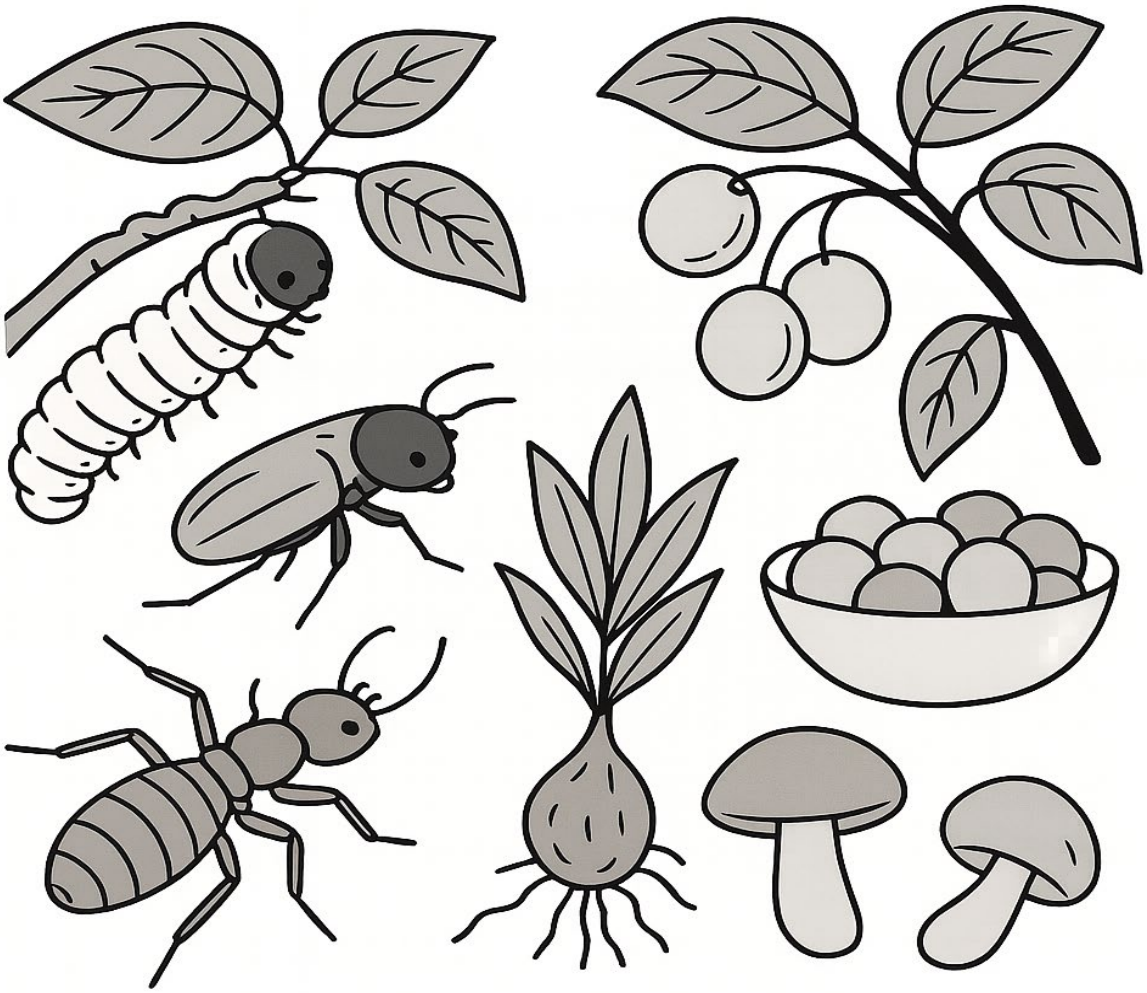
Natural Resources Conservation and Management Training Manual: Edible Insects and Non-Timber Forest Foods



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FOREWORD

The forests and woodlands of Southern Africa form an abundant natural food basket that has supported communities for generations. These ecosystems offer a wide range of nutritious resources, including edible insects, wild fruits, leaves, nuts, and many other valuable foods. This manual has been developed to equip harvesters and involved stakeholders with practical knowledge and skills that promote careful and responsible use of these resources. By embracing practices that protect and regenerate the natural environment, communities can safeguard the nutritional and economic benefits provided by these foods. This approach also helps preserve the cultural heritage and traditional knowledge connected to these foods so that future generations may continue to enjoy and depend on them.

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INTRODUCTION

This training guide outlines the principles and practices of sustainable natural resource management for harvestable foods. It focuses on preventing overharvesting, protecting habitats, and strengthening community based management systems to ensure long term availability. It emphasizes our shared responsibility in protecting the environment and its diverse food basket.

Target audience: Edible insect harvesters, processors, community leaders, and extension officers

Total estimated time: 3 hours 30 minutes

Training objectives

1. Understand the importance of sustainable harvesting for conserving edible insect and NTFF populations.
2. Identify the main edible insect species and Non Timber Forest Foods in the region and the threats to their sustainability.
3. Demonstrate knowledge of and implement sustainable harvesting techniques for different species.
4. Recognize the role of local knowledge, governance, and community action in conservation.
5. Develop a simple conservation action plan for a local resource.

Definition of terms

1. **Sustainability:** Using a resource in a way that meets current needs without compromising the ability of future generations to meet their own needs.
2. **Natural Resources Conservation:** The sustainable use and management of natural resources to prevent depletion and destruction.
3. **Sustainable Harvesting:** A harvesting practice that does not reduce the population base of the resource, allowing for natural regeneration.

4. **Non Timber Forest Food (NTFF):** Any food product of biological origin other than timber, derived from forests, wooded land, and trees.
5. **Habitat:** The natural environment in which a plant or animal lives and grows.
6. **Ecosystem:** A biological community of interacting organisms and their physical environment.
7. **Regeneration:** The process of a population or plant re growing and reproducing itself.

PART 1: Our natural food basket - An overview

Unit time: 30 minutes

Introduction

- Southern Africa's ecosystems are rich with diverse foods that have been relied upon for centuries.
- Understanding what we have is the first step to protecting it.
- Beyond edible insects, these forests and woodlands provide a diverse range of nutritious foods that contribute significantly to rural diets and economies.

- Edible Insects: Mopane worm, emperor moth larvae, termites, and crickets.
- Wild Fruits: Marula, baobab
- Leafy Vegetables: Spider plant, amaranth
- Other NTFFs: Mongongo nuts, Kalahari truffles.

Activity 1

Participants should answer the following questions **(20 minutes)**.

1. What wild foods do we collect from our forests and fields?

2. Why are these foods important to your family?

3. Have you noticed any of these becoming harder to find than they were in the past?

Tips to the instructor

- As participants call out answers (e.g., "Mopane worms," "Marula," write each one on a separate card or sticky note.
- Allow the group to sort these cards into categories on a flip chart: **Insects, Wild fruits, Leafy Vegetables, Nuts/Seeds, Tubers/Roots, Others NTFFs.**
- **Time: 20 minutes** (10 for brainstorming and sorting, 10 for discussion)

Training Materials Required

- Flip chart paper with pre-drawn category columns
- Markers of different colours
- Sticky notes of different colours

PART 2: The Need for Conservation - Why Sustainability Matters

Unit time: 60 minutes

Introduction

- Natural resources are naturally occurring plants, insects, trees, soils, and other ecosystem products that communities rely on for food, nutrition, and livelihoods.
- Natural resources are not unlimited.
- When harvesting pressure increases or habitats are damaged, many species struggle to regenerate or disappear entirely from local areas. The loss of edible insects and forest foods affects nutrition, income, cultural traditions, and ecological balance.
- Conservation is essential because it protects the natural systems that support life.

Threats to resources

A threat is any human activity or environmental process that causes a decline in a species' population or degrades the integrity of an ecosystem, thereby reducing its long-term viability and capacity for renewal.

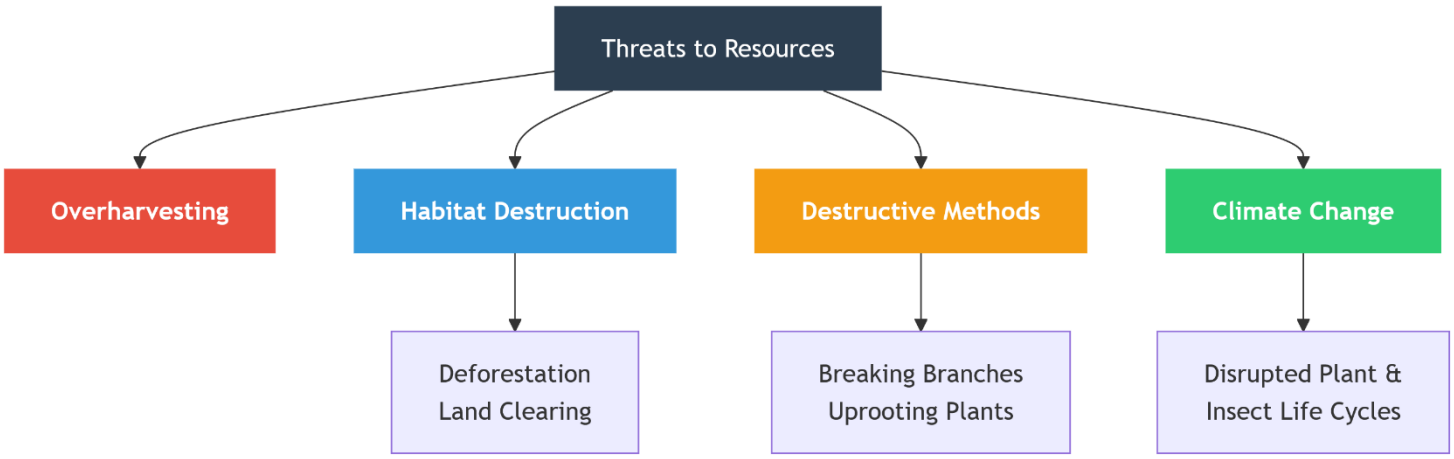


Figure 1:Categorized threats to plant and insect resources

Table 1:Major Threats to Natural Resources and Their Impacts

Threat	Definition	Key Drivers	Primary Impact
Overharvesting 	The removal of insects or plants at a rate faster than they can replace themselves	High demand for food, medicine, or income, lack of management, and illegal collection	Decline in populations, reduced diversity, and possible disappearance of species
Habitat destruction 	The clearing or damaging of natural areas so they can no longer support native species	Cutting trees for farming or building, land clearing, mining, and pollution	Breakdown of ecosystems, loss of species, and reduced natural services such as clean water and soil protection
Destructive methods 	Collection practices that harm the plant or insect source or damage the environment	Limited knowledge, easier short term methods, focus on immediate benefits	Reduced future harvests and long term loss of the resource
Climate change 	Shifts in temperature and rainfall that disrupt natural growth and life cycles	Burning fuels, industrial activities, and land changes that increase greenhouse gases	Changes in species behaviour, movement of species away from their natural areas, and higher death rates from extreme weather

Activity 2

Purpose
To help participants identify local threats to natural resources and understand why conservation is important.

What Participants Do

1. Participants are divided into small groups of 4.
2. Each group will get a picture or simple sketch of a "natural food basket" containing insects, wild fruits, and vegetables.
3. Ask each group to list or draw what could happen to the basket if the four threats occur. **(10 minutes)**

    - Overharvesting
    - Habitat destruction
    - Destructive methods
    - Climate change

4. Each group then presents what their basket looks like after the threats **(4 minutes for each group)**

Discussion Questions (5 minutes)

- What changes did you notice in your basket?
- How would these changes affect food availability in your community?
- What practices can protect these resources for future use?

Tips to instructor

- Show a sample drawing of a natural food basket to help participants understand the task quickly.
- Allow participants to draw, write, or use symbols.
- Ask questions like "What happens if too much is taken?" or "How does this affect future harvests?" as

Training materials required

- Flip chart paper or plain paper
- Markers
- Simple drawings or printed pictures of a natural food basket
- Sticky notes

Case study

Online Reporter

SundayNews

January 4, 2026

0 Comment

Correspondent

MOPANE worms, a protein-rich delicacy commonly harvested across Southern Africa, are more than just a sustainable food source — they are crucial to local livelihoods and cultural practices.

However, new research is shedding light on the need for conservation efforts amid warnings of rising environmental threats and over-harvesting.

Researchers from Stellenbosch University, in collaboration with the South African National Biodiversity Institute and other institutions, recently published a pivotal study in the journal "Conservation Genetics", focusing on the genetic diversity and population distribution of mopane worms in Namibia and the Limpopo River Basin, which spans South Africa and Botswana.

Their findings reveal alarming trends that could jeopardise the future of this vital species.

Known for containing three times more protein than beef or chicken, as well as rich levels of calcium, iron and zinc, mopane worms are typically boiled or fried to be enjoyed as a snack or incorporated into meals.

While their nutritional value supports local communities, the study underscores an urgent need to understand the genetic health of these populations due to reported over-harvesting across Botswana, Namibia, South Africa and Zimbabwe.

PART 3: Sustainable harvesting practices

Unit time: 45 minutes

Introduction

- Every harvesting action taken in the field affects the future availability of that resource.
- Sustainable harvesting focuses on practical ways to collect food while allowing nature enough time and space to replenish itself.
- These practices help keep insect populations stable, protect host plants and habitats, and support long term community benefits.
- Prevents overexploitation, maintains biodiversity, and ensures food security and income stability.
- By learning the correct techniques for insects, fruits, vegetables, and tubers, harvesters become active guardians of their natural food systems and contribute to healthier landscapes.

Table 2:Sustainable Harvesting Practices for Edible Insects, Wild Fruits, Leaves, and Tubers

Category	Key Conservation Practices
Edible Insects Mopane worms 	• Do not strip a tree completely - Leave at least 20 to 30 percent of larvae on the tree. • Avoid harvesting during pupation. • Use gentle methods like shaking larvae onto sheets instead of breaking branches.
Termites 	• Harvest only mature termites and avoid taking the entire colony. • Do not dig deep into or break termite mounds because they support many other species. • Use surface collection methods such as placing containers at openings. • Protect breeding chambers so termite populations can regenerate.

Category	Key Conservation Practices
Crickets 	• Harvest adult crickets and avoid collecting all individuals from one area. • Do not disturb or destroy hiding places such as grass patches and leaf litter. • Use light traps or simple catch methods instead of digging or clearing vegetation. • Leave part of the population to continue breeding for future availability.
Wild Fruits and Nuts *eg. Nhengeni, Mongongo nuts* 	• Pick ripe fruit gently without damaging branches. • Collect fallen fruits where possible. • Do not break branches to reach fruit.
Leafy Vegetables and Tubers 	• Harvest leaves from multiple plants, not all from one. • Do not uproot medicinal plants or tubers. • Take only what you need and leave the plant to regrow. • Replant small tubers or cuttings.



Table 3: Examples of conservation practices and their benefits

Practice	Conservation Benefit
Leaving a percentage of larvae on each tree	Ensures a breeding population remains, securing future harvests.
Harvesting only mature fruits and leaving some for wildlife	Allows plants to reproduce and maintains the food web for other species.
Adhering to official open and closed seasons	Protects resources during critical life cycle stages, allowing populations to recover.
Promoting woodland conservation programs	Safeguards the entire ecosystem, benefiting all NTFFs, wildlife, and soil quality.

Activity 3

Purpose

Learn the right way to collect food from nature without harming it for the future.

What to Do

1. Read the Stories: Read each short story below.
2. Decide: Was the person's action **Good** for the forest or **Bad** for the forest?
3. Discuss with the group. What should the person have done instead?

The Stories

Story 1: The Caterpillars (5 minutes)

John finds a tree covered in caterpillars. He scrapes every single one off the tree into his bag so he can sell them all.

- Good or Bad?
- What should he have done? (Hint: Leave some behind!)

Activity 3

Story 2: The High Fruit (5 minutes)

Stella sees the best fruit at the top of a tree. She can't reach it, so she breaks the branch to pull it down and get the fruit.

- Good or Bad?
- What should she have done?

Story 3: The Medicinal Root (5 minutes)

Jeremy needs a special root for medicine. He finds the plant and pulls the whole thing out of the ground, including the root.

- Good or Bad?
- What should he have done?

Story 4: The Closed Season (5 minutes)

It's against the rules to pick a certain nut at this time of year. Anna knows this, but she goes and picks a big bag of them anyway because she needs money.

- Good or Bad?
- What should she have done?

Tips to instructor

- Encourage participants to share traditional knowledge and incorporate it with conservation practices.

Training materials required

- Flip chart paper or plain paper
- Markers

PART 4: Habitat protection and community management

Unit time: 45 minutes

Introduction

- Natural resources thrive only when their habitats are healthy and intact.
- Forests and woodlands are living systems that require care, protection, and responsible management.
- Individual good practices are important, but lasting conservation happens when communities work together, set clear rules, and uphold shared values.
- This section explores how protecting trees, preventing fires, and strengthening local governance systems can safeguard entire ecosystems and ensure that the benefits of these resources are enjoyed by everyone.

Table 4: Habitat protection and community-based management strategies

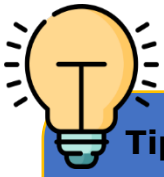
	Explanation
Prevent Wildfires	Careless fire use destroys insects, fruits, trees, and whole woodlands. Teach participants to control cooking fires, avoid open flames in dry areas, and properly put out all fires.
Protect Host Trees	Trees like Mopane and Marula are the home and food source for many insects and wild foods. Encourage protection of these trees by avoiding unnecessary cutting and clearing.
Community Based Management	Communities should work together to manage resources. Local leaders can guide the creation of harvesting rules, use traditional knowledge, and set clear access and use rights.
Benefit Sharing	When communities benefit from selling woodland products, they are more motivated to conserve the resources. Promote fair income sharing and collective responsibility.

Activity 4

Purpose
Come up with a community conservation agreement

What to Do

- Divide participants into small groups of 4
- Participants will brainstorm and write down 3-5 simple rules for harvesting a specific local resource that their community could agree to follow **(10 minutes)**.
- Each group will be assigned to one:
    - Insects
    - Wild fruits
    - Leafy Vegetables
    - Nuts/Seeds
    - Tubers/Roots
- Each group presents their rules **(5 Minutes)**.
- The facilitator helps to combine the best ideas into a single 'Model Community Conservation Agreement' **(10 minutes)**



Tips to instructor

Encourage participants to think about what is realistic for their own community.

Training materials required

- Flip chart paper
- Markers

PART 5: Integrating knowledge from learning to action

Unit time: 30 minutes

Introduction

- Learning about conservation is valuable, but the real impact comes from putting this knowledge into daily practice.
- Sustainable harvesting and habitat protection depend on personal commitment and collective responsibility.
- This final section will help participants transform what they have learned into practical steps they can apply during every harvesting season.
- By making personal pledges and adopting simple monitoring habits, participants take active roles in protecting their natural resources for the future.

Activity 5

My Conservation Pledge

- Each participant receives a small card and writes down or draw one thing they pledge to do differently in their next harvesting exercising to practice conservation **(5 minutes)**
- Volunteers are invited to share their pledges with the whole group **(10 minutes)**

Tips to the instructor

Encourage participants to think honestly about one small change they can make that is realistic for them.

Training materials required

- Small index cards Pens
- A small box for collecting pledges

Appendix: Training materials checklist for facilitator

- Flip Chart Stand and at least 10 sheets of paper.
- Markers in multiple colours.
- Pens for all participants.
- Index Cards or small paper slips for Activity 5.
- Visual Aids
  - Pictures of key edible insects and NTFFs
  - Pictures showing good vs. bad harvesting practices.
- Attendance Register.
- Refreshments for participants.