INTO BASIC SCHOOL CURRICULUM**

**BY:
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April 2026

About FONAR

Forum for Natural Regeneration LBG (FONAR) is a registered Ghanaian non-profit and non-governmental organization (NGO) dedicated to the promotion of Farmer Managed Natural Regeneration (FMNR) and related climate smart agricultural practices. We work with local communities, schools, civil society organizations, local and national government agencies, and international partners to restore degraded agricultural landscapes for improved livelihoods and poverty reduction. Our approach is through advocacy, research, education, community mobilization, sharing of lessons learned and partnering with like-minded organizations to achieve more synergy.

Disclaimer

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Cover Photo: An Eco-club Coordinator teaching children tree measurement.

Photo: Eugene Agomna/FONAR

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Foreword

Dear Educator,

You hold in your hands a manual that represents hope – hope for our landscapes, hope for our communities and hope for the next generation of environmental stewards in Northern Ghana and beyond. Farmer Managed Natural Regeneration (FMNR) is not just a technique for restoring degraded land. It is a mindset shift. It teaches us that the solution to environmental degradation often lies beneath our feet, waiting to be recognized and nurtured. In the drylands of Northern Ghana, where trees struggle to survive when planted as seedlings, FMNR offers a proven, low-cost alternative that works with nature rather than against it.

The Forum for Natural Regeneration (FONAR) has been at the forefront of promoting FMNR in Ghana since 2014. We have seen firsthand how communities in Talensi and Nabdam Districts have transformed more than 750 hectares of degraded farmlands into productive agroforestry landscapes. We have witnessed farmers' incomes increase, soil fertility improve and hope returned to villages that once feared the advancing desert.

But lasting change requires the involvement of the youngest members of our society – our school children. They are the farmers, teachers, chiefs and policymakers of tomorrow. If they grow up understanding the value of trees and the principles of FMNR, they will make decisions that protect and regenerate our environment for decades to come.

Since 2022, FONAR has worked with basic schools in Talensi District to integrate FMNR into classroom teaching and to establish vibrant FMNR Eco-Clubs. This manual is the culmination of those efforts. It provides you – the classroom teacher – with the knowledge, tools and confidence to teach FMNR effectively across all subjects.

Climate change education is now embedded in Ghana's basic school curriculum. But many teachers have told us they need practical support to translate curriculum requirements into engaging, action-oriented lessons. This manual and an earlier one developed by FONAR answers that call. It contains sample lesson plans, active learning strategies, guidance on Eco-Club management, and tools for monitoring your students' learning and your school's environmental impact.

We encourage you not just to read this manual, but to use it. Adapt the lesson plans to your local context. Experiment with the active learning strategies. Involve your students in caring for the trees on your school compound. Reach out to parents and community leaders. And share your successes with us so that we can learn from you.

Together, we can build a squad of young FMNR champions who will advocate for tree stewardship, environmental conservation and the sustainability of FMNR practices in their communities. The future is in our hands and in our classrooms.

Sumaila Seidu Saaka

Executive Director

Forum for Natural Regeneration (FONAR)

Bolgatanga, Upper East Region, Ghana

Abbreviations and Acronyms

FMNR	Farmer Managed Natural Regeneration
FONAR	Forum for Natural Regeneration
GES	Ghana Education Service
MoE	Ministry of Education
OWOP	Our World, Our People
RME	Religious and Moral Education
WVG	World Vision Ghana

Acknowledgements

The Forum for Natural Regeneration (FONAR) developed this manual with generous funding support from the Heidehof Foundation of Germany and Awaken Trees of Austria under the project "*Regreening Communities Through School Kids FMNR Eco-Clubs*"(2025–2026). Thank you to Heidehof Foundation and Awaken Trees for funding this project and the production of this manual. Your support restores mindscapes, landscapes and transforms livelihoods sustainably.

We wholeheartedly acknowledge the contributions of the following individuals and organizations:

- **Tony Rinaudo**, World Vision Australia, for pioneering FMNR and inspiring a global movement, and for supporting the work of FONAR in amazing ways.
- **The Ghana Education Service (GES)**, Talensi District Directorate, for ongoing collaboration and support.
- **The teachers and headteachers** of the 25 partner schools in Talensi District who have piloted FMNR education and Eco-Club activities.
- **The traditional authorities and community members** of Talensi District who have embraced FMNR and supported school-based initiatives.
- **FONAR field staff and volunteers** who have facilitated training workshops and provided ongoing coaching to teachers and eco-club schools.

Special thanks to the Curriculum Research and Development Division (CRDD) of the Ghana Education Service (GES) for their work in integrating climate change content into the national curriculum, upon which many of the curriculum connections in this manual are based.

We are also grateful to the children of Talensi District, whose enthusiasm for learning about trees and caring for the environment inspires us every day.



How to Use this Manual

Integrating the teaching of Farmer Managed Natural Regeneration (FMNR), climate change and environmental education into the basic school curriculum requires a shift from passive learning to active, community-centred stewardship. By embedding these concepts across existing subjects like Science, Mathematics and Social Studies, schools can equip pupils/students with practical land restoration skills while fostering 21st-century problem-solving abilities. Hence, this manual is designed to be both a reference document and a practical workbook. You do not need to read it from cover to cover. Instead, use it as a resource to support your teaching as needed.

For Classroom Teachers

- **New to FMNR?** Start with Chapter 1 to understand the basics of FMNR. Then read Chapter 2 to see how FMNR connects to climate change and the curriculum.
- **Ready to plan lessons?** Go directly to Chapter 6 for sample lesson plans in your subject area. Adapt them to your class level and local context.
- **Looking for teaching strategies?** Chapter 5 provides detailed guidance on active learning approaches you can use immediately.
- **Want to start or strengthen an Eco-Club?** Chapters 7 and 8 provide step-by-step guidance and activity ideas.
- **Need monitoring tools?** Chapter 10 and the Appendices contain ready-to-use forms and templates.

For School Administrators and Curriculum Leads

- Use **Chapter 3** to support whole-school curriculum integration of FMNR and environmental education.
- Use **Chapter 11** to plan and facilitate teacher professional development sessions.
- Use **Chapter 10** to establish school-wide monitoring and reporting systems.

For Teacher Trainers and Facilitators

- **Chapter 11** provides a complete three-day workshop agenda with facilitator notes.
- The **Appendices** contain assessment tools, templates, and additional resources for training sessions.

Icons Used in This Manual

Icon	Meaning
	Activity — A suggested classroom or training activity
	Teaching Tip — Practical advice from experienced teachers
	Caution — Important safety or sensitivity warning
	Local Connection — Information specific to Northern Ghana
	Curriculum Link — Connection to Ghana Education Service curriculum
	Resource Needed — Materials required for an activity
	Check for Understanding — Formative assessment prompt

A Note on Language

This manual is written in English, the language of instruction in Ghanaian basic schools. However, we strongly encourage teachers to use **local languages** (Gurene, Talen, etc.) when introducing new concepts, facilitating discussions and engaging with community members. Key FMNR terms are provided in English, but teachers should develop local language equivalents with their students.

PART ONE: FOUNDATIONS

Chapter 1: Introduction to Farmer Managed Natural Regeneration (FMNR)

1.1: What is FMNR?

Farmer Managed Natural Regeneration (FMNR) is a low-cost, rapid and scalable land restoration technique used to increase the number of trees in fields and landscapes through the protection and management of trees and shrubs that regenerate naturally from existing rootstocks, stumps, and dispersed seeds. Simply, FMNR is the practice of selecting, pruning and protecting the trees that are already trying to grow, rather than planting new ones.

The technique was pioneered in Niger in the 1980s by Australian agronomist Tony Rinaudo and has since spread to more than 27 countries across Africa, Asia and beyond. Over 800 million trees have been regenerated in the Sahel region alone using FMNR.

Key Characteristics of FMNR

Characteristic	Explanation
Low-cost	Requires no nurseries, no watering and no purchased seedlings
Rapid	Trees grow from established root systems, reaching maturity faster than planted seedlings
High survival rate	Almost 100% of protected stumps survive, compared to often less than 20% for planted seedlings in dryland areas
Farmer-managed	Communities and individuals own and control the process and the benefits
Scalable	Can be applied from individual fields to entire landscapes

Activity: Personal Reflection

Before reading further, take a moment to reflect:

- Have you seen trees growing from stumps or roots in your community?
- What happens to those trees? Are they protected or cut down?
- Why might protecting existing trees be easier than planting new ones?

1.2: The Underground Forest: How FMNR Works

Tony Rinaudo often speaks of the "Underground Forest." In many dryland areas of Africa, including Northern Ghana, the land may appear barren and treeless. But beneath the surface lies a vast network of living tree roots and stumps. These are the remnants of forests and woodlands that once covered the land.

When farmers clear land for crops, they often cut trees at ground level. But many indigenous tree species have extensive root systems that remain alive underground. When the rains come, these roots send up new shoots, sometimes dozens from a single stump.

Without FMNR: Farmers see these shoots as "weeds" or "bush" and clear them before planting crops. The tree never gets a chance to grow.

With FMNR: Farmers learn to recognize valuable tree species among the shoots. They select the strongest stems, prune away competing stems, and protect the chosen stems from fire and livestock. Within a few years, these stems grow into mature trees that provide multiple benefits.

The Science Behind FMNR

Factor	Explanation
Established root systems	Trees regenerating from existing roots have access to deep soil moisture and nutrients that newly planted seedlings cannot reach.
Mycorrhizal networks	Existing roots have already formed beneficial relationships with soil fungi that help them absorb water and nutrients.
Local adaptation	Regenerating trees are indigenous species already adapted to local climate and soil conditions.
Continuous growth	Unlike seedlings that experience transplant shock, regenerating stems continue growing without interruption.

Local Connection: Trees of Northern Ghana

Common indigenous tree species that regenerate well through FMNR in the Upper East Region and other parts of Northern Ghana include:

Local Name (Gurune/Talen)	English/Scientific Name	Uses
Tan'g	Shea (<i>Vitellaria paradoxa</i>)	Shea butter, fruit, medicine
Zaag	Winter-thorn (<i>Faidherbia albida</i>)	Fodder, soil fertility, firewood
Duah	African Locust Bean (<i>Parkia biglobosa</i>)	Food seasoning, medicine
Tua	Baobab (<i>Adansonia digitata</i>)	Leaves for soup, fruit pulp, fibre
Sinsabka/Sinsibi	African Grapes (<i>Lannea microcarpa</i>)	Edible fruits, firewood, poles
Gea	African ebony (<i>Diospyros mespiliformis</i>)	Edible fruits, firewood, medicine
Baagne	Camel's foot (<i>Piliostigma reticulatum</i>)	Fodder, soil improvement, fibre
Kinkanga	Sycamore fig. (<i>Ficus gnaphalocarpa</i>)	Firewood, fodder, fruits, medicine

 **Teaching Tip:** Ask students to name trees in their local language. Create a classroom poster with local names, English names and uses.

1.3: FMNR vs. Conventional Tree Planting

Many people assume that the only way to increase tree cover is to plant seedlings. While tree planting has its place, FMNR offers several critical advantages, especially in dryland environments like Northern Ghana.

Factor	FMNR	Conventional Tree Planting
Cost	Very low (labour for pruning only)	High (nursery, watering, transport, protection)
Survival rate	Almost 100%	Often below 20% in drylands
Growth rate	Rapid (established root system)	Slow (transplant shock, root establishment)
Water requirement	None after establishment	Regular watering needed for first 1–2 years
Species	Indigenous, locally adapted	Often exotic species (e.g., neem, teak, eucalyptus)
Biodiversity	Maintains local biodiversity	May reduce biodiversity if monocultures planted
Ownership	Community/farmer owned and managed	Often externally driven
Scale	Easily scalable across landscapes	Limited by nursery capacity and resources

As FONAR's Executive Director Sumaila Seidu Saaka explains:

"FMNR is less expensive compared to tree planting, has a very rapid, almost 100 percent tree survival rate, and is culturally sensitive, particularly for Northern Ghana's harsh geographical location."

 **Important Clarification:** FMNR does **not** mean never planting trees. Tree planting can complement FMNR, especially for fruit trees or species that do not regenerate naturally. But in most dryland contexts, FMNR should be the primary strategy for increasing tree cover.

 **Curriculum Link:** This comparison supports Science curriculum objectives on "Ecosystems" and "Human Impact on the Environment" (B4–B6) and "Agricultural Science" (B7–B9).

1.4: The Five Steps of FMNR

FMNR is simple enough for a primary school child to understand, yet its impacts are profound. The technique can be broken down into five core steps:

Step 1: Select the Best Stems

- **What to do:** From each stump or root system, identify the healthiest, straightest and most vigorous stems.
- **How many?** Typically **3 to 5 stems per stump** are selected. Leaving multiple stems allows for future selection and provides insurance against damage.
- **What to look for:** Stems that are growing upright, free from pest damage and of a desirable species.

Step 2: Prune Competing Stems

- **What to do:** Cut away all other stems and side branches up to about waist height (approximately 1 metre).
- **Why?** Removing competition allows the selected stems to grow faster and straighter. It also makes the field easier to work in.
- **Tool:** Use a sharp cutlass, pruning sickle or secateurs.

Step 3: Protect from Fire

- **What to do:** Establish firebreaks around FMNR areas before the dry season.
- **How?** Clear strips of land of all vegetation, or plough strips around fields.
- **Community action:** Fire management requires collective action. Communities should agree on burning practices and penalties for uncontrolled burning.

Step 4: Protect from Livestock

- **What to do:** Prevent goats, sheep and cattle from browsing on young FMNR trees.
- **How?** Community agreements on grazing areas, designated herding routes and penalties for damage. Individual tree protection (thorny branches around stems) can also be used.
- **Timing:** Protection is most critical in the first 2–3 years while stems are still within reach of animals.

Step 5: Harvest Sustainably

- **What to do:** Once trees are established, they can be harvested for poles, firewood, fodder or other products **without killing the tree**.
- **How?** Harvest only a portion of stems, or prune branches rather than cutting the whole tree. Always leave enough stems and leaves for the tree to recover.
- **Benefit:** Sustainable harvest provides ongoing income and resources for decades, rather than a one-time gain from cutting down the tree.

Activity: FMNR Step Matching

Match each FMNR step with its description:

Step	Description
1. Select	a. Remove extra stems and lower branches
2. Prune	b. Prevent animals from eating young shoots
3. Protect from Fire	c. Take products without killing the tree
4. Protect from Livestock	d. Choose the healthiest stems
5. Harvest Sustainably	e. Create firebreaks

(Answer: 1-d, 2-a, 3-e, 4-b, 5-c)

1.5: FMNR in Northern Ghana: The FONAR Story

The Forum for Natural Regeneration (FONAR) was established in 2014 with a mission to promote FMNR as a solution to land degradation and rural poverty in Northern Ghana. Based in Bolgatanga in the Upper East Region, FONAR has worked with farming communities, schools and local authorities to scale up FMNR adoption.

Key Achievements (2020–2025)

Indicator	Achievement
Land restored	About 64 hectares of degraded farmlands under FMNR management in Nabdam District, Upper East Region.
Farmers reached	More than 1,200 farmers trained in FMNR techniques
Schools engaged	10 basic schools with active FMNR Eco-Clubs (2025–2026)
Teachers trained	About 60 teachers trained in FMNR education and lesson planning
Community FMNR groups	15 community-based FMNR groups established
Policy engagement	All 15 Municipal and District Assemblies engaged in FMNR advocacy

The Talensi Context

Talensi District lies in the Guinea Savannah ecological zone, characterized by:

- A single rainy season (May–October) with erratic rainfall
- A long dry season (November–April) with high temperatures
- Widespread land degradation due to overgrazing, bushfires and unsustainable farming practices
- High poverty rates and food insecurity

In this challenging environment, FMNR has proven to be a game-changer. Farmers who practice FMNR report:

- *Increased crop yields* (trees improve soil fertility through leaf litter and nitrogen fixation)
- *Increased availability of fodder* for livestock (pruned leaves and pods)
- *Increased availability of firewood* (from sustainable pruning)
- *Improved soil moisture retention* (tree shade and organic matter)
- *Additional income* from sale of tree products

Local Connection: Pusu-Namongo Community

Pusu-Namongo was one of the first communities in Talensi to embrace FMNR through World Vision Ghana and FONAR's support. Within three years, farmers reported:

- Visible increase in tree cover across community farmlands
- Reduced soil erosion during heavy rains
- Increased availability of shea nuts and dawadawa for household use and sale
- A shift in community attitudes from seeing tree shoots as "weeds" to seeing them as "assets"

 **Teaching Tip:** Use the Pusu-Namongo story as a local case study in Social Studies or Our World Our People lessons. If possible, invite a farmer from the community to speak to your class.

1.6: Global Impact of FMNR

While this manual focuses on Ghana, it is important for teachers and students to understand that FMNR is part of a global movement.

Region	FMNR Scale	Key Outcomes
Niger	Over 7 million hectares	Largest FMNR success story; 200 million+ trees regenerated; significant increases in crop yields and household income
Ethiopia	Over 1 million hectares	Integrated into national land restoration programs
Kenya	Over 100,000 hectares	Community-based FMNR in dryland areas
Senegal, Mali, Burkina Faso	Hundreds of thousands of hectares	FMNR integrated into agroforestry and climate adaptation programs
Indonesia, Timor-Leste, Myanmar	Expanding adoption	FMNR adapted to tropical forest margins

FMNR is recognized by the United Nations Convention to Combat Desertification (UNCCD), the Food and Agriculture Organization (FAO), and the World Bank as a proven approach to land restoration and climate change adaptation.

 **Curriculum Link:** Global FMNR stories support Social Studies objectives on "World Issues" and "Environmental Challenges" (B7–B9) and English Language reading comprehension using authentic texts.

Chapter 2: Climate Change and Environmental Education in Ghana

2.1: Climate Change in the Upper East Region (Northern Ghana): Local Realities

Climate change is not an abstract concept for the people of Northern Ghana. It is a daily reality that affects farming, water availability, food security and livelihoods.

Observed Climate Trends in the Upper East Region

Trend	Observation	Impact on Communities
<i>Rising temperatures</i>	Average temperatures have increased by approximately 1°C over the past 50 years	Increased heat stress on crops, livestock and people; higher evaporation rates
<i>Erratic rainfall</i>	Total rainfall has not decreased dramatically, but the <i>distribution</i> has become highly unpredictable	Difficulty in planning planting dates; increased risk of crop failure
<i>More intense rainfall events</i>	When rain falls, it is often heavier, causing flooding and soil erosion	Loss of topsoil; damage to crops and infrastructure
<i>Longer dry spells</i>	Periods without rain during the growing season have increased	Crop wilting and reduced yields
<i>Earlier end to rains</i>	The rainy season often ends abruptly in September rather than October	Crops do not reach full maturity
<i>Increased frequency of droughts and floods</i>	Extreme events are becoming more common	Food insecurity; displacement; loss of assets

How Communities Experience Climate Change

In FONAR's engagement with communities in Talensi and Nabdam Districts, farmers consistently report that:

- "The rains no longer come when we expect them."
- "We used to harvest in October. Now the crops dry up in September."
- "The sun is hotter than it used to be. It burns the young plants."
- "When it rains, the water washes away our soil."

These lived experiences align with scientific data and underscore the urgency of climate adaptation strategies, including FMNR.

Activity: Climate Change Observation Journal

Ask students to interview an elder (parent, grandparent, community elder) about changes they have observed in the weather and environment over their lifetime. Use prompts:

- Has the timing of rains changed?
- Are temperatures different now than when you were young?
- What trees and animals were common then that are rare now?

Compile class findings and discuss patterns.

2.2: Ghana's Basic School Curriculum and Climate Change

The Ghana Education Service (GES) under the Ministry of Education (MoE) has recognized the importance of climate change education and has integrated it into the national curriculum for basic schools.

Timeline of Curriculum Integration

Year	Level	Action
2019	Primary (B1–B6)	New standards-based curriculum introduced with climate change content embedded across subjects
2021	Junior High School (B7–B9)	Common Core Programme (CCP) curriculum introduced with climate change as a cross-cutting issue

Where Climate Change Appears in the Curriculum

Climate change content is **not** confined to Science. It appears across multiple subjects:

Subject	Climate Change Content Examples
<i>Science</i>	Weather and climate; ecosystems; human impact on the environment; renewable and non-renewable resources
<i>Social Studies / Our World Our People (OWOP)</i>	Environmental issues; human-environment interactions; sustainable development; natural disasters
<i>English Language</i>	Reading comprehension texts on environmental topics; writing persuasive texts about environmental actions, poetry
<i>Religious and Moral Education (RME)</i>	Stewardship of creation; moral responsibility to protect the environment
<i>Mathematics</i>	Data handling using climate data; tree measurements, calculating carbon footprints; graphing temperature and rainfall trends
<i>Creative Arts</i>	Creating art about nature and environmental themes; drama performances on environmental issues
<i>Physical and Health Education</i>	Effects of climate change on health and physical activity

Curriculum Emphasis on Action

Research on Ghana's curriculum indicates that learners are positioned to learn about climate change for three key purposes:

- *Instrumental purposes:* Gaining knowledge and skills to take practical action
- *Emancipatory purposes:* Developing critical thinking to question unsustainable practices
- *Civic engagement purposes:* Participating in community and national environmental decision-making

This means that effective climate change education should **not** be limited to transmitting facts. It should empower students to **act**.

 **Curriculum Link:** This manual supports teachers in meeting the curriculum's emphasis on action-oriented climate change education. The lesson plans in Chapter 6 provide concrete examples of how to achieve this.

2.3: Why FMNR is a Powerful Climate Action Tool

FMNR is not just a land restoration technique, it is a powerful climate change mitigation and adaptation strategy. Understanding this connection helps teachers frame FMNR within the broader climate change curriculum.

FMNR for Climate Change Mitigation (Reducing Greenhouse Gases)

Mechanism	Explanation
Carbon sequestration	Trees absorb carbon dioxide (CO ₂) from the atmosphere and store it as carbon in their trunks, branches, roots, and the soil
Soil carbon storage	FMNR increases soil organic matter, which stores carbon and improves soil health
Reduced emissions from burning	With more trees available for sustainable firewood harvest, pressure on remaining forests decreases; less deforestation means fewer emissions

FMNR for Climate Change Adaptation (Coping with Impacts)

Mechanism	Explanation
Microclimate cooling	Tree shade reduces ground temperatures, protecting crops and soil moisture
Windbreaks	Trees reduce wind speed, decreasing soil erosion and crop damage
Improved soil moisture	Tree roots improve soil structure, allowing better water infiltration and retention
Increased water availability	Trees contribute to local water cycles through transpiration
Diversified livelihoods	Tree products (fodder, fruit, poles, honey) provide alternative income sources when crops fail
Fodder availability	Tree leaves and pods provide livestock feed during dry seasons when grass is scarce

The FMNR-Climate Connection: A Simple Analogy for Students

"Think of FMNR trees as umbrellas and air conditioners for our farms. The umbrella (shade) protects the soil and crops from the hot sun. The air conditioner (transpiration) cools the air around it. And while the tree is doing all this, it is also breathing in the bad air (carbon dioxide) and breathing out the good air (oxygen)."

Activity: Climate Benefit Mapping

Draw a large tree on the board or flip chart. Ask students to come up and write or draw one climate benefit of FMNR on the tree:

- Roots = soil carbon storage
- Trunk = carbon locked in wood
- Branches = shade and cooling
- Leaves = oxygen production and moisture
- Surrounding area = crop protection, fodder, windbreak

2.4: The Role of Teachers in Environmental Stewardship

Teachers are uniquely positioned to influence environmental attitudes and behaviours. Research shows that environmental education in schools can:

- Increase students' environmental knowledge
- Foster pro-environmental attitudes
- Influence household practices (students take messages home)
- Build a foundation for lifelong environmental citizenship

The FONAR Vision for Teachers

FONAR sees teachers not just as instructors, but as **FMNR Champions**. A teacher who embraces this role:

Role	Actions
<i>Knowledge transmitter</i>	Teaches FMNR concepts accurately across subjects
<i>Role model</i>	Demonstrates care for trees and the environment in their own life
<i>Facilitator</i>	Creates opportunities for students to practice FMNR and environmental action
<i>Community connector</i>	Links school FMNR activities to parents and community leaders
<i>Advocate</i>	Speaks up for environmental protection in school and community forums

As FONAR Executive Director Sumaila Seidu Saaka states:

"Education is the most powerful tool of change and that is why we are training the school children and their teachers on the FMNR approach to protect the environment."

 **Teaching Tip:** Start small. You do not need to transform your entire teaching practice overnight. Begin by incorporating one FMNR lesson from this manual. Observe how students respond. Build from there.

Chapter 3: Curriculum Integration – Finding FMNR in Every Subject

3.1: Mapping FMNR Across the Curriculum

FMNR is not a standalone subject. It is a **context** and a **case study** that can enrich teaching and learning across the entire curriculum. This chapter helps you identify where FMNR fits naturally within existing subjects and topics.

Guiding Questions for Curriculum Integration

When reviewing your scheme of work or lesson notes, ask:

1. **Content:** Does this topic relate to plants, soil, weather, environment or natural resources?
2. **Context:** Can I use an FMNR example to illustrate this concept?
3. **Skills:** Can students practice this skill (measuring, writing, drawing, calculating) using FMNR data or materials?
4. **Values:** Does this lesson provide an opportunity to discuss environmental responsibility?

3.2: Primary School Entry Points (B1–B6)

The table below identifies specific topics in the primary curriculum where FMNR can be integrated. This is not exhaustive, use it as a starting point for your own planning.

Subject	Class	Strand/Topic	FMNR Integration Opportunity
OWOP	B1–B3	The Environment and the Weather	Observe trees in school compound; discuss why trees are important
OWOP	B1–B3	Plants and Animals	Identify local tree species; explain how trees grow from stumps
OWOP	B1–B3	Caring for the Environment	Simple actions to protect trees; classroom tree care roster
OWOP	B4–B6	The Environment and Climate	Local climate changes; how trees help cool the environment
OWOP	B4–B6	Farming and Food Production	FMNR as a farming practice; trees improve soil for crops
Science	B4–B6	Living Things and Ecosystems	Tree life cycles; regeneration from stumps; interdependence
Science	B4–B6	Soil and Soil Fertility	How tree leaves improve soil; organic matter
Science	B4–B6	Weather and Climate	Observing local weather; effect of trees on temperature
Mathematics	B1–B3	Measurement	Measure tree height using simple methods (hand spans, sticks)
Mathematics	B1–B3	Data Handling	Count trees in school compound; make simple pictograms
Mathematics	B4–B6	Measurement (Length, Area)	Measure tree height; calculate area of school FMNR plot
Mathematics	B4–B6	Data Handling	Collect data on tree species; create bar charts

Subject	Class	Strand/Topic	FMNR Integration Opportunity
English Language	B1–B3	Reading Comprehension	Read simple texts about trees and nature
English Language	B1–B3	Creative Writing	Write sentences or short paragraphs about "My Favourite Tree"
English Language	B4–B6	Reading Comprehension	Read information texts about FMNR or climate change
English Language	B4–B6	Persuasive Writing	Write a letter persuading the headteacher to protect trees
RME	B1–B6	Care for the Environment	Religious teachings on caring for creation
Creative Arts	B1–B6	Drawing and Colouring	Draw trees, leaves, and FMNR landscapes
Creative Arts	B1–B6	Modelling	Create models of trees using clay or papier-mâché

3.3: Junior High School Entry Points (B7–B9)

Subject	Class	Strand/Topic	FMNR Integration Opportunity
Science	B7–B9	Ecosystems	FMNR as ecosystem restoration; biodiversity benefits
Science	B7–B9	Photosynthesis and Plant Growth	Pruning science; why FMNR stems grow faster
Science	B7–B9	Soil Science	Soil organic matter; nitrogen fixation by trees
Science	B7–B9	Climate and Climate Change	FMNR as climate mitigation and adaptation
Science	B7–B9	Agricultural Science	FMNR in farming systems; agroforestry principles
Social Studies	B7–B9	The Environment	Human-environment interactions; land degradation and restoration
Social Studies	B7–B9	Population and Resources	Sustainable resource management; FMNR case study
Social Studies	B7–B9	Development	Sustainable development goals; FMNR and SDG 13 (Climate Action), SDG 15 (Life on Land)
Mathematics	B7–B9	Measurement and Geometry	Calculate tree height using similar triangles; plot area calculations
Mathematics	B7–B9	Data Handling and Probability	Design and conduct FMNR surveys; analyze tree growth data
Mathematics	B7–B9	Ratios and Proportions	Calculate tree survival rates; compare FMNR vs. planting success rates
English Language	B7–B9	Reading Comprehension	Read and analyze texts on FMNR, climate change, environment
English Language	B7–B9	Composition (Persuasive/Argumentative)	Write essays arguing for FMNR adoption; letters to community leaders

Subject	Class	Strand/Topic	FMNR Integration Opportunity
English Language	B7–B9	Literature	Analyze poems or stories with environmental themes; create FMNR poetry
RME	B7–B9	Moral Teachings on the Environment	Stewardship; intergenerational responsibility
RME	B7–B9	Social and Environmental Ethics	Balancing human needs with environmental protection
Career Technology	B7–B9	Agriculture	FMNR practices; tree crop management
Career Technology	B7–B9	Design	Designing FMNR demonstration plots; creating FMNR information materials
Creative Arts and Design	B7–B9	Visual Arts	FMNR poster design; photography of FMNR sites
Creative Arts and Design	B7–B9	Performing Arts	Drama sketches on FMNR themes; songs about trees

3.4: Cross-Curricular Themes and Project-Based Learning

One of the most powerful ways to integrate FMNR is through **project-based learning** that spans multiple subjects. This approach mirrors real-world problem-solving and allows students to see connections between subjects.

Example: Whole-School FMNR Project (Term-Long)

Guiding Question:

"How can our school increase tree cover and improve our environment using FMNR?"

Phase	Subject	Activity
Phase 1: Investigate	Science	Survey existing trees on school compound; identify species; assess health
	Social Studies	Interview elders about historical tree cover in the area
	Mathematics	Collect and graph data on tree numbers, species and condition
Phase 2: Plan	English	Write a proposal for school FMNR site development
	Career Technology	Design a map/layout of proposed FMNR demonstration plot
	Mathematics	Calculate resources needed and potential tree growth
Phase 3: Act	Science / Agriculture	Implement FMNR pruning on selected trees; establish firebreaks
	Creative Arts	Create signage and educational posters for the FMNR site
	All subjects	Establish monitoring schedule and assign class responsibilities
Phase 4: Share	English	Write reports, articles, or letters sharing project outcomes

Phase	Subject	Activity
	Creative Arts	Prepare a presentation or performance for school assembly or PTA meeting
	RME / Social Studies	Reflect on the moral and community dimensions of environmental action

Activity: Cross-Curricular Mapping for Your School

In your school team, identify:

1. **One term-long project** that could integrate FMNR across subjects
2. **Three subjects** that would be involved
3. **One specific activity** for each subject

Use this format:

Project Theme:	
Subject 1:	Activity:
Subject 2:	Activity:
Subject 3:	Activity:



PART TWO: PEDAGOGY AND LESSON PLANNING

Chapter 4: Principles of Effective Lesson Planning for Environmental Education

4.1: Backwards Design: Starting with the End in Mind

Effective lesson planning begins not with "What will we do today?" but with "What do I want students to know and be able to do by the end of this lesson?"

The **Backwards Design** framework, developed by Wiggins and McTighe, provides a clear structure:

Stage	Focus Questions	FMNR Lesson Example
<i>Stage 1: Identify Desired Results</i>	What should students know, understand, and be able to do?	Students will understand that FMNR restores trees from existing rootstocks and explain why this is more effective than tree planting in drylands.
<i>Stage 2: Determine Acceptable Evidence</i>	How will I know they have achieved the objectives?	Students will correctly explain the five FMNR steps and give one reason FMNR is better than tree planting.
<i>Stage 3: Plan Learning Activities</i>	What activities will lead to the desired results?	Video, hands-on pruning demonstration, group discussion, exit ticket quiz.

 **Teaching Tip:** Write your learning objectives **before** planning activities. This keeps your lesson focused and ensures activities serve a purpose.

4.2: Writing Clear, Measurable Learning Objectives

Effective learning objectives are **SMART**:

- **Specific** – The goal is clear and well-defined, answering who, what, where, when and why.
- **Measurable** – Progress and completion can be tracked with concrete evidence or numbers.
- **Achievable** – The goal is realistic and attainable given available resources and constraints.
- **Relevant** – The goal aligns with broader priorities, curriculum standards or long-term plans.
- **Time-bound** (within the lesson) – There is a clear deadline or timeframe for completion.

Use action verbs that describe observable behaviours.

Avoid Vague Verbs	Use Observable Verbs
• Understand	Explain, Describe, Identify, List
• Know	State, Name, Recall
• Appreciate	Give reasons for, Compare, Justify
• Learn	Demonstrate, Perform, Calculate, Write

Examples: FMNR Lesson Objectives

Weak Objective	Strong Objective
Students will understand FMNR.	By the end of the lesson, students will be able to explain the five steps of FMNR in their own words.
Students will know about climate change.	By the end of the lesson, students will be able to list three local impacts of climate change and describe how FMNR helps address one of them.
Students will appreciate trees.	By the end of the lesson, students will be able to give two reasons why protecting trees is important for their community.

Activity: Practice Writing Learning Objectives

Rewrite these weak objectives as strong, measurable objectives:

1. Students will learn about pruning.
2. Students will know the benefits of FMNR.
3. Students will understand why we should protect trees.

(Possible answers: 1. Students will demonstrate correct pruning technique on a practice stem. 2. Students will list four benefits of FMNR for farmers. 3. Students will write a paragraph explaining two reasons why tree protection is important.)

4.3: The 5E Instructional Model for FMNR Lessons

The **5E Model** (Engage, Explore, Explain, Elaborate, Evaluate) is particularly well-suited to environmental education because it begins with student curiosity and hands-on experience before introducing formal explanations.

Phase	Purpose	FMNR Lesson Example
Engage	Spark curiosity; activate prior knowledge	Show a "before and after" photo of an FMNR site. Ask: "What do you notice? How did this change happen?"
Explore	Hands-on investigation	Take students to the school compound. Let them observe stumps with new shoots. Ask them to count stems.
Explain	Introduce concepts and vocabulary	Teacher explains FMNR, the five steps, and the "underground forest" concept. Introduce key terms (regeneration, pruning).
Elaborate	Apply learning to new situations	Students work in groups to plan an FMNR strategy for a hypothetical degraded field.
Evaluate	Assess understanding	Students complete an exit ticket: "Name two FMNR steps. Explain why FMNR works better than tree planting in dry areas."

 **Teaching Tip:** The 5E model works for a single lesson or can be spread across a series of lessons (e.g., Engage and Explore in Lesson 1; Explain and Elaborate in Lesson 2; Evaluate in Lesson 3).

4.4: Differentiating Instruction for Diverse Learners

In any classroom, students have different learning needs, prior knowledge and abilities. Effective teachers plan for these differences.

Differentiation Strategies for FMNR Lessons

Area of Differentiation	Strategies for FMNR Lessons
Content	Provide simplified reading materials or visual summaries for struggling readers; offer extension articles on global FMNR for advanced learners.
Process	Allow students to work in mixed-ability pairs for hands-on pruning practice; provide step-by-step picture cards for students who need more structure.
Product	Offer choice in how students demonstrate learning: written explanation, oral presentation, drawing or physical demonstration.
Learning Environment	Provide quiet spaces for individual reflection; create small group zones for collaborative work; use outdoor space for kinesthetic learners.

Supporting English Language Learners

In Ghanaian classrooms, students may have varying levels of English proficiency. Use these strategies:

- Pre-teach key vocabulary with visuals (show a picture of a "stump," a "shoot," "pruning")
- Use gestures and demonstrations alongside verbal explanations
- Allow students to discuss concepts in their local language before responding in English
- Provide bilingual word banks (English and local language)

Including Students with Disabilities

- For students with mobility challenges, bring FMNR demonstration materials indoors or ensure outdoor paths are accessible.
- For students with visual impairments, provide tactile experiences (touching different tree stems, feeling pruned vs. unpruned stumps).
- For students with hearing impairments, use visual aids and written instructions.

 **Check for Understanding:** After explaining a new concept, use a simple signal (thumbs up/down, coloured cards) to quickly gauge whole-class understanding before moving on.

4.5: Formative and Summative Assessment Strategies

Assessment in environmental education should measure both **knowledge** and **attitudes / behaviours**.

Formative Assessment (Ongoing, During Lessons)

Strategy	FMNR Example
Exit Tickets	<i>"Write one thing you learned today about FMNR and one question you still have."</i>
Think-Pair-Share	<i>"Think: Why is FMNR better than tree planting? Pair with a partner. Share your ideas with the class."</i>
Observation	Watch students during hands-on pruning practice. Note who demonstrates correct technique and who needs support.
Quick Quizzes	3–5 multiple choice or short answer questions at the end of a lesson.
Student Self-Assessment	<i>"Rate your understanding: 1 = I'm confused; 2 = I understand some parts; 3 = I could explain this to a friend."*</i>

Summative Assessment (End of Unit/Term)

Strategy	FMNR Example
Unit Test	Questions covering FMNR concepts, climate connections and local applications.
Project	Students create an FMNR information poster or brochure for their community.
Presentation	Students present their FMNR Action Plan to the class or school leadership.
Portfolio	Collection of student work: nature journal entries, tree measurement data, reflections.
Performance Task	Students demonstrate correct pruning technique and explain their decisions.

Assessing Attitudes and Behaviour Change

Environmental education aims to influence not just what students know, but what they do. Consider assessing:

Dimension	Assessment Method
Attitudes	Pre- and post-unit surveys: <i>"How important is it to protect trees?"</i> (Scale of 1–5)
Self-reported behaviour	<i>"In the past month, have you talked to your family about protecting trees?"</i>
Observed behaviour	Do students voluntarily care for school trees? Do they remind others not to damage trees?
Community impact	Has the school Eco-Club influenced parent practices? (This may require longer-term follow-up)

Chapter 5: Active Learning Strategies for FMNR and Climate Change

5.1: Nature Journaling and Field Observation

Nature journaling involves students recording observations of the natural world through writing, drawing and data collection. It develops observation skills, scientific thinking and personal connection to the environment.

How to Implement Nature Journaling for FMNR

Step	Guidance
1. Provide journals	Simple exercise books or homemade stapled paper booklets work perfectly.
2. Establish routine	Dedicate 15–20 minutes weekly for nature journaling.
3. Focus observations	Each session, give a specific focus: <i>"Today, find an FMNR tree and draw its leaves."</i> <i>"Count the number of new shoots on a stump."</i>
4. Use prompts	<i>"I notice... I wonder... It reminds me of..."</i>
5. Include data	Date, weather, location, measurements.
6. Reflect	Periodically, have students review their journals. <i>"How has the tree changed since your first entry?"</i>

Sample Nature Journal Entry for FMNR

Date	Weather	Location	Observation
15 May 2026	Sunny, hot	Behind Class 5 block	<i>I noticed the Shea stump has 7 new shoots. The tallest is about as long as my arm. The leaves are dark green and shiny. I wonder if we should prune some shoots so the strong ones grow better. It reminds me of the FMNR video we watched.</i>

Activity: Try Nature Journaling

Take students outside for 15 minutes. Ask them to:

- Find a tree stump with shoots.
- Draw the stump and shoots.
- Count the number of shoots.
- Complete the sentence: *"I wonder..."*

 **Resources Needed:** Exercise books or paper, pencils, clipboards (or cardboard as a writing surface).

5.2: Role Play and Drama for Environmental Decision-Making

Role play allows students to explore different perspectives on environmental issues and practice decision-making in a safe environment.

FMNR Role Play Scenario: "The Village Meeting"

Background: The chief has called a village meeting to decide whether the community should adopt FMNR or continue clearing all tree shoots before planting.

Roles (assign to student volunteers or small groups):

- **Chief:** Facilitates the meeting; wants what is best for the community.
- **Farmer A (Pro-FMNR):** Has seen FMNR work in a neighbouring village. Believes it will improve soil fertility and provide firewood.
- **Farmer B (Skeptical):** Worries that trees will shade crops and reduce yields. Thinks clearing all shoots is faster.
- **Herder:** Needs fodder for goats; thinks FMNR could provide more dry-season feed.
- **Young person:** Worried about the future; wants trees for tomorrow.
- **Elder:** Remembers when the land had more trees; wants to restore what was lost.

Procedure:

1. Assign roles and give students 5–10 minutes to prepare their arguments.
2. Arrange chairs in a circle or semi-circle to simulate a village meeting.
3. The Chief opens the meeting and invites each person to speak.
4. After all have spoken, the Chief summarizes and the group votes.
5. **Debrief:** Discuss the different perspectives. *"Which arguments were most convincing? Was the decision easy or hard? Why?"*

Additional FMNR Drama Ideas

Activity	Description
FMNR Tableau	Students create "frozen pictures" (statues) representing FMNR concepts (e.g., "Before FMNR," "Pruning," "After FMNR")
Hot Seating	A student plays "Tony Rinaudo" or "An FMNR Tree" and answers questions from the class
FMNR News Report	Students create a short TV news segment reporting on FMNR success in their school
Conscience Alley	A student playing a farmer walks between two lines of classmates. One side whispers reasons to practice FMNR; the other side whispers reasons not to. The farmer then decides.

 **Teaching Tip:** Drama activities work best when students feel safe. Start with low-pressure activities (tableau, whole-group role play) before asking individuals to perform in front of the class.

5.3: Outdoor Inquiry and School Grounds as Living Laboratories

The school compound is an underutilized teaching resource. Even a few trees can provide rich opportunities for scientific inquiry.

Sample Outdoor Inquiry Activities for FMNR

Activity	Description	Curriculum Link
Tree Mapping	Students create a map of all trees on the school compound, noting species, location, and condition.	Geography, Mathematics (coordinates, scale)
Stem Count Investigation	Students count shoots on different stumps. <i>"Do older stumps have more shoots? Do different species have different numbers of shoots?"</i>	Science (investigation skills), Mathematics (data)
Temperature Comparison	Students measure ground temperature in direct sun vs. under tree shade. <i>"How much cooler is it under a tree?"</i>	Science (heat, climate), Mathematics (measurement)
Soil Observation	Students compare soil from under trees vs. bare ground. <i>"Which soil is darker? Which has more organic matter? Which holds water better?"</i>	Science (soil), Agriculture
Growth Measurement	Students measure and record the height of selected FMNR stems monthly. Plot growth over time.	Mathematics (measurement, graphing), Science
Leaf Litter Investigation	Students collect leaf litter from under trees and observe decomposition. <i>"How do leaves become soil?"</i>	Science (decomposition, nutrient cycling)

Safety Guidelines for Outdoor Learning

Before taking students outdoors:

- *Scout the area* in advance to identify hazards (sharp objects, unstable ground, harmful plants or animals).
- *Establish clear boundaries* and rules (stay within sight, no running, respect living things).
- *Brief students* on what to do if they encounter snakes or insects (freeze, call teacher, do not touch).
- *Bring a first aid kit.*
- *Ensure adequate supervision* (consider asking a colleague or older student to assist).
- *Check weather conditions* (avoid extreme heat; schedule for cooler morning hours).
- *Obtain necessary permissions* from school administration and inform parents.

5.4: Using Local Songs, Poetry and Storytelling

Oral traditions are powerful vehicles for environmental messages. Integrating local songs, poems and stories makes FMNR learning culturally relevant and memorable.

Creating FMNR Songs

Songs can be original compositions or adaptations of familiar tunes.

Example: FMNR Song (to the tune of a local folk song or simple chant)

(Create your own lyrics in English or local language. Here is a sample in English:)

FMNR, FMNR,

Let the trees grow near and far!

Select the stems, prune the rest,

FMNR, it is the best!

Protect from fire, goats, and sheep,

Watch the underground forest peep!

Harvest wisely, never kill,

FMNR gives life still!

 **Teaching Tip:** Involve students in creating lyrics. They will remember songs they helped write.

FMNR Poetry Forms

Form	Description	Example Prompt
Acrostic Poem	First letter of each line spells a word	Write "FMNR" vertically. Each line starts with F, M, N, R.
Haiku	3 lines: 5 syllables, 7 syllables, 5 syllables	"Underground forest / Waiting for the rains to come / New life from old roots"
Cinquain	5 lines: noun, 2 adjectives, 3 verbs, 4-word phrase, synonym	"Stump / Hidden, strong / Waiting, sprouting, growing / Hope beneath the soil / Forest"
Free Verse	No set structure	Write a poem expressing feelings about seeing a degraded landscape transform through FMNR.

Storytelling for FMNR

Stories are how humans have transmitted knowledge for millennia. Use stories to introduce FMNR concepts or as a prompt for student writing.

Story Prompt Ideas:

- "The Tree That Came Back" – A story from the perspective of a tree stump that regrows.
- "The Farmer Who Listened to the Land" – A story about a farmer who tries FMNR despite community skepticism.
- "Grandmother's Wisdom" – A story about an elder who remembers when the land had many trees and teaches a young person how to restore them.

Activity: Story Circle

Sit in a circle. Begin a story: *"Once there was a school compound with only three trees..."* Each student adds one sentence. Encourage them to incorporate FMNR elements.

5.5: Low-Cost and No-Cost Teaching Aids

Effective FMNR teaching does not require expensive materials. Local, natural and recycled materials can create powerful teaching aids.

Teaching Aid	Materials	How to Make/Use
FMNR Step Cards	Cardboard, markers	Draw or write each FMNR step on a separate card. Students sequence them.
Tree Identification Board	Large cardboard, collected leaves	Press and attach leaves from local tree species. Label with local and English names.
FMNR Before/After Diorama	Shoe box, twigs, leaves, soil, small stones	Create a 3D scene showing a degraded field (bare soil, one stump) and the same field after FMNR (multiple trees, crops).
Pruning Practice Model	Bundle of sticks tied together, or a real potted plant with multiple stems	Use for indoor pruning demonstrations before going outside.
Tree Growth Chart	Long strip of paper or painted on wall	Mark student heights against tree heights. Compare growth over time.
FMNR Matching Game	Cardboard squares	Create pairs: FMNR term on one card, definition on another. Students match pairs.
Leaf Rubbings	Paper, crayons, leaves	Place leaf under paper. Rub crayon over paper to reveal leaf vein patterns.
Tree Cookie	Cross-section of a branch (ask local carpenter)	Use to teach tree rings and growth. (Note: Only use pruned branches, never cut a tree for this.)

 **Resource Needed:** Collect materials gradually. Ask students to bring in cardboard, leaves or other natural materials. Involve the community – a local carpenter might donate wood offcuts.

5.6: Facilitating Classroom Discussions on Sensitive Topics

Climate change and environmental degradation can be emotionally challenging topics. Students may feel anxious, hopeless or overwhelmed. Effective facilitation is essential.

Creating a Safe Discussion Environment

Principle	Practice
Establish ground rules	Co-create norms: listen respectfully, one voice at a time, no put-downs, right to pass.
Use pair or small group discussion first	Students are more willing to share after they have rehearsed ideas with a partner.
Validate emotions	<i>"It is normal to feel worried about climate change. Many people do."</i>
Focus on action	Balance discussion of problems with exploration of solutions. FMNR is a solution.
Use neutral prompts	Instead of <i>"Why is climate change so bad?"</i> try <i>"What changes have you noticed in the weather?"</i>
Be honest but hopeful	Do not minimize the seriousness of environmental challenges, but emphasize that positive change is possible and already happening.

Discussion Prompts for FMNR and Climate Change

Topic	Prompt
Observing change	<i>"What differences have you noticed in the weather or environment since you were younger?"</i>
Cause and effect	<i>"Why do you think trees are becoming fewer in some areas?"</i>
Solutions focus	<i>"What is one thing our class could do to help trees grow?"</i>
Future vision	<i>"Imagine our school in 10 years. What would you like the environment to look like?"</i>
Personal action	<i>"What could you do at home to protect or care for trees?"</i>

✅ **Check for Understanding:** After a sensitive discussion, do a quick emotional check-in: *"Show me with your fingers: 1 = I'm feeling worried; 2 = I'm feeling okay; 3 = I'm feeling hopeful."** Follow up with individuals as needed.

Chapter 6: Sample Lesson Plans for All Subjects

This chapter provides complete, ready-to-adapt lesson plans for integrating FMNR across the basic school curriculum. Each plan includes curriculum references, learning objectives, materials, procedure and assessment strategies.

6.1: Science: Tree Anatomy and the Science of Pruning (B7)

Field	Details
Subject	Science
Class	B7 (JHS 1)
Strand	Diversity of Matter
Sub-Strand	Living Cells and Cell Division
Topic	Plant Structure and Growth
Lesson Title	<i>Why FMNR Works: The Science of Tree Regeneration and Pruning</i>
Duration	70 minutes (double period)
Curriculum Reference	B7.2.3.1: Explain the structure and function of plant parts

Learning Objectives:

By the end of this lesson, students will be able to:

- **Identify** the main parts of a tree (roots, stem, leaves, buds) and explain their functions.
- **Explain** why trees regrow after being cut, using the concept of stored energy in roots.
- **Describe** how pruning affects tree growth (apical dominance, redirection of energy).
- **Demonstrate** correct pruning selection on a diagram or practice stem.

FMNR Connection: This lesson provides the scientific foundation for understanding why FMNR works. Students learn that tree roots store energy that can produce new shoots, and that pruning directs this energy to selected stems.

Materials/Resources:

- Diagram of tree structure (root system, stump, shoots)
- Live tree stump with shoots (if available) or clear photographs
- Simple pruning demonstration using a potted plant with multiple stems OR a bundle of sticks
- Whiteboard/flip chart and markers
- Student notebooks
- **Handout:** Tree Anatomy Diagram (Appendix)

Lesson Procedure:

Time	Phase	Teacher Activity	Student Activity
5 mins	Starter	Show a photograph of a tree stump with many new shoots. Ask: <i>"Where did these shoots come from? How is this possible if the tree was cut down?"</i>	Students observe image and share initial ideas. Teacher records ideas on board without confirming or correcting.
15 mins	Explore	Take students outside to observe a real stump with shoots (or show close-up photographs if outdoor access limited). Ask: <i>"What parts of the original tree can you see? Where are the new shoots growing from?"</i>	In pairs, students observe and sketch the stump and shoots. They label any parts they know.
20 mins	Explain	Using diagram, explain tree structure: Roots (anchor, absorb water/nutrients, store energy), Stem/Trunk (support, transport), Buds (growth points), Leaves (photosynthesis). Introduce key concept: Stored energy in roots allows regrowth after cutting . Explain that pruning removes some shoots so energy concentrates in fewer stems, making them grow faster and straighter. Introduce term "apical dominance" (the main stem grows stronger when side shoots are removed).	Students add notes and labels to their sketches. They ask clarifying questions.
20 mins	Elaborate	Demonstrate pruning on a practice model (potted plant or bundle of sticks). Think aloud: <i>"I am looking for the 3–5 healthiest stems. I will remove the weak, crooked or damaged ones. I will also remove lower side branches."</i>	Students work in pairs using a diagram to select which stems they would keep and which they would prune. They justify their choices.
10 mins	Evaluate	Exit Ticket: <i>"1. Why can a cut tree regrow? 2. Why does pruning make selected stems grow faster?"</i>	Students write responses on slips of paper. Teacher collects for formative assessment.

Differentiation:

- **Support:** Provide a word bank for the exit ticket (roots, energy, nutrients, concentrate).
- **Extension:** Ask advanced students to research "apical dominance" and explain why removing the growing tip causes bushier growth.

Homework/Extension:

Find a stump near your home. Observe it over the next two weeks. Record any new shoots that appear. Bring your observations to share next week.

6.2: Science: Soil Fertility and Organic Matter (B5)

Field	Details
Subject	Science
Class	B5 (Primary 5)
Strand	Earth and Space
Sub-Strand	Rocks and Soil
Topic	Soil Types and Soil Fertility
Lesson Title	<i>How Trees Make Soil Healthy: Leaf Litter and FMNR</i>
Duration	50 minutes
Curriculum Reference	B5.4.2.1: Describe the composition of soil and factors that affect soil fertility

Learning Objectives:

By the end of this lesson, students will be able to:

- **Describe** what soil is made of (minerals, organic matter, water, air).
- **Explain** how tree leaves improve soil fertility.
- **Compare** soil from under a tree with soil from bare ground.

FMNR Connection: FMNR increases soil fertility through leaf litter. Trees drop leaves that decompose, adding organic matter to the soil. This is a key benefit of FMNR for farmers.

Materials/Resources:

- Two soil samples: one from under a tree, one from bare ground (collected in advance)
- Clear jars or plastic bottles cut in half (one per group)
- Water
- Magnifying glasses (if available)
- White paper or plates
- Flip chart and markers

Lesson Procedure:

Time	Phase	Teacher Activity	Student Activity
5 mins	Engage	Hold up two soil samples (labelled A and B). Ask: <i>"Which soil do you think will grow better crops? Why?"</i>	Students vote and give reasons. Teacher records predictions.
15 mins	Explore	Distribute soil samples to groups. Guide observation: <i>"Look at the colour. Feel the texture. Smell it. What do you notice? Look for tiny pieces of leaves or roots."</i> Students record observations on a simple table.	In groups, students examine soil samples using senses and

Time	Phase	Teacher Activity	Student Activity
			magnifying glasses. They record: colour, texture, smell, visible plant material.
15 mins	Explain	Reveal that Sample A is from under a tree, Sample B from bare ground. Explain: Organic matter (dead leaves, roots, insects) makes soil dark, crumbly and fertile. Tree leaves fall, decompose and become part of the soil. This is why FMNR helps farmers – more trees mean more leaves, which means better soil. Introduce terms: humus, decomposition, nutrients.	Students compare their observations with the explanation. They add new vocabulary to notebooks.
10 mins	Elaborate	Ask: "If you were a farmer, where would you want to plant your crops? Why?" Discuss how FMNR creates fertile patches across a farm.	Students discuss in pairs and share responses.
5 mins	Evaluate	Quick Quiz: "1. What is organic matter? 2. Give one reason soil under trees is better for crops."	Students answer orally or in writing.

Differentiation:

- **Support:** Provide a sentence starter: "Soil under trees is better because..."
- **Extension:** Ask students to design a simple experiment to test whether leaf litter improves soil fertility (e.g., plant seeds in soil with and without added leaf litter).

Homework:

Find a tree near your home. Collect a small sample of soil from under the tree and from a bare spot nearby. Compare them. Write or draw what you notice.

6.3: Social Studies/OWOP: How FMNR Transformed Talensi (B4–B6)

Field	Details
Subject	Social Studies/OWOP
Class	B4–B6 (adaptable)
Strand	The Environment and the Weather
Topic	Human Activities and the Environment
Lesson Title	<i>From Bare Land to Trees: The FMNR Story in Talensi District</i>
Duration	60 minutes
Curriculum Reference	B4.5.2.1: Describe how human activities affect the environment

Learning Objectives:

By the end of this lesson, students will be able to:

- **Describe** how land degradation affected farmers in Talensi District.
- **Explain** how FMNR helped restore trees and improve farming.
- **Identify** at least three benefits of FMNR for the community.

FMNR Connection: This lesson uses the local World Vision Ghana (WVG) Partnerships/Talensi FMNR story as a case study of positive human impact on the environment.

Materials/Resources:

- Before/after photographs of FMNR sites in Talensi District
- Simple case study text (provided below) or guest speaker (farmer from FONAR partner community)
- Map of Talensi District showing partner communities
- Flip chart and markers

Case Study Text (Adapt for reading level):

The Story of Pusu-Namongo Community

Pusu-Namongo is a farming community in Talensi District. Ten years ago, the land around Pusu-Namongo had very few trees. Farmers cut down all the bushes before planting their crops. When the rains came, the soil washed away. Crops did not grow well. Families struggled to find firewood and fodder for their goats and other animals.

Then, World Vision Ghana (WVG) working in partnership with FONAR and other organizations introduced Farmer Managed Natural Regeneration (FMNR). Farmers learned to protect and prune the trees that grew naturally from stumps and roots. At first, some people laughed. "Why protect bushes?" they said. But the farmers who tried FMNR saw changes. Within three years, their fields had more trees. The trees dropped leaves that made the soil fertile. Crops grew better. Goats had more to eat. Families could collect firewood without walking long distances.

Today, Pusu-Namongo is a different place. Trees grow among the crops. The soil is darker and richer. Farmers are proud of what they have achieved. And they are teaching their children to continue the work.

Lesson Procedure:

Time	Phase	Teacher Activity	Student Activity
5 mins	Engage	Show a before/after image pair of an FMNR site. Ask: "What do you notice? What changed?"	Students share observations. Teacher records on board.

Time	Phase	Teacher Activity	Student Activity
15 mins	Explore	Read aloud the Pusu-Namongo case study (or have students read in pairs). Provide guiding questions: *"1. What was the problem in Pusu-Namongo? 2. What solution did WVG and partners like FONAR introduce? 3. What changes happened?"*	Students read/listen and discuss guiding questions in pairs.
20 mins	Explain	Lead whole-class discussion of the case study. Create a simple cause-and-effect chain on the board: <i>Degraded land</i> → <i>FMNR introduced</i> → <i>Trees grow</i> → <i>Soil improves</i> → <i>Crops improve</i> → <i>Community benefits</i> . Emphasize that this is a local story – it happened near where students live.	Students contribute to the cause-and-effect chain. They take notes.
15 mins	Elaborate	Ask: "What could our school or community learn from Pusu-Namongo? What would it take for our area to have more trees?"	Students discuss in small groups and share one idea with the class.
5 mins	Evaluate	Exit Ticket: "Name one problem FMNR solved in Pusu-Namongo and one benefit the community gained."	Students write responses.

Differentiation:

- **Support:** Provide a simplified version of the case study with pictures.
- **Extension:** Ask students to interview a family member about changes they have observed in the local environment over time.

Homework:

Talk to an adult at home. Ask: "Have you heard of FMNR or FONAR? What do you know about trees growing back from stumps?" Be ready to share what you learn.

6.4: Social Studies: Environmental Stewardship in Our Community (B8)

Field	Details
Subject	Social Studies
Class	B8 (JHS 2)
Strand	Environment and Development
Topic	Sustainable Development and Environmental Stewardship
Lesson Title	<i>Who Takes Care of the Trees? Environmental Stewardship and FMNR</i>
Duration	70 minutes (double period)
Curriculum Reference	B8.3.2.1: Explain the concept of sustainable development and the role of citizens in environmental protection

Learning Objectives:

By the end of this lesson, students will be able to:

- **Define** environmental stewardship.
- **Identify** different stakeholders responsible for environmental protection (individuals, communities, government, NGOs).
- **Analyze** a local environmental issue and propose stewardship actions.

FMNR Connection: FMNR is an example of community-based environmental stewardship. This lesson helps students understand their own role and the roles of others in caring for trees and land.

Materials/Resources:

- Flip chart and markers
- Sticky notes
- Handout: Stewardship Roles Table (see below)
- Optional: Guest speaker from FONAR or District Assembly Environment Unit

Handout: Stewardship Roles Table

Stakeholder	Responsibility for Environmental Stewardship	Example Related to Trees/FMNR
Individuals (farmers, citizens)	Care for trees on their land; report illegal cutting	A farmer practices FMNR on his farm
Community (village, traditional authorities)	Make and enforce local rules; organize community action	Community agrees to protect FMNR area from goats
District Assembly / Government	Create policies; provide extension services; enforce laws	District includes FMNR in development plan
NGOs (like FONAR)	Provide training, resources and support	FONAR trains farmers and schools in FMNR
Schools and Students	Learn about environment; care for school trees; educate others	Eco-Club manages school FMNR site

Lesson Procedure:

Time	Phase	Teacher Activity	Student Activity
10 mins	Engage	Pose scenario: <i>"You see someone cutting down a young tree on the school compound. Who is responsible for stopping this? Whose job is it to protect trees?"</i>	Students share initial thoughts. Teacher records responses on board.
20 mins	Explore	Carousel Brainstorm: Place four flip chart sheets around the room, each labelled with a stakeholder: Individuals, Community, Government, NGOs . Students rotate in groups, adding sticky notes with ideas about that stakeholder's responsibility for trees.	In groups, students rotate through stations, writing one idea per sticky note and posting it on the chart.

Time	Phase	Teacher Activity	Student Activity
20 mins	Explain	Review the ideas on each chart. Clarify and add to them. Introduce the term environmental stewardship (the responsible use and protection of the natural environment through conservation and sustainable practices). Distribute the Stewardship Roles Table handout. Discuss how FMNR involves all these stakeholders working together.	Students compare their sticky note ideas with the handout. They add to their own notes.
15 mins	Elaborate	Small group task: <i>"Your group is the School Environmental Committee. A patch of trees behind the school is being damaged by goats. Develop a plan involving at least three different stakeholders to address this problem."</i>	Groups develop a simple plan and share with the class.
5 mins	Evaluate	3-2-1 Exit Ticket: <i>"3 stakeholders responsible for trees, 2 things our school could do to be better stewards, 1 thing you will personally do."</i>	Students write responses.

Differentiation:

- Support: Provide sentence frames: "The _____ is responsible for _____."
- Extension: Ask students to research the role of the Environmental Protection Authority (EPA) in Ghana and add to the stakeholder list.

Homework:

Identify one tree in your community. Interview someone about who "owns" it and who is responsible for caring for it. Write a short paragraph about what you learn.

6.5: English Language (Persuasive Writing) – Why Our School Should Protect Trees

Field	Details
Subject	English Language
Class	B7–B9 (adaptable)
Strand	Writing
Sub-Strand	Persuasive Writing
Topic	Writing a Persuasive Letter
Lesson Title	<i>Convincing Others: Writing a Persuasive Letter for FMNR</i>
Duration	60–70 minutes
Curriculum Reference	B7.3.3.1: Write persuasive texts using appropriate structure and language features

Learning Objectives:

By the end of this lesson, students will be able to:

1. **Identify** the features of persuasive writing (statement of position, reasons, evidence, call to action).
2. **Draft** a persuasive letter arguing for tree protection or FMNR adoption.
3. **Use** persuasive language features (rhetorical questions, emotive language, modal verbs).

FMNR Connection: Students apply persuasive writing skills to advocate for FMNR or tree protection within their school or community context.

Materials/Resources:

- Sample persuasive letter (provided below or teacher-created)
- Anchor chart: Features of Persuasive Writing
- Persuasive writing planning template (Appendix)
- Writing paper/notebooks

Sample Persuasive Letter:

To the Headmistress, Yagzore D/A Basic School

Dear Madam,

I am writing to request that our school establish an FMNR demonstration plot on the unused land behind the Class 6 block.

Have you noticed how bare and dusty that area is? During break time, students have no shade. The soil blows away when the harmattan comes. This is not just unpleasant, it is a missed opportunity.

FMNR, or Farmer Managed Natural Regeneration, is a simple way to grow trees from existing stumps and roots. It costs almost nothing. It requires no watering. And it works. Communities across Talensi District, like Pusu-Namongo, have used FMNR to restore their land.

If we establish an FMNR plot, several benefits will follow. First, students will have shade during outdoor activities. Second, the trees will improve the soil and reduce dust. Third, the plot will serve as a living classroom where we can learn about science and the environment. Finally, our school will set an example for the entire community.

Some might say we do not have time or resources for this project. But FMNR requires very little, just a few hours to prune existing shoots and a commitment to protect them from goats. The Eco-Club is ready to take responsibility.

I urge you to consider this proposal. Together, we can make our school greener, cooler and more beautiful, while teaching students valuable skills for the future.

Yours sincerely,

[Student Name]

Basic 8, Eco-Club President

Lesson Procedure:

Time	Phase	Teacher Activity	Student Activity
10 mins	Engage	Ask: "Have you ever tried to convince someone to do something? What did you say? What worked?" Introduce the concept of persuasion.	Students share personal experiences with persuasion.
15 mins	Explore	Read the sample persuasive letter aloud. Ask students to identify: "What is the writer's position? What reasons do they give? How do they try to convince the reader?"	Students read along and annotate or note features of persuasion.
15 mins	Explain	Create an anchor chart: Features of Persuasive Writing. Include: Statement of position (what you want), Reasons (why it is a good idea), Evidence/Examples (proof), Counter-argument (addressing objections), Call to action (what the reader should do). Also discuss language features: rhetorical questions, emotive words (e.g., <i>dusty</i> , <i>bare</i> , <i>beautiful</i>), modal verbs (<i>should</i> , <i>must</i> , <i>will</i>).	Students copy the anchor chart into notebooks. They identify examples from the sample letter.
20 mins	Elaborate	Students choose a topic and audience for their own persuasive letter. Options: <i>Letter to Headteacher requesting FMNR plot</i> / <i>Letter to PTA asking for support for Eco-Club</i> / <i>Letter to community chief advocating for tree protection by-laws</i> / <i>Letter to a farmer explaining why they should try FMNR</i> . Distribute planning template. Students begin drafting.	Students select topic, complete planning template, and begin drafting their letter.
5 mins	Evaluate	Peer check: Partners exchange plans and give one piece of feedback: "Is the writer's position clear? Is there at least one strong reason?"	Students provide brief peer feedback.

Differentiation:

- **Support:** Provide sentence starters: "I am writing to request..." "First..." "Some people might say... but..."
- **Extension:** Challenge students to include a counter-argument and rebuttal in their letter.

Homework/Follow-Up:

Complete the draft of your persuasive letter. Revise and edit for a final copy. If appropriate, deliver the letter to the intended recipient.

6.6: English Language (Reading Comprehension) – The Story of an FMNR Tree

Field	Details
Subject	English Language
Class	B4–B6
Strand	Reading
Sub-Strand	Comprehension
Topic	Reading and Understanding Narrative Text
Lesson Title	<i>The Tree That Came Back: An FMNR Story</i>
Duration	50 minutes
Curriculum Reference	B4.1.1.1: Read and answer comprehension questions on a variety of texts

Learning Objectives:

By the end of this lesson, students will be able to:

1. **Read** a short narrative text with fluency and understanding.
2. **Answer** literal and inferential comprehension questions.
3. **Retell** the main events of the story in sequence.

FMNR Connection: This narrative text introduces FMNR concepts through a story, making it accessible and engaging for primary learners.

Materials/Resources:

- Copies of the reading passage (one per student or pair)
- Comprehension question worksheet
- Sequence cards (optional)

Reading Passage: The Tree That Came Back

The Tree That Came Back

A long time ago, there was a big Shea tree in Anafo's family farm. Every year, Anafo's grandmother collected shea nuts from under the tree. She made shea butter to sell at the market.

One year, Anafo's father needed money for school fees. He decided to cut down the Shea tree to make charcoal. Anafo was sad. "Grandmother's tree is gone," she cried.

The next rainy season, something amazing happened. Anafo was walking in the farm when he saw small green shoots growing from the old tree stump. "Papa, come and see!" he called. His father came and looked. "Those are just weeds," he said. "I will clear them before planting."

But Anafo remembered a lesson from school. His teacher had talked about FMNR (Farmer Managed Natural Regeneration). "Papa," he said, "please do not cut them. Let us protect the strongest ones. They will grow into a new tree."

Anafo's father agreed to try. They selected the three healthiest shoots and cut away the rest. They put thorny branches around the stump to keep the goats away.

The shoots grew and grew. After two years, they were taller than Anafo. After five years, one of them was as tall as the original tree. It began to produce shea nuts.

Anafo's grandmother smiled. "The tree came back," she said. "And this time, we will never cut it down completely. We will only take what we need."

Today, Anafo is a grown man. He teaches his own children about FMNR. "The underground forest is always waiting," he tells them. "We just need to protect it."

Comprehension Questions:

Literal Questions	Inferential Questions
1. Why did Anafo's father cut down the Shea tree?	5. Why do you think Anafo's father called the shoots "weeds"?
2. What did Anafo see growing from the stump?	6. How did Anafo know to protect the shoots?
3. How many shoots did they protect?	7. What does the grandmother mean when she says, "The tree came back"?
4. How long did it take for the new tree to produce shea nuts?	8. What lesson does this story teach us?

Lesson Procedure:

Time	Phase	Teacher Activity	Student Activity
5 mins	Pre-Reading	Activate prior knowledge: " <i>Have you ever seen a tree grow back after being cut down? What happened?</i> " Introduce key vocabulary: stump, shoots, protect, regenerate.	Students share experiences. They repeat and discuss new vocabulary.
15 mins	During Reading	First reading: Teacher reads aloud with expression. Second reading: Students read in pairs (paired reading) or individually.	Students listen, then read the passage.
20 mins	Post-Reading	Distribute comprehension questions. Students answer in writing or orally. Discuss answers as a class, focusing on inferential questions.	Students answer questions individually or in pairs. They participate in class discussion.
10 mins	Elaborate	Sequencing activity: Provide sentence strips with key events. Students arrange them in order.	Students sequence events and retell the story to a partner.
5 mins	Evaluate	Quick Write: " <i>What is one thing you learned from Anafo's story?</i> "	Students write a sentence or two.

Differentiation:

- **Support:** Provide a simplified version of the story. Pair struggling readers with stronger readers.
- **Extension:** Ask students to write a sequel: "*What happens next in Anafo's community?*"

Homework:

Draw a picture showing the story in four parts: 1. The big tree, 2. The cut stump, 3. The new shoots, 4. The regrown tree. Write a caption for each picture.

6.7: Mathematics: Measuring Tree Growth and Calculating Survival Rates

Field	Details
Subject	Mathematics
Class	B6–B8 (adaptable)
Strand	Measurement and Data Handling
Topic	Length Measurement and Calculating Percentages
Lesson Title	<i>How Fast Do FMNR Trees Grow? Measuring and Calculating Growth</i>
Duration	60 minutes
Curriculum Reference	B6.3.2.1: Measure length using appropriate units; B7.1.3.1: Calculate percentages

Learning Objectives:

By the end of this lesson, students will be able to:

1. **Measure** tree height using simple methods (direct measurement for small trees, estimation for larger trees).
2. **Calculate** growth rate (change in height over time).
3. **Calculate** survival rate as a percentage.
4. **Interpret** data to compare FMNR vs. conventional planting success.

FMNR Connection: This lesson uses real FMNR data to practice mathematical skills. Students understand that FMNR has a much higher survival rate than conventional tree planting.

Materials/Resources:

- Measuring tapes or metre sticks
- String and a weight for estimating height of taller trees (optional)
- Data table (provided below)
- Calculators
- Student notebooks

Data Table: FMNR vs. Tree Planting Survival

Method	Number of Trees Started	Number Surviving After 2 Years
FMNR (protected shoots)	50	48
Planted Seedlings	50	9

Lesson Procedure:

Time	Phase	Teacher Activity	Student Activity
10 mins	Engage	Ask: "If a farmer protects 50 FMNR shoots, how many do you think will survive? What if they plant 50 seedlings? Which method is more reliable?"	Students make predictions. Teacher records on board.
20 mins	Explore	Part A: Measuring Height. Take students outside to measure FMNR trees on the school compound. For small trees, measure directly with tape. For taller trees, demonstrate simple estimation method (hold stick at arm's length, align top of stick with top of tree, mark where base of tree aligns on stick; height = distance from tree × ratio). Record measurements. Part B: Calculating Growth. If previous measurements exist, calculate growth since last measurement. If not, use sample data: Year 1 height = 45 cm, Year 2 height = 120 cm. Growth = $120 - 45 = 75$ cm.	Students work in groups to measure trees and record data. They calculate growth using sample or real data.
15 mins	Explain	Introduce survival rate calculation: $(\text{Number Surviving} \div \text{Number Started}) \times 100\%$. Using the data table, guide students through calculation: FMNR survival rate = $(48 \div 50) \times 100\% = 96\%$. Planting survival rate = $(9 \div 50) \times 100\% = 18\%$. Discuss: "What do these percentages tell us? Why is FMNR more reliable?"	Students calculate percentages using calculators. They record results and discuss implications.
10 mins	Elaborate	Pose problem: "A school wants to establish 20 trees on their compound. How many FMNR shoots should they protect to end up with 20 trees? How many seedlings would they need to plant?" (FMNR: protect ~21 shoots; Planting: plant ~111 seedlings!)	Students solve problems in pairs and share strategies.
5 mins	Evaluate	Exit Ticket: "1. A farmer protects 30 FMNR shoots. 28 survive. What is the survival rate? 2. Why does knowing survival rate matter for planning?"	Students calculate and write responses.

Differentiation:

- **Support:** Provide a step-by-step calculation guide for percentages. Use simpler numbers (e.g., 10 out of 20).
- **Extension:** Ask students to create a graph comparing FMNR and planting survival rates. Research survival rates for other tree-planting projects.

Homework:

Measure the height of one tree near your home (or use an object if no tree is available). Estimate how much it might grow in one year if protected.

6.8: Mathematics (Data Handling) – FMNR Survey and Graphs

Field	Details
Subject	Mathematics
Class	B5–B7
Strand	Data Handling
Topic	Collecting, Organizing and Representing Data
Lesson Title	<i>What Trees Grow in Our School? Surveying and Graphing Tree Species</i>
Duration	60 minutes
Curriculum Reference	B5.4.1.1: Collect, organize and represent data using pictograms and bar graphs

Learning Objectives:

By the end of this lesson, students will be able to:

1. **Collect** data through observation and tallying.
2. **Organize** data in a frequency table.
3. **Represent** data using a bar graph or pictogram.
4. **Interpret** the graph to answer questions.

FMNR Connection: Students survey tree species on the school compound, building awareness of local biodiversity and providing baseline data for FMNR monitoring.

Materials/Resources:

- Clipboards or cardboard writing surfaces
- Data collection sheets (see below)
- Pencils
- Graph paper or plain paper
- Rulers
- Coloured pencils (optional)

Data Collection Sheet:

Tree Species	Tally	Frequency (Total)
Shea (Tang)		
Locust Bean (dawadawa -Duah)		
Baobab (Tuo)		
Neem		
Mango		
Other (name):		
Other (name):		

Lesson Procedure:

Time	Phase	Teacher Activity	Student Activity
10 mins	Engage	Ask: "How many different types of trees grow in our school compound? Which type is most common?" Take predictions.	Students make predictions. Teacher records.
20 mins	Explore	Take students outside. Demonstrate how to tally: four vertical lines, fifth line crosses. Assign groups to different areas of the compound. Students count and tally trees by species.	In groups, students survey assigned area, tallying tree species on data collection sheets.
15 mins	Explain	Return to classroom. Guide students to total their tallies and combine group data into a class frequency table on the board. Discuss: "What is the most common species? The least common? Why might some species be more common?"	Students total tallies. They copy the class frequency table.
10 mins	Elaborate	Students create a bar graph or pictogram representing the class data. Review graph components: title, labelled axes, appropriate scale, accurate bars.	Students draw graphs individually or in pairs.
5 mins	Evaluate	Peer assessment: Partners check each other's graphs against a simple checklist (Title? Labels? Correct heights?).	Students check graphs and provide feedback.

Differentiation:

- **Support:** Provide pre-drawn axes for the graph. Use a smaller number of species categories.
- **Extension:** Ask students to write three questions that can be answered using their graph, then swap with a partner to answer.

Homework:

Survey the trees in your compound at home. Create a simple tally chart or pictogram. Bring to share next class.

6.9: Religious and Moral Education (RME): Caring for Creation

Field	Details
Subject	Religious and Moral Education (RME)
Class	B1–B6 (adaptable)
Strand	Moral Values
Topic	Care for the Environment
Lesson Title	<i>Caring for God's Creation: Why We Protect Trees</i>
Duration	40–50 minutes
Curriculum Reference	B1.3.1.1: Explain why we should care for the environment

Learning Objectives:

By the end of this lesson, students will be able to:

1. **Explain** why caring for the environment is a moral responsibility.
2. **Identify** religious teachings (Christianity and Islam) about caring for creation.
3. **Describe** one practical action they can take to care for trees.

FMNR Connection: FMNR is framed as an act of stewardship – caring for the trees and land that God/Allah has provided.

Materials/Resources:

- Bible (Genesis 2:15) and/or Qur'an (Surah Al-A'raf 7:56, Surah Al-Baqarah 2:205) references
- Pictures of healthy environment vs. degraded environment
- Drawing paper and colours

Key Religious Teachings:

Faith	Teaching
Christianity	"The Lord God took the man and put him in the Garden of Eden to work it and take care of it." (Genesis 2:15) – Humans are stewards (caretakers) of creation.
Islam	"Do not cause corruption on the earth after it has been set in order." (Surah Al-A'raf 7:56) — Humans have a responsibility not to damage the earth.

Lesson Procedure:

Time	Phase	Teacher Activity	Student Activity
5 mins	Engage	Show two pictures: a healthy, green landscape and a degraded, bare landscape. Ask: " <i>Which place would you rather live in? Why? Which place do you think God/Allah wants for us?</i> "	Students share preferences and reasons.
10 mins	Explore	Read and discuss the religious texts. Explain the concept of stewardship (being a caretaker). Ask: " <i>What does it mean to 'take care of' the earth? What does 'corruption on the earth' mean?</i> "	Students listen, read along (if able), and discuss.
15 mins	Explain	Connect to FMNR: " <i>One way we can be good stewards is by protecting trees. FMNR is a way to help trees grow back. When we protect a tree, we are doing what God/Allah asks—we are taking care of creation.</i> " Discuss practical actions: not cutting trees unnecessarily, protecting young shoots, planting and watering.	Students identify actions they can take.
10 mins	Elaborate	Students draw a picture showing "Caring for Creation." Prompt: " <i>Draw yourself doing something to protect a tree or help the environment.</i> "	Students draw and, if time, share with a partner.
5 mins	Evaluate	Oral question: " <i>Why should we take care of trees? What is one thing you will do this week to care for creation?</i> "	Students respond.

Differentiation:

- **Support:** Provide sentence frames: "I can care for creation by _____."
- **Extension:** Ask older students to write a short prayer or reflection on caring for the environment.

Homework:

Tell your family about what you learned. Do one thing this week to care for a tree or plant.

6.10: Creative Arts: Drawing the Underground Forest

Field	Details
Subject	Creative Arts
Class	B1–B3
Strand	Visual Arts
Topic	Drawing and Colouring
Lesson Title	<i>The Underground Forest: Drawing What We Cannot See</i>
Duration	40 minutes
Curriculum Reference	B1.2.1.1: Draw and colour objects from the environment

Learning Objectives:

By the end of this lesson, students will be able to:

1. **Draw** a tree showing both above-ground and below-ground parts.
2. **Use** colour to distinguish different parts of the tree.
3. **Explain** their drawing to a partner.

FMNR Connection: This lesson helps young learners visualize the "underground forest" concept – the living roots beneath the soil that can produce new trees.

Materials/Resources:

- Drawing paper
- Crayons or coloured pencils
- Example drawing (teacher-created)
- Optional: Real tree stump for observation

Lesson Procedure:

Time	Phase	Teacher Activity	Student Activity
5 mins	Engage	Show a picture of a tree. Ask: " <i>What parts of the tree can we see? What parts are hidden underground?</i> "	Students name visible parts (trunk, branches, leaves). Teacher prompts for underground parts (roots).
10 mins	Explore	If possible, take students to observe a tree stump with exposed roots. Point out: " <i>Even when we cut the tree, the roots are still alive underground. They can grow new shoots!</i> "	Students observe and touch (if safe).
15 mins	Explain/ Demonstrate	On the board, demonstrate how to draw a tree showing BOTH above ground (stump, new shoots, leaves) and below ground (thick roots spreading out). Explain: " <i>This is the underground forest – the living roots waiting to grow.</i> "	Students watch demonstration.
15 mins	Elaborate	Students create their own "Underground Forest" drawings. Encourage them to include: roots underground, a stump at ground level, and new green shoots growing up.	Students draw and colour. Teacher circulates to support.
5 mins	Evaluate	Gallery Walk: Students place drawings on desks. They walk around and look at classmates' work. Teacher asks: " <i>What do you like about your friend's drawing?</i> "	Students view work and share positive comments.

Differentiation:

- **Support:** Provide a template with the ground line and stump outline for students to complete.
- **Extension:** Ask students to add labels to their drawing (roots, stump, shoot, leaves).

Homework:

Show your drawing to someone at home. Explain what the "underground forest" means.

6.11: Creative Arts and Design: FMNR Poster Design and Drama Skits

Field	Details
Subject	Creative Arts and Design
Class	B7–B9
Strand	Visual Arts / Performing Arts
Topic	Graphic Design / Drama
Lesson Title	<i>Communicating FMNR: Poster Design and Drama Performance</i>
Duration	70–90 minutes (may span two lessons)
Curriculum Reference	B7.2.2.1: Design and produce visual communication materials; B7.3.2.1: Create and perform drama pieces

Learning Objectives:

By the end of this lesson, students will be able to:

1. **Design** an effective FMNR awareness poster using principles of visual communication.
2. **Create and perform** a short drama skit communicating an FMNR message.
3. **Evaluate** the effectiveness of visual and performance communication.

FMNR Connection: Students apply creative skills to become FMNR communicators, spreading awareness within the school and community.

Materials/Resources:

- Poster paper or large cardboard
- Markers, crayons, paint
- Sample posters (collect examples of health or environmental awareness posters)
- Space for drama rehearsal
- Optional: Simple props or costumes

Lesson Procedure:

Time	Phase	Teacher Activity	Student Activity
10 mins	Engage	Show a powerful environmental poster. Ask: " <i>What message is this poster sending? What makes it effective?</i> " <u>Discuss elements:</u> bold headline, clear image, simple message, call to action.	Students analyze the poster and identify effective elements.
15 mins	Explore	Divide class into two groups: Poster Design Group and Drama Group . (Or do both activities over two lessons.) Provide brief for each: Poster: Create a poster promoting FMNR for the school or community. Drama: Create a 2–3 minute skit showing the benefits of FMNR or convincing someone to try FMNR.	Students form groups and begin planning.
30–40 mins	Elaborate	Groups work on their projects. Teacher circulates to provide guidance: Poster group: Check for clear message, eye-catching design. Drama group: Check for clear storyline, FMNR message, engaging performance.	Students create posters or rehearse skits.
15 mins	Evaluate	Gallery Walk / Performances: Poster group displays posters. Class does a gallery walk, leaving sticky note feedback. Drama group performs skits. Class provides warm and cool feedback.	Students present work and provide/receive feedback.

Assessment Criteria (can be shared with students in advance):

Poster Assessment	Drama Assessment
Clear FMNR message	Clear FMNR message
Eye-catching design	Engaging performance
Appropriate for audience	Appropriate for audience
Includes call to action	Conveys emotion/persuasion

Differentiation:

- **Support:** Provide templates or scripts as starting points. Assign specific roles within groups.
- **Extension:** Challenge students to present their work at a school assembly or community event.

Homework/Follow-Up:

Display posters around the school. Perform skits for other classes or at PTA meeting.

6.12: OWOP / Citizenship: Rules and Responsibilities for Tree Protection

Field	Details
Subject	Our World Our People (OWOP)
Class	B1–B3
Strand	Values and Beliefs / Citizenship
Topic	Rules and Responsibilities
Lesson Title	<i>Rules for Our Trees: How We Protect Trees at School and Home</i>
Duration	40 minutes
Curriculum Reference	B1.3.1.1: Identify rules and responsibilities in the school and community

Learning Objectives:

By the end of this lesson, students will be able to:

1. **Identify** rules that help protect trees.
2. **Explain** why we have rules about trees.
3. **Suggest** a rule for protecting trees in the classroom or school.

FMNR Connection: Young learners understand that protecting FMNR trees requires simple rules and shared responsibility.

Materials/Resources:

- Picture cards showing tree care actions (watering, not breaking branches, protecting shoots)
- Large paper for class poster
- Markers

Lesson Procedure:

Time	Phase	Teacher Activity	Student Activity
5 mins	Engage	Show a picture of a damaged tree (broken branches, cut stem). Ask: " <i>What happened to this tree? How do you think the tree feels?</i> "	Students share observations and feelings.
10 mins	Explore	Brainstorm: " <i>What are some things we should NOT do to trees? What are some things we SHOULD do to care for trees?</i> " Record ideas on board in two columns.	Students contribute ideas. Teacher scribes.
10 mins	Explain	Introduce the concept of rules : " <i>Rules help us remember how to behave. We have rules in class. We can have rules for trees too.</i> " Present 3–4 simple "Tree Rules" (e.g., <i>Do not break branches. Do not cut young trees. Water young trees in the dry season. Tell a teacher if you see someone hurting a tree.</i>)	Students listen and repeat the rules.
10 mins	Elaborate	As a class, create a "Tree Protection Rules" poster. Students can draw pictures to illustrate each rule.	Students contribute drawings or write simple phrases.
5 mins	Evaluate	Ask: " <i>What is one tree rule you will follow? Why is this rule important?</i> "	Students respond orally.

Differentiation:

- **Support:** Use picture cards for students who are pre-literate.
- **Extension:** Ask students to teach the tree rules to a younger class or sibling.

Homework:

Share the tree rules with your family. Ask if your family has any rules about trees at home.

PART THREE: BEYOND THE CLASSROOM

Chapter 7: Establishing and Sustaining FMNR Eco-Clubs

7.1: The FONAR School Kids FMNR Eco-Club Model

Eco-Clubs are student-led groups that provide opportunities for hands-on environmental learning and action beyond the classroom. Since 2022, FONAR has supported the establishment of FMNR Eco-Clubs in 25 rural public basic schools in Talensi District under the two different projects funded by Awaken Trees Foundation and Heidehof foundation of Germany. The first project was solely funded by Awaken Trees, while the current project – "*Regreening Communities Through School Kids FMNR Eco-Clubs.*", is jointly funded by Awaken Trees and Heidehof Foundation.

Core Principles of FONAR FMNR Eco-Clubs

Principle	Description
1. Student-led	Students take leadership roles; teachers facilitate and guide
2. Action-oriented	Club activities involve doing, not just talking
3. School-based	Activities focus on the school compound and immediate environment
4. Community-connected	Clubs reach out to parents and community members
5. Inclusive	All interested students are welcome, regardless of academic performance
6. Sustainable	Clubs operate with minimal resources, using FMNR principles

Typical Eco-Club Structure

Role	Responsibility
Teacher Coordinator	Provides guidance, ensures safety, liaises with school administration and FONAR
Student President	Leads meetings, represents the club
Student Vice-President	Assists President, takes over when President absent
Student Secretary	Takes minutes, keeps records, manages club register
Student Organizer	Arranges meeting space, coordinates activity logistics
Student Treasurer	Manages any club funds or resources (if applicable)
General Members	Participate in activities, contribute ideas

 **Teaching Tip:** Hold elections for student leadership positions at the start of each term. This builds ownership and develops leadership skills.

7.2: Steps to Start an Eco-Club

If your school does not yet have an FMNR Eco-Club, or if you are revitalizing an existing club, follow these steps:

Step	Action	Responsible
1. Secure Approval	Meet with the Headteacher to explain the Eco-Club concept and obtain permission. Share this manual and FONAR materials.	Interested Teacher(s)
2. Identify a Coordinator	Designate at least one teacher to serve as the Eco-Club Coordinator. Ideally, involve at least two teachers for continuity.	Headteacher / Teachers
3. Announce and Recruit	Make an announcement at school assembly. Invite interested students to an initial meeting. Keep membership open.	Teacher Coordinator
4. Hold First Meeting	Explain the purpose of the club. Elect interim or permanent officers. Decide on a regular meeting time (e.g., weekly or bi-weekly).	Teacher Coordinator + Students
5. Register with FONAR	If your school is in a FONAR partner area, register the club with FONAR to receive support, training and materials.	Teacher Coordinator
6. Plan First Activity	Choose a simple, visible first activity (e.g., mapping trees on the school compound). Success builds momentum.	Club Members + Coordinator
7. Establish a Meeting Routine	Hold regular meetings. Keep them engaging, balance discussion with action.	Club Officers

7.3: Eco-Club Leadership and Student Voice

Empowering students to lead is essential for long-term club sustainability. When students feel ownership, they are more likely to remain engaged and to sustain activities even when teachers change.

Strategies for Developing Student Leadership

Strategy	How to Implement
Rotate Responsibilities	Change meeting roles (chair, timekeeper, note-taker) so all members experience leadership
Student-Led Planning	Have students propose and vote on club activities for the term
Peer Education	Train older or experienced club members to teach FMNR concepts to younger students or new members
Public Speaking Opportunities	Encourage club officers to speak at school assembly, PTA meetings, or community events
Mentorship	Pair experienced club members with new members
Celebrate Contributions	Recognize student leaders publicly (certificates, announcements, display board)

Activity: Student Leadership Reflection

At the end of each term, ask student leaders to reflect:

- *What did I do well as a leader?*
- *What was challenging?*
- *What would I do differently next term?*
- *What advice would I give to the next person in this role?*

7.4: Sample Eco-Club Activity Calendar (Termly)

Below is a sample termly calendar. Adapt to your school calendar, local seasons, and specific interests.

Week	Activity	Description	FMNR Connection
Week 1	Club Launch / Elections	Elect officers, review club purpose, set term goals	Building ownership
Week 2	School Tree Survey	Map and count all trees on school compound	Baseline data for FMNR
Week 3	FMNR Basics Refresher	Review five steps of FMNR using videos or demonstration	Knowledge building
Week 4	Pruning Practice	Hands-on pruning of selected trees on school compound (with teacher supervision)	Skill development
Week 5	Firebreak Establishment	Clear firebreaks around school FMNR areas before dry season intensifies	FMNR Step 3: Protect from Fire
Week 6	Tree Growth Monitoring	Measure and record height of selected FMNR trees	Data collection
Week 7	Poster Creation	Design FMNR awareness posters for school and community	Communication
Week 8	Community Outreach Planning	Plan a visit to a local FMNR farm or invite a farmer to speak	Community connection
Week 9	Nature Journaling Session	Outdoor observation and journaling focused on trees	Observation skills
Week 10	FMNR Quiz or Game	Fun review of FMNR knowledge	Knowledge reinforcement
Week 11	Prepare for End-of-Term Event	Plan a presentation or display for school assembly or PTA	Celebration and advocacy
Week 12	End-of-Term Celebration	Present club achievements, recognize members, plan for next term	Reflection and continuity

 **Local Connection:** Adjust the calendar based on the agricultural and school calendar. For example, schedule pruning before the dry season when it is most beneficial.

7.5: Monitoring and Documenting Eco-Club Impact

Tracking Eco-Club activities and impact serves multiple purposes:

- Demonstrates value to school administration and community
- Provides data for FONAR reporting and funding proposals
- Motivates students by showing progress
- Identifies areas for improvement

Simple Monitoring Tools

Tool	Purpose	Frequency
Club Register	Record attendance at meetings and activities	Every meeting
Activity Log	Brief record of each activity: date, description, number of participants, observations	Every activity
Tree Growth Monitoring Sheet	Track height and condition of selected FMNR trees on demonstration plot	Monthly or termly
Photo Documentation	Photograph club activities, tree growth and special events	Ongoing
Student Reflection Journals	Individual student reflections on learning and experiences	Optional, termly
Termly Report Template	Summarize term's activities, achievements, challenges and plans	End of each term

Sample Activity Log Entry

Date	Activity	Participants	What We Did	Observations/Outcomes
15/03/2026	Pruning practice	22 students, 2 teachers	Pruned 5 Shea stumps behind Class 6. Each student practiced selecting 3–5 stems.	Students were careful and focused. Two stumps had more than 15 shoots—students understood why pruning is needed.

Activity: Set Up Your Monitoring System

At the start of the term, designate a club member (e.g., Secretary) to maintain the Activity Log. Store all records in a dedicated folder or notebook.

Chapter 8: The School Compound as an FMNR Learning Site

8.1: Selecting and Mapping FMNR Trees on School Grounds

Every school compound, no matter how bare, has potential for FMNR. Even a single stump can become a living demonstration site.

Step-by-Step: Establishing a School FMNR Site

Step	Action	Details
1. Survey	Walk the entire school compound. Identify all existing trees, stumps and areas with regenerating shoots.	Involve students in the survey.
2. Map	Create a simple sketch map showing locations of trees and stumps.	Use landmarks (classroom blocks, latrines, football field).
3. Select	Choose 3–5 stumps or areas to focus on for FMNR demonstration.	Prioritize areas that are visible and accessible but protected from heavy foot traffic.
4. Label	Create simple signs for selected trees/stumps.	Sign could include: species name (local and English), date of first pruning, "Protected by [Class/Eco-Club]."
5. Protect	Establish protection measures: fencing with thorny branches, clear boundaries, community agreements about livestock.	Involve school security and neighbouring households.
6. Monitor	Assign responsibility for regular observation and care.	Different classes or Eco-Club members can "adopt" specific trees.

 **Safety Consideration:** Ensure FMNR sites are not in areas where falling branches could injure students. Regularly inspect trees for dead or hazardous branches.

8.2: Establishing an FMNR Demonstration Plot

If space allows, designate a specific area as an **FMNR Demonstration Plot**. This provides a focused site for teaching and monitoring.

Characteristics of a Good Demonstration Plot

Characteristic	Why It Matters
1. Visible	Located where students, staff and visitors can see it
2. Accessible	Easy to reach for teaching and maintenance
3. Defined boundaries	Clear markers (stones, posts, painted lines) show the area is protected
4. Diverse species	Include different local tree species if possible
5. Documented	Records kept of interventions and growth
6. Signed	Informational sign explains FMNR and the purpose of the plot

Plot Layout Considerations

Element	Suggestion
Size	Even 10m × 10m is sufficient for a demonstration
Number of stumps/trees	3–10 stumps allows for comparison
Paths	Define clear walking paths to prevent trampling
Firebreak	Clear a strip around the perimeter before dry season
Shade area	If possible, include a shaded seating area for outdoor lessons

Activity: Design Your School FMNR Plot

With students, sketch a design for a demonstration plot. Include:

- Location of existing stumps/trees
- Proposed paths
- Location of sign
- Areas for future planting (if desired)

8.3: Safety Guidelines for Outdoor Activities

Outdoor learning is powerful but requires attention to safety.

Pre-Activity Checklist

	Item
	Area scouted in advance for hazards (sharp objects, holes, harmful plants)
	Weather conditions checked (avoid extreme heat; morning sessions preferred)
	Students briefed on behaviour expectations and boundaries
	First aid kit available
	Adequate adult supervision (recommend 1 adult per 15–20 students)
	Students wearing appropriate footwear (closed shoes if possible)
	Water available for hydration
	Permission from school administration obtained
	Parents informed (for off-site activities)

Specific Hazards and Mitigation

Hazard	Mitigation
Snakes	Brief students: if you see a snake, freeze, do not approach, call teacher. Teachers should know basic snake safety.
Sharp tools (cutlasses)	Only teachers or trained older students should use sharp tools. Establish a "tool safety zone." Never leave tools unattended.
Falling branches	Do not conduct activities under trees with dead or hanging branches. Inspect trees before activities.
Heat and sun	Schedule outdoor activities for cooler morning hours. Encourage hats. Provide shaded rest areas.
Insects (bees, wasps)	Be aware of nests. If students are allergic, have emergency plan.
Uneven ground	Warn students to watch their step. Clear major tripping hazards.

8.4: Integrating FMNR into School Farming Activities

Many basic schools in Ghana have school farms or gardens. FMNR can be integrated into these existing activities.

FMNR on the School Farm

Practice	How to Integrate FMNR
Land preparation	Instead of clearing all trees and bushes, identify and protect valuable tree stumps before ploughing
Crop planting	Plant crops around protected FMNR trees (trees provide shade and leaf litter)
Weeding	Train students to distinguish between crop weeds and tree shoots that should be protected
Pruning	Schedule pruning sessions as part of farm maintenance activities
Harvest	Discuss how tree products (leaves for fodder, pruned branches for stakes) can be harvested alongside crops

Benefits of Integrating FMNR with School Farming

- **Educational:** Students see the interaction between trees and crops (agroforestry in practice).
- **Practical:** Trees improve soil fertility for school crops.
- **Efficient:** One site serves multiple educational purposes.
- **Sustainable:** Models practices students can take home to family farms.

💡 **Teaching Tip:** If your school has an Agriculture Science teacher, collaborate with them to integrate FMNR into practical agriculture lessons.



Chapter 9: Engaging Parents, Community and Local Leaders

9.1: Communicating FMNR to Parents and Guardians

Students are powerful messengers, but direct communication with parents builds understanding and support.

Strategies for Parent Engagement

Strategy	How to Implement
PTA Meeting Presentations	Eco-Club students present a short FMNR demonstration or report at PTA meetings
Parent Information Letters	Send home simple, illustrated letters explaining FMNR and the school's activities (in English and/or local language)
Open Days / FMNR Tours	Invite parents to visit the school FMNR site and see student work
Home Conversation Prompts	Send students home with specific questions to discuss with parents (e.g., "Ask your parents: Did trees used to grow in our farm? What happened to them?")
Student-Led Demonstrations	During parent-teacher gatherings or community engagements, have students show parents the trees they care for
Success Stories	Share stories of local farmers who have benefited from FMNR (with their permission)

Sample Parent Letter (Adapt and Translate)

Dear Parent/Guardian,

This term, our school is teaching students about Farmer Managed Natural Regeneration (FMNR). FMNR is a simple way to grow trees from the stumps and roots that are already in our fields. It does not cost money. It does not require watering. And it helps make our soil more fertile for crops.

Your child will be learning about FMNR in class and may participate in caring for trees on the school compound. We encourage you to ask your child what they are learning. You might even try protecting a few tree shoots on your own farm!

If you would like to learn more about FMNR, please contact the school or speak with [Teacher Name], our Eco-Club Coordinator.

Together, we can help our land become greener and more productive for our children's future.

Thank you for your support.

Sincerely,

[Headteacher Name]

9.2: Involving Traditional Authorities and Opinion Leaders

Chiefs, elders, Assembly members and religious leaders hold significant influence in communities. Their support can legitimize and amplify school FMNR efforts.

Strategies for Engaging Traditional Leaders

Strategy	How to Implement
Courtesy Calls	Headteacher and Eco-Club Coordinator visit the chief and/or elders to explain the school's FMNR activities and seek blessing
Invitations to School Events	Invite chiefs and elders to FMNR-related events (tree pruning and planting ceremonies, Eco-Club launches, open days)
Student Delegations	Arrange for Eco-Club officers to present their work to the traditional council (Chief and Elders)
Community FMNR Days	Partner with traditional authorities to organize community-wide FMNR activities
Recognition	Publicly acknowledge the support of traditional leaders in school communications
Link to Custom	Frame FMNR as consistent with traditional practices of environmental stewardship

Sample Talking Points for Meeting with Chiefs/Elders

- *"FMNR is not new. It builds on the way our ancestors managed the land."*
- *"We are teaching the children to value and protect our local trees."*
- *"We seek your blessing and guidance as we do this work."*
- *"We would be honoured if you would visit the school to see what the children are doing."*

9.3: Community FMNR Days and Celebrations

Community events create visibility, build momentum and celebrate progress.

Planning a Community FMNR Day

Element	Considerations
Timing	Choose a date that does not conflict with major farming activities, community events or religious observances
Venue	School compound or central community space
Programme	Include student presentations, FMNR demonstrations, speeches by leaders, recognition of FMNR adopters
Activities	Hands-on pruning demonstrations, tree mapping, FMNR quiz with prizes
Food/Refreshments	If resources allow, provide light refreshments
Publicity	Announce at places of worship, market days, community information centres
Documentation	Take photos and record attendance for reporting

Sample Programme for Community FMNR Day (2–3 hours)

Time	Item	Led By
15 mins	Welcome and Opening Prayer	Headteacher / Religious Leader
10 mins	Purpose of the Gathering	Eco-Club Teacher Coordinator
20 mins	FMNR Drama or Song Performance	Eco-Club Students
20 mins	FMNR Demonstration (live pruning)	FONAR Staff or Trained Farmer
15 mins	Remarks by Chief / Assembly Member	Traditional / Government Leader
15 mins	Testimony from FMNR Farmer	Community FMNR Adopter
15 mins	Questions and Answers	Facilitator
10 mins	Closing Remarks and Call to Action	Eco-Club President or Headteacher
15 mins	Tour of School FMNR Site	Eco-Club Students
	Refreshments and Networking	All

9.4: Linking School FMNR to Household Practice

The ultimate goal is for students to take FMNR knowledge and attitudes home, influencing family practices.

Strategies for Home-School Linkage

Strategy	How to Implement
Home Challenges	Give students a simple challenge: <i>"This week, identify one tree stump on your family's land and protect one shoot from being cut."</i>
Family FMNR Pledge	Send home a simple pledge form: <i>"Our family will try FMNR by protecting at least [number] tree shoots this year."</i>
Student Reporting	Have students report back on family FMNR activities during Eco-Club meetings
Home Visits	Where feasible, Eco-Club Coordinator visits interested families to provide encouragement and basic guidance
Success Recognition	Recognize families who adopt FMNR (with their permission) in school communications or community events
Link to Livelihoods	Emphasize practical benefits: more firewood, fodder for goats, improved crop yields

Activity: Family FMNR Conversation Starter

Provide students with this prompt to take home:

"This week at school, I learned about FMNR (Tintuug Lebge Tia), a way to grow trees from stumps. Can you show me a stump on our land? Could we try protecting one shoot and see what happens?"

Chapter 10: Monitoring, Evaluation and Reporting for School FMNR

10.1: Simple Tools for Tracking Tree Growth

Monitoring does not need to be complicated. Simple, consistent measurements provide valuable data and engage students in scientific observation.

Tree Growth Monitoring Sheet

Tree ID	Species	Date of First Pruning	**Height (cm) Date: **	**Height (cm) Date: **	**Height (cm) Date: **	Notes (condition, damage, etc.)
T001	Shea	15/03/2026	45			Healthy, 3 stems
T002	Dawadawa	15/03/2026	30			Some goat browsing
T003	Baobab	20/04/2026	55			Vigorous growth

How to Measure Tree Height (Simple Methods)

Method	Description	Best For
Direct Measurement	Use a measuring tape or metre stick. Measure from ground to the highest point of the tallest stem.	Trees up to ~2 metres
Pencil Method	Hold a pencil at arm's length. Align the top of the pencil with the top of the tree. Move your thumb down the pencil until it aligns with the base of the tree. Rotate the pencil horizontally. Have a partner walk out from the tree until they align with the pencil tip. Measure the distance from tree to partner—this approximates tree height.	Taller trees
Shadow Method	Measure the length of the tree's shadow. Measure the length of a stick's shadow. Use ratio: Tree Height = (Stick Height × Tree Shadow Length) ÷ Stick Shadow Length.	Tall trees on sunny days

See <https://www.wikihow.com/Measure-the-Height-of-a-Tree>

 **Teaching Tip:** Choose one consistent method for your school and use it each time. This ensures measurements are comparable.

10.2: Student Portfolios and Reflection Journals

Portfolios and journals document individual student learning and growth over time.

Contents of an FMNR Student Portfolio

Item	Description
Nature journal entries	Dated observations, drawings, measurements
Completed worksheets	From FMNR lessons
Photos of student work	Student engaged in FMNR activities (if available)
Reflection pieces	Written or drawn reflections on learning and experiences
Self-assessments	Student's own rating of their understanding and participation
Goal setting	Student's goals for FMNR learning and action

Reflection Prompts for Students

Prompt Type	Example Prompts
Observation	"Today I noticed..." "I was surprised by..."
Connection	"This reminds me of..." "I wonder if this is connected to..."
Feeling	"I felt... when I saw..."
Learning	"Something new I learned is..." "I used to think... but now I know..."
Action	"Because of what I learned, I will..." "One thing I want to try is..."

10.3: Reporting to FONAR and Education Authorities

Regular reporting demonstrates accountability and helps FONAR and education authorities understand the impact of FMNR education.

Suggested Reporting Schedule

Report Type	Frequency	Content	Audience
Termly Eco-Club Report	End of each term	Activities conducted, participation, tree growth data, challenges, plans for next term	FONAR, School Administration
Annual School FMNR Summary	End of academic year	Highlights of the year, key achievements, student impact stories, photos	FONAR, GES District Office, PTA
Special Event Reports	As needed	Reports on Community FMNR Days, trainings attended, special activities	FONAR

Template: Termly Eco-Club Report

Section	Content
School Name	
Term and Year	
Eco-Club Coordinator	
Number of Club Members	(Boys: ___ Girls: ___ Total: ___)
Number of Meetings Held	
Summary of Activities	(List key activities with brief descriptions)
FMNR Trees Under Management	(Number of trees/stumps being monitored)
Tree Growth Highlights	(e.g., "Shea tree T001 grew from 45 cm to 120 cm this term")
Community Engagement Activities	(e.g., PTA presentation, home visits)
Challenges Encountered	(e.g., goat damage, dry season stress)
Plans for Next Term	(Brief outline)
Support Needed from FONAR	(If any)
Photos Attached?	(Yes/No)

10.4: Celebrating Success and Sharing Stories

Celebration sustains motivation and inspires others.

Ways to Celebrate and Share FMNR Success

Method	Description
School Assembly Recognition	Recognize Eco-Club members and their achievements at school assembly
FMNR Notice Board	Maintain a dedicated board with photos, tree growth charts, and student work
Certificates	Award certificates for participation, leadership, or specific achievements
Success Stories	Write short stories about school FMNR impact for FONAR newsletters or social media
Peer Exchanges	Visit other schools to share experiences and learn from each other
Media Engagement	Invite local radio stations to cover Community FMNR Days (with appropriate permissions)
Annual FMNR Celebration	Host an end-of-year event celebrating all school FMNR activities

Tips for Writing Success Stories

A good success story has:

- **A compelling headline** (e.g., "From Bare Ground to Shade: How Sakorit Primary School Grew Its Own Forest")
- **A human focus** (e.g., a specific student or teacher whose experience illustrates the impact)
- **Concrete details** (e.g., "The club pruned 15 stumps and measured a 200% increase in tree height")
- **Quotes** (e.g., direct words from students, teachers, or community members)
- **Photos** (with appropriate consent)
- **A clear connection to FMNR** and FONAR's mission

PART FOUR: FACILITATOR RESOURCES

Chapter 11: Conducting Teacher Training on FMNR Lesson Planning

11.1: Three-Day Workshop Agenda (Detailed)

This section provides a ready-to-use agenda for a three-day teacher training workshop on FMNR lesson planning. The agenda is designed for 25–30 participants and includes timing, session objectives, activities, and materials.

(Note: For brevity in this manual, a condensed reference is provided here. Facilitators should refer to the complete three-day workshop curriculum document for detailed session plans.)

Day 1: Understanding FMNR & Climate Change

Time	Session	Key Activities
08:30–09:30	Opening & Welcome	Introductions, pre-training quiz, workshop overview
09:30–11:00	What is FMNR?	TEDx Talk video, FONAR presentation, Q&A
11:00–11:30	Health Break	
11:30–13:00	Climate Change in Northern Ghana	Gallery walk, local impacts discussion, FMNR-climate link
13:00–14:00	Lunch	
14:00–15:30	FMNR 5-Step Technique	Outdoor demonstration and guided practice
15:30–16:30	Curriculum Mapping	Subject-group mapping of FMNR to curriculum
16:30–17:00	Reflection & Closing	3-2-1 Exit Ticket

Day 2: Lesson Planning & Hands-on Pedagogy

Time	Session	Key Activities
08:30–09:00	Recap & Energy Builder	FMNR True/False Relay
09:00–10:30	Backwards Design Framework	Presentation, worked example, draft learning objectives
10:30–11:00	Health Break	
11:00–13:00	Lesson Planning Workshop	Teachers develop complete lesson plans with facilitator support
13:00–14:00	Lunch	
14:00–15:30	Peer Review Clinic	Structured peer feedback and lesson plan revision
15:30–16:30	Active Learning Stations	Rotation through 5 stations (journaling, drama, outdoor inquiry, songs, low-cost aids)
16:30–17:00	Reflection & Closing	One Word Checkout

Day 3: Beyond the Classroom — Eco-Clubs & Action Plans

Time	Session	Key Activities
08:30–09:00	Recap & Reflection	Pair-share overnight ideas
09:00–10:45	FONAR Eco-Club Model	Presentation, testimonial, Q&A
10:45–11:15	Health Break	
11:15–13:00	Eco-Club Activity Design	Carousel stations, school team activity planning
13:00–14:00	Lunch	
14:00–15:30	Community Engagement	Case study discussion, strategy development
15:30–16:30	Termly Action Plan	School teams develop and peer-review action plans
16:30–17:00	Closing & Graduation	Certificates, Commitment Wall, group photo, post-training quiz

11.2: Facilitator Notes and Tips

Preparation Before the Workshop

	Task	Timeline
	Confirm venue with outdoor access to FMNR trees	2 weeks prior
	Prepare and print all handouts and materials	1 week prior
	Confirm guest speakers (GES representative, FONAR staff)	2 weeks prior
	Test all equipment (projector, speakers, videos)	Day before
	Prepare outdoor pruning demonstration site	Day before
	Arrange refreshments/lunch	1 week prior
	Send reminders to participants	3 days and 1 day prior

During the Workshop

Tip	Explanation
Start and end on time	Respects participants' time and sets professional tone
Use local language strategically	Allow for translation and discussion in local language, especially for complex concepts
Balance plenary and group work	Vary the format to maintain energy and engagement
Address misconceptions gently	When participants express incorrect ideas, ask clarifying questions rather than simply correcting
Document the workshop	Take photos (with consent), collect attendance, save participant work samples
Be flexible	Adjust timing based on participant needs and energy levels
Model active learning	Demonstrate the teaching strategies you want teachers to use

After the Workshop

Task	Timeline
Send thank-you message and resources to participants	Within 1 week
Compile and analyze pre/post training quiz results	Within 1 week
Share workshop report with FONAR and GES	Within 2 weeks
Schedule first follow-up school visit	Within 4 weeks

11.3: Pre- and Post-Training Assessment Tools

(Full quiz provided in Appendix J)

Use the same quiz before and after the training to measure knowledge gain. A sample of key questions:

#	Question	Answer
1	What does FMNR stand for?	Farmer Managed Natural Regeneration
2	FMNR requires planting new tree seedlings. (True/False)	False
3	How many stems should typically be left per stump when pruning?	3–5 strongest stems
4	FMNR helps mitigate climate change by...	Increasing tree cover and soil carbon
5	FMNR is more expensive than conventional tree planting. (True/False)	False

Analyzing Results

Metric	Calculation
Average pre-training score	Sum of all pre-training scores ÷ Number of participants
Average post-training score	Sum of all post-training scores ÷ Number of participants
Average knowledge gain	Post-training average – Pre-training average
Percentage of participants showing improvement	Number who improved ÷ Total participants × 100%

11.4: Follow-Up Support and Coaching Protocols

Training alone is insufficient. Ongoing support is essential for sustained implementation.

Recommended Follow-Up Protocol

Timeline	Activity	Purpose	Responsible
Week 1 post-training	Send digital resources and group photo via WhatsApp	Reinforcement, community building	FONAR Programme Officer
Week 4 post-training	First school support visit: observe one FMNR lesson, provide coaching feedback, check Eco-Club register	Implementation support	FONAR Field Staff
Week 8 post-training	Second school visit: check Action Plan progress, support with challenges	Troubleshooting, encouragement	FONAR Field Staff
End of Term	Collect Termly Eco-Club Reports and Action Plan updates	Monitoring, documentation	FONAR Programme Officer
Termly	Peer learning meeting (cluster of 3–5 schools)	Sharing best practices, problem-solving	FONAR + Teachers
Annually	Refresher training or advanced workshop	Deepening skills, sustaining momentum	FONAR + GES

Coaching Conversation Framework

When providing feedback to teachers after lesson observation, use this structure:

Step	Prompt	Purpose
1. Ask	"How do you feel the lesson went?"	Teacher self-reflection first
2. Affirm	"I noticed [specific strength]. That was effective because..."	Reinforce what worked
3. Inquire	"What would you do differently next time?"	Teacher identifies areas for growth
4. Suggest	"One idea you might consider is..."	Offer concrete, actionable suggestion
5. Plan	"What support do you need to try that?"	Commitment to action

APPENDICES

Appendix A: Glossary of FMNR and Climate Change Terms

Term	Definition
Agroforestry	The practice of integrating trees with crops and/or livestock on the same land.
Apical dominance	The tendency of the main central stem to grow more strongly than side stems.
Biodiversity	The variety of living organisms in an area.
Carbon sequestration	The capture and storage of carbon dioxide from the atmosphere.
Climate change	Long-term changes in temperature and weather patterns.
Decomposition	The breakdown of organic matter into simpler substances
Degradation	The decline in quality of land, soil, or vegetation
Ecosystem	A community of living organisms interacting with their physical environment
FMNR (Farmer Managed Natural Regeneration)	A low-cost land restoration technique involving the protection and management of naturally regenerating trees
Humus	Dark, organic material in soil formed by decomposition of plant and animal matter
Mitigation	Actions to reduce or prevent greenhouse gas emissions
Organic matter	Material derived from living organisms, found in soil
Photosynthesis	The process by which plants use sunlight to make food from carbon dioxide and water
Pruning	The selective removal of certain parts of a plant (stems, branches)
Regeneration	The process of renewal, regrowth, or restoration
Stewardship	The responsible use and protection of the natural environment
Stump	The base part of a tree left after the trunk has been cut
Sustainable	Able to be maintained at a certain rate or level without depleting resources
Transpiration	The process of water movement through a plant and its evaporation from leaves

Appendix B: FMNR Lesson Plan Template (Blank)

Field	Details
Teacher Name	
School	
Subject	
Class Level	
Strand / Topic	
Lesson Title	
Duration	minutes
Curriculum Reference	
Learning Objectives	By the end of this lesson, students will be able to: 1. 2.
FMNR Connection	
Materials / Resources	
Lesson Procedure	
Starter (5–10 mins)	
Main Activity (25–35 mins)	
Plenary / Assessment (5–10 mins)	
Differentiation	
Homework / Extension	

Appendix C: Peer Review Feedback Form

Reviewer Name: _____ Lesson Plan: _____

Author: _____

Criteria	✓ Yes	⚠ Partially	✗ Not Yet	Comments
Learning objectives are clear and measurable				
FMNR is central to the lesson				
Students are actively doing something				
Lesson connects to students' lived experience				
Assessment method is appropriate				
Timing is realistic				

One strength: _____

One suggestion: _____

Appendix D: Eco-Club Activity Planning Worksheet

School: _____ Term: _____

Activity Name	Learning Goal	Materials Needed	Student Leadership Role	FMNR Connection
1.				
2.				
3.				

Appendix E: Termly FMNR Action Plan Template

School: _____ Term: _____ Year: _____

Activity	Category	Who Leads?	When?	Resources Needed	Evidence of Success
1.					
2.					
3.					

Signatures: Teacher 1: _____ Teacher 2: _____ Headteacher: _____

Appendix F: Tree Growth Monitoring Sheet

Tree ID	Species	Date of First Pruning	**Height (cm) Date: __ **	**Height (cm) Date: __ **	**Height (cm) Date: __ **	Notes
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Appendix G: Sample FMNR Songs and Poems

FMNR Song (English, to a simple chant tune)

FMNR, FMNR,

Let the trees grow near and far!

Select the stems, prune the rest,

FMNR, it is the best!

Protect from fire, goats, and sheep,

Watch the underground forest peep!

Harvest wisely, never kill,

FMNR gives life still!

FMNR Acrostic Poem

Farmers see the shoots appear

Managing the land with care

Nature's gift beneath the ground

Regeneration all around

Haiku

Underground forest

Waiting for the rains to come

New life from old roots

(Encourage teachers and students to create versions in Gurene, Talen, or other local languages.)

Appendix H: Frequently Asked Questions About FMNR

Question	Answer
Is FMNR just letting bushes grow wild?	No. FMNR involves active management, selecting the best stems, pruning and protecting. It is farming trees, not abandoning land.
Do trees shade crops and reduce yields?	With proper management (pruning, spacing), the benefits of trees (soil fertility, moisture retention, wind protection) outweigh any shading effects. Farmers can also prune branches to allow more light.
Does FMNR work for all tree species?	FMNR works best with indigenous species that naturally regenerate from stumps and roots (e.g., Shea, Dawadawa, Acacia, Baobab). Some species may not regenerate well.
How long does it take to see results?	Visible growth occurs within the first rainy season. Significant benefits (shade, soil improvement, harvestable products) typically appear within 2–5 years.
Is FMNR against tree planting?	No. FMNR and tree planting can complement each other. FMNR is often more successful in drylands, while planting may be better for fruit trees or species that do not regenerate naturally.
Can FMNR be done on small plots?	Yes. Even a single tree stump can be managed with FMNR.
What about termites or pests?	Healthy, fast-growing FMNR trees are generally more resistant to pests. Indigenous species also have natural defences.
Do I need permission to practice FMNR on my land?	FMNR is a farming practice. On your own land, no permission is needed. For communal or school land, seek agreement from relevant authorities.

Appendix I: Recommended Resources and Further Reading

FONAR Resources

- FONAR FMNR Teacher's Guide (available from FONAR office)
- FONAR FMNR Farmer Field School Manual
- FONAR website and social media pages

Videos

- *"An Underground Forest"* – Tony Rinaudo TEDx Talk (available on YouTube)
- *"The Forest Maker"* – Documentary on Tony Rinaudo's work
- World Vision FMNR training videos

Publications

- Rinaudo, T. (2020). The Forest Underground: Hope for a Planet in Crisis.
- World Agroforestry Centre (ICRAF) FMNR resources
- World Vision FMNR Field Guide

Ghana Education Service Curriculum Documents

- National Pre-Tertiary Education Curriculum Framework
- Primary School Curriculum (B1–B6)
- Common Core Programme Curriculum (B7–B9)

Climate Change Education Resources

- Ghana Environmental Protection Authority (EPA) educational materials
- UNICEF Climate Change Education resources
- UNESCO Climate Change Education for Sustainable Development

Appendix J: FMNR Pre- and Post-Training Knowledge Check

Teacher Name: _____ School: _____

Circle the correct answer.

#	Question	Options
1	What does FMNR stand for?	a) Forest Management and Natural Resources b) Farmer Managed Natural Regeneration c) Farming Methods for Northern Regions d) Forest Monitoring and National Restoration
2	FMNR requires planting new tree seedlings. (True/False)	True / False
3	Which part of the tree does FMNR focus on protecting?	a) Only the leaves b) Existing rootstocks and stumps c) Only planted seedlings d) Fruit only
4	How many stems should typically be left per stump when pruning?	a) All stems b) 1 stem only c) 3–5 strongest stems d) None
5	FMNR helps mitigate climate change by...	a) Increasing tree cover and soil carbon b) Burning bushes c) Removing all trees d) Using chemical fertilizers
6	Climate change content is already in Ghana's basic school curriculum. (True/False)	True / False
7	Which of these is a local climate impact in the Upper East Region?	a) Prolonged dry season b) Erratic rainfall c) Soil degradation d) All of the above
8	FMNR is more expensive than conventional tree planting. (True/False)	True / False
9	How many countries worldwide practice FMNR?	a) Less than 5 b) About 10 c) More than 25 d) Only Ghana
10	What is the survival rate of FMNR trees compared to planted seedlings?	a) Lower b) About the same c) Higher (almost 100%) d) Cannot be compared

Answer Key: 1-b, 2-False, 3-b, 4-c, 5-a, 6-True, 7-d, 8-False, 9-c, 10-c

Key References

Curriculum Research and Development Division (CRDD). (2019). *National Pre-Tertiary Education Curriculum Framework*. Ghana Education Service, Ministry of Education.

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Rinaudo, T. (2020). *The Forest Underground: Hope for a Planet in Crisis*.

Wiggins, G. & McTighe, J. (2005). *Understanding by Design, Expanded 2nd Ed.* Association for Supervision and Curriculum Development, Alexandria, Virginia USA

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