Biodiversity Training Materials

Developed as part of IFC-BACP funded project “Biodiversity and Cocoa Farming: Ghana Case”

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Topic 1
The Importance of Trees
Information for Handout for Farmers

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Topic 1: The Importance of Trees

Trees are important for several reasons:

1. Economic value
   Fruit harvested can be sold, thus providing income. Fruit trees are mango, oranges, avocado, cola nuts, oil palm, etc.

2. Community and social value
   Trees provide shade when people gather under them during community meetings and outdoor activities with family and friends. Many neighborhoods are also the home of very old trees that serve as historic landmarks and are the town’s pride.

3. Ecological and environmental value
   - Trees contribute to the environment by providing oxygen, improving air quality, conserving water, preserving soil, and supporting wildlife.
   - Trees control climate by moderating the effects of the sun, rain and wind. Leaves absorb and filter the sun's radiant energy, keeping things cool. Trees also preserve warmth by providing a screen from harsh wind. They shield us from the downfall of rain.
   - Far reaching roots hold soil in place and fight erosion. Trees absorb and store rainwater which reduce runoff and sediment deposit (materials broken down by erosion during rainfall) after storms. This helps the ground water supply recharge, prevents the transport of chemicals into streams and prevents flooding.
   - Fallen leaves make excellent compost that enriches soil.
   - Many animals eat leaves and fruits for nourishment, flowers are eaten by monkeys, and nectar is a favorite of birds, bats and many insects. Trees provide habitat for animals such as monkeys, birds and squirrels.

4. Practical value
   - The branches and trunk of trees are used for cooking, heating, building construction, furniture manufacture, tools, and thousands of household items. Wood pulp is used to make paper.
   - Fruit trees give fruits and nuts that serve as food.
   - The bark and leaves of some trees are sources of chemicals and medicines. Quinine and aspirin are both made from bark extracts.
   - The inner bark of some trees contains latex, the main ingredient of rubber.
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**Topic 1:** The Importance of Trees

Trees contribute to the biodiversity of cocoa farms. The word biodiversity is the short form of the term ‘biological diversity’. Biodiversity is the variety of all living things on Earth. This includes the millions of species (people too) that live on land, freshwater systems and oceans. It also includes the tiny organisms that we can see only with a microscope as well as fungi, plants, the trees, ants, beetles, butterflies, birds and the large animals (elephants, whales, bears, etc.).

But biodiversity is much more than the large variety of species that exist on earth. It includes individuals that form populations, populations that form species and the relationship that exist between species that form what is called communities. It is also the many functions that natural systems perform – like producing clean water and fresh air – which are essential to wild species and humans.

Biodiversity provides the following benefits

- Production of soils and maintenance of soil fertility
- Maintenance of air quality
- Maintenance of water quality
- Pest control
- Decomposition of wastes
- Pollination and crop production
- Climate stabilization
- Prevention and mitigation of natural disasters
- Provision of food security
- Provision of health care
- Income generation
- Spiritual / cultural values

Agroforestry is a land-use system in which trees, shrubs, palms and bamboos are deliberately planted together with agricultural crops or on grazing land. For example, farmers in most parts of Africa, keep a number of forest tree species, fruit trees and shrubs on their farms. These trees provide fruit, fuel and fodder, give shelter to birds and animals, improve soil fertility and maintain the general ecosystem of the farm. A shaded cocoa farm for example supports up to 180 species of birds that help control insect pests and disperse seeds.

Conservation and biodiversity in and around cocoa farms. STCP, 2009
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**Topic 1:** The Importance of Trees

**Learning objectives:** By the end of this training, participants understand
- Different values of trees

**Materials needed:**
- Colored cards
- Marker

**Time needed:** 45 min

**Preparations:**
- Prepare colored cards with the following (simple) drawings:
  - *Bag with a cedi sign* (to indicate economic value)
  - *People holding hands* (to indicate social value)
  - *Several trees* (to indicate environmental value)
  - *Hands* (to indicate practical value)

**Set up**

**Attention:** Ask if anyone has trees on their cocoa farm, next to their cocoa trees.

**Title:** Tell participants that the title: *Importance of trees.*

**Objectives:** To explain why trees are important.

**Benefits:** Trees have economic, social, environmental and practical value.

**Direction:** We will focus on four ways trees can be valuable depending on the type of trees. We will name a few examples but we will not go into detail on specific types of trees.

**Delivery**

**Explanation, Demonstration, Exercise, and Guidance:**

1. Tell participants that we are going to focus on four values or benefits of trees: economic, social, environmental and practical value (every time you mention the word, show the matching colored card with the drawing).

2. Split participants into four groups. Give each group a colored card with drawing and ask them to think about practical examples of the value depicted on their card (for example:
list some practical examples of how a tree can give economic value). Let the also name a few trees that have these benefits. Let the groups discuss for a few minutes. If there is someone in the group who can write, they can write their answers in their notebooks.

3. **Discuss the results.** Let the groups present their results one by one and ask other groups to make contributions. Ask questions to guide groups towards the options that listed in the fact sheet. You can ask:
   
   a. Which parts of a tree can be sold?
   b. How can leaves/roots/fruits contribute to the environment?
   c. How can branches/trunk/bark/leaves be used for practical purposes?

**Finish**

**Summary:** Summarize the session by showing the cards with the drawings one by one and mention some practical examples.

**Questions:** Ask if anyone has a question or comment.

**Evaluation:** Ask participants what economical value trees have. Ask what environmental value trees have. Ask what practical value trees have.

**Next step:** In the next session we will focus on the benefits of shade trees.
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Topic 2
Shade Trees
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**Topic 2: Shade Trees**

Shade trees are *useful for the growth of cocoa* because they:

1. **Reduce the intensity of sunlight** on cocoa and will protect from
   a. Mirids, because they can be caused by excessive sunshine.
   b. Burning of cocoa leaves.

2. **Improve the soil fertility** by nutrients recycling because
   a. Their roots can reach nutrients that cannot be reached by cocoa trees.
   b. Leaves will fall on the ground and will provide nutrients to the soil.

3. **Improve the moisture level** through
   a. Protecting cocoa trees and soil from direct sunlight so there will be less evaporation from the soil and leaves.
   b. Leaves that serve as mulch and will keep the moisture in the soil.

**Selection of good shade trees**

- It should not block the sunlight completely but allow enough sunlight to penetrate.
- It sheds leaves that can improve the soil fertility.
- It can retain water to improve the moisture level.
- It suppresses weed growth because the leaves act as mulch and prevent weed germination.
- It should have a strong root structure so it will not be uprooted with strong winds.
- It is tall enough to allow air circulation on the farm.
- It must not shed branches that can damage cocoa trees or hurt someone.
- It must not host pests and diseases that affect cocoa.

**Standard requirements**

- At least 18 shade trees per hectare
- At least 12 different shade trees per hectare

**Examples of desirable shade trees**

Ghanaian local name

- Nyamedua
- Penkwa-akoa
- Kruba
- Odum
- Otie
- Ofram

Local name

- Kyen-kyen
- Penkwa / Sapele
- Dubini (Mahogany)
- Kusia
- Nyankom
- Baku

Edinam

- Utile
- Oprono / Mansonia
- Kyereye
- Emire
Trees that are not good as shade trees

<table>
<thead>
<tr>
<th>Odwuma</th>
<th>Nyankuma</th>
<th>Osonkrobia</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sua-Bese / Kwaku-bese</td>
<td>Watupuo</td>
<td></td>
</tr>
</tbody>
</table>

Note: If there are a few trees on the farm that are not good as shade trees but do not have any negative effect on the farm, they can stay on the farm. So it is not necessary to cut trees that are not good as shade trees.
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Topic 2: Shade Trees

Learning objectives: By the end of this training, participants will
☑ Understand the benefits of shade trees
☑ Know how select good shade trees

Materials needed: ☑ Flip-sheet
☑ Markers to make the drawing
☑ Colored cards
☑ Masking tape

Time needed: 45 min

Preparations: ☑ Make a similar drawing as depicted at the end of this topic. Make sure all details that will be discussed in the topic are on the drawing. Paste the drawing on the wall.
☑ Colored cards with the following text:
  - Reduce intensity of sunlight
  - Improve soil fertility
  - Improve moisture level

☑ Colored cards with the following (simple) drawings:
  - Drawing of a sun (to indicate enough sunlight)
  - Drawing of a leaf (to indicate shedding of leaves)
  - Drawing of water drops (to indicate moisture level)
  - Drawing of weeds with red cross through it (to indicate suppression of weed growth)
  - Drawing of roots (to indicate strong roots)
  - Drawing of wind flow (to indicate air circulation)
  - Drawing of a branch that has been broken off (to indicate shed branches)
  - Drawing of a harmful insect with a red cross through it (to indicate it should not host pest and diseases)

Note: If you do this topic in the field, make sure to identify some trees before you start your session. You can use the trees as examples for shade trees.
Set up

Attention: Show participants the drawing.

Title: Tell participants the title of the session: shade trees.

Objectives: To explain what shade trees are, what benefits shade trees have and how to select good shade trees.

Benefits: Shade trees are useful for the growth of cocoa and can increase the yield of your cocoa.

Direction: We will not discuss how to plant shade trees.

Delivery

Explanation, Demonstration, Exercise, and Guidance:

1. Ask participants to form half a circle around the drawing so everyone can see it clearly. Say that shade trees are useful for the growth of cocoa through several ways. Point to the sun and the canopy and ask: what will the canopy reduce? It will reduce the intensity of the sunlight. Ask: how can the reduction of sunlight improve the growth of cocoa? It will protect from:
   a. Myrids, because they can be caused by excessive sunshine.
   b. Burning of cocoa leaves.

2. Point to the soil, the roots of the shade tree and the leaves on the ground. Say that shade trees can improve soil fertility. Ask how it improves soil fertility? By nutrients recycling because:
   a. Their roots can reach nutrients that cannot be reached by cocoa trees.
   b. Leaves will fall on the ground and will provide nutrients to the soil.

3. Point to the leaves on the ground and say that shade trees will improve the moisture level. Ask how. It improves through:
   a. Protecting cocoa trees and soil from direct sunlight so there will be less evaporation from the soil and leaves.
   b. Leaves that serve as mulch and will keep the moisture in the soil.

4. Take your colored cards with the drawings. Say that not every tree is a good shade tree. A good shade tree should be selected on certain criteria. Ask what those criteria can be. You can assist them by pointing towards certain characteristics. Every time someone mentions a characteristic, paste the colored card on the drawing at the appropriate place. Make sure the following criteria are mentioned:
   a. It should not block the sunlight completely but allow enough sunlight to penetrate.
   b. It sheds leaves that can improve the soil fertility.
   c. It can retain water to improve the moisture level.
d. It suppresses weed growth. It suppresses weed growth because the leaves act as mulch and prevent weed germination.
e. It should have a strong root structure so it will not be uprooted with strong winds.
f. It is tall enough to allow air circulation on the farm.
g. It must not shed branches that can damage cocoa trees or hurt someone.
h. It must not host pest and diseases that affect cocoa.

5. Ask if anyone can mention trees that would qualify as **good shade trees**. Make sure all trees that are listed in the fact sheet, are mentioned.

6. Ask if anyone can mention trees that would **not** qualify as good shade trees. Make sure all trees that are listed in the fact sheet, are mentioned. Add that if there are a few trees on the farm that are not good as shade trees but do not have any negative effect on the farm, they can stay on the farm. So it is **not** necessary to cut trees that are not good as shade trees.

7. Finally mention the standard requirements. Each farm should have at least:
   
a. At least 18 shade trees per hectare
b. At least 12 different shade trees per hectare

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**Finish**

<table>
<thead>
<tr>
<th>Summary:</th>
<th>Summarize by using the drawing of the tree to repeat the qualities of a good shade tree and its advantages.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Questions:</td>
<td>Ask if anyone has a question or comment.</td>
</tr>
<tr>
<td>Evaluation:</td>
<td>Ask participants what benefits a shade tree has. Ask to mention a few criteria of a good shade tree.</td>
</tr>
<tr>
<td>Next step:</td>
<td>In the next session we will see how to plant and maintain shade trees.</td>
</tr>
</tbody>
</table>

Distribute the handout to all participants.
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Topic 3
Setting Up a Nursery
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Topic 3: Setting Up a Nursery

It can be difficult to procure and raise tree seeds. Therefore, it is important to make sure that as many seedlings as possible survive and grow. Nurseries provide the necessary combination of moisture, light, soil and predators to allow production of healthy and hardy seedlings.

Nursery tools include mattock, hoe, watering can, cutlass, line, tape measure, wheelbarrow, foot fork, hand fork, shovel and rake.

Preparations

When establishing a nursery, it should be:

- In a place with sandy, loamy soil near a reliable water source.
- Away from shading trees, because they will negatively affect the hardening off process.
- Away from stagnant water, because this will negatively affect the germination of the seeds.
- Close to the house of the caretaker, so he/she can visit it often and maintain it well.
- Accessible to a vehicle in case the nursery services several communities to easily transport the seedlings.

Seedbeds

Beds should be on flat land, the longitudinal axis of the bed should be east-west, to prevent plants in the nursery from shading one another.

On slopes, make beds along the contour (against the slope) to help reduce the risk of erosion.
Set up the seedbeds as follows:

1. Loosen the soil and make a **raised, narrow bed**, not more than one meter wide to allow for weed control without stepping on the bed.
2. **Add black soil and sand** to the bed and mix them well. The sand loosens the soil for better drainage and easier seedling uprooting.
3. Level the bed and make **shallow furrows** with your finger or stick.
4. **Sow the seeds in furrows**. Allow sufficient room for seedlings to grow. If seedlings will be potted when they are still small, sow the seeds densely.
5. Thin **cover** the furrows with **soil** (not more than the thickness of the seed).
6. Construct a **shade roof** to provide partial shade. It should be loosely woven and easily removed when the seedlings need to be hardened off. You can use sticks and palm fronds.
7. **Water the beds daily**.
8. Allow **enough time** for the seeds to **germinate**. Some trees take a month or more to germinate.
9. **Label** the species with dates.
10. **Fence** the nursery to keep out stray animals.

Seeds of low or unknown germination percentage are best **sown in a seedbed** and **transplanted to pots** when they have developed at least 2 true leaves. It is easier and cheaper for raising many seedlings, especially for groups. Large fruit-tree seeds of **good viability** can be sown directly into pots. Plant the seed with the hilum (the point on the seed where it is attached to the fruit) downwards.

When transplanting seedlings, **prepare the pots** as follows:

1. Prepare the soil or compost in which the seed will be planted in with topsoil.
2. Perforate the black polythene bags and fill them 2 cm up to the brim, making them full enough to stand.

To **transplanting the seedlings** to pots do the followings:

1. Water the seedbeds before pricking.
2. Water the seedlings and the filled pots about two hours before potting.
3. Cut the taproot before transplanting the seedling to the polybag.
4. Dribble a hole in the filled pot and transfer one seedling per pot, taking care not to break the roots or bend the taproot.
5. Press the seedling base firmly but gently with the fingers to make sure seedling is stable.
6. Water the seedlings daily.
7. Raise the shade roof a bit higher to get enough sunlight to the seedlings but still shade them against too much direct sunlight.
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**Topic 3:** Setting Up a Nursery

**Learning objectives:** By the end of this training, participants will know
- How to set up a nursery
- How to transplant seedlings into polybags

**Materials needed:**
- Flip-sheets
- Markers
- Back soil (enough for all demonstrations)
- Seeds (or something that looks like seed to demonstrate sowing and transplanting)
- Polythene bags (to demonstrate transplanting)

**Time needed:** 60 min

**Preparations:**
- Make a drawing a map on a flip-sheet similar to the map in the drawing you will find at the end of this session.

**Note:** This session should be done at a place where you can demonstrate to prepare a seedbed.

**Set up**

**Attention:** Ask where farmers buy their seedlings. Collect a few answers. Tell them that with a group of farmers they can also grow their own seedlings.

**Title:** Tell participants that the title: *Setting up a nursery.*

**Objectives:** To learn the steps on how to establish a nursery.

**Benefits:** It can be difficult to procure seedlings and they can be expensive. A tree nursery will guarantee access to seedlings and when it is done with a group of farmers, it is also cheaper than buying them.

**Direction:** We will not discuss how to plant the seedling on the cocoa farm. That will be discussed in the next topic.
Delivery

Explanation, Demonstration, Exercise, and Guidance:

1. Tell participants that **setting up a nursery** involves preparations, setting up the seedbeds and transplanting the seedlings to pots.

2. We will start with the **preparations**. Show the map on the flip-sheet. Ask what would be a good place to start a nursery and why? Let everyone discuss for a few minutes with their neighbor. Then ask someone to point on the map where they would set up a nursery. Ask **why**? Ask a few more people to indicate a possible location. Then say that a **good location for a nursery**, should be:
   a. In a place with sandy, loamy soil near a reliable water source.
   b. Away from shading trees, because they will negatively affect the hardening off process.
   c. Away from stagnant water, because this will negatively affect the germination of the seeds.
   d. Close to the house of the caretaker, so he/she can visit it often and maintain it well.
   e. Accessible to a vehicle in case the nursery services several communities to easily transport the seedlings.

3. Continue with the **seedbeds**. Say while making a drawing as in the example:
   a. Beds should be on flat land, the longitudinal axis of the bed should be east-west, to prevent plants in the nursery from shading one another.
   b. On slopes, make beds along the contour (against the slope) to help reduce the risk of erosion.

![Flat land and slopes](image)

4. Tell participants that you will now demonstrate how to set up a **seedbed**. Every time you do something, explain what you do and why you do it. Demonstrate the following steps:
   a. Loosen the soil and make a raised, narrow bed, not more than one meter wide to allow for weed control without stepping on the bed.
   b. Add black soil and sand to the bed and mix them well. The sand loosens the soil for better drainage and easier seedling uprooting.
   c. Level the bed and make shallow furrows with your finger or stick.
   d. Sow the seeds in furrows. Allow sufficient room for seedlings to grow. If seedlings will be potted when they are still small, sow the seeds densely.
e. **Thin cover** the furrows with soil (not more than the thickness of the seed).

5. After your demonstration, add the following information:
   a. The seeds should be **shaded from the sun**. That can be done by erecting a low shade over the beds, using sticks and palm fronds.
   b. **Water** the beds daily.
   c. Allow enough time for the seeds to **germinate**. Some trees take a month or more to germinate.
   d. **Label** the species with dates.
   e. **Fence the nursery** to keep out stray animals.

6. Say that seedlings should be **transplanted to pots** when they have developed at least 2 true leaves. Ask why this should be done? Seeds of low or unknown germination percentage are best **sown in a seedbed** and then **transplanted to pots**. It is easier and cheaper for raising many seedlings, especially for groups.

7. Ask for a **volunteer** to demonstrate the transplanting of seeds into pots. Give the volunteer one polythene bag, soil and a seed. Every time the volunteer does something, **explain what** he does and **why** he does it. If it is not done well, ask advice from other participants. Make sure the steps as described in the fact sheet are done. You can ask the following questions:
   a. Ask why the bags should be almost filled to the brim? To make them full enough to stand.
   b. Ask when the seedlings are ready to be transferred to individual pots? When they have developed at least two true leaves.
   c. What can go wrong when you are not careful when transferring a seedling into a pot? You can break the roots or bend the taproot.

8. Thank the volunteer for the job well done.

**Finish**

**Summary:** Summarize with key points what a good location for a nursery is and how to set up a seedbed.

**Questions:** Ask if anyone has a question or comment.

**Evaluation:** Ask participants what is important when selecting a location. Ask how to set up a seedbed.

**Next step:** In this session, we have seen how to set up a nursery to grow seedlings. In the next session will discuss how to transplant the seedlings into the cocoa farm.

Distribute the handout to all participants.
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Topic 4

Out-Planting Seedlings
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**Topic 4:** Out-Planting Seedlings

**Pruning the taproot**

- The *taproot* is the main, central root pointing downward and giving off small lateral roots.
- Pruning the taproot develops a strong, compact root system.
- It is done *before out-planting* approximately 6 months after sowing.
- When seedlings are in polybags, the taproot often grows beyond the poly bag into the soil, which means you *cut into the polybag* (see drawing).
- Cut diagonally at about 20cm length.

**Preparing seedlings for out-planting**

Careless handling and planting will often cause high mortality of seedlings. To prepare the seedlings, do the following steps:

1. **Discard** all damaged, deformed and diseased seedlings. Make sure seedlings have well-developed root-balls.
2. Seedlings brought from a distant nursery should be allowed to recover from transportation shock for two to four weeks at the planting site before out-planting. Do not water them on the day they will be out-planted because this will soften the soil and cause it to compact when planted.
3. **Gently lift** the seedlings from the bed with a shovel. Prune the taproot and the crown to reduce transpiration. Cut back any soft green shoots.

**Out-planting the seedlings**

1. Plant at the *beginning of the rainy season*, but not after the soil has become fully moisture.
2. **Slice off 1cm** of the bottom of the plastic bag to eliminate any bent taproot.
3. Hold the seedling **upright** in the dug hole. Avoid bending the taproot.
4. **Mulch** newly planted seedlings to conserve moisture and keep the soil surface cool.
Keep in mind the following:

- The **planting distance** for cocoa trees is **24 cm by 24 cm**.
- When planting other trees in an already establish cocoa farm, farmers should locate **gaps** within the cocoa where there is **sunlight**. Trees can also be planted at areas where the cocoa has been thinned.
- When planting **different trees** on wasteland or buffer zones, they should be planted so they follow a height order: taller trees should follow short trees.
- **Never** plant the young tree under the cocoa canopy. They will not get sunlight to grow faster and taller.
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Topic 4: Out-Planting Seedlings

Learning objectives: By the end of this training, participants know how to

- Prune the taproot
- Out-plant seedlings
- Leaves to demonstrate mulching

Materials needed:

- Seedlings ready for out-planting
- Shovel
- Cutlass to prune the taproot

Time needed: 45 min

Preparations:

- Put a seedling in the soil to demonstrate how to lift it out during the session.

Set up

Attention: Show a seedling ready for out-planting.
Title: Tell participants that the title: Out-planting seedlings.
Objectives: To explain how to prune taproots and how to transplant seedlings.
Benefits: Careless handling and planting will often cause high mortality of seedlings. When you know what to do you can avoid losing seedlings.
Direction: We have seen in the previous session how to sow seeds and transplant seedlings into polybags. We will pick up this session from the moment the seedlings are ready for out-planting.

Delivery

Explanation, Demonstration, Exercise, and Guidance:

1. Say that before seedlings can be out-planted, a few things need to be done including pruning the taproot. Take your seedling and ask someone to point where the taproot is.
The **taproot** is the main, central root pointing downward and giving off small lateral roots.

2. Ask **why** to prune the taproot. To develop a **strong, compact root system**. Say that pruning the taproot should be done **before out-planting** approximately 6 months after sowing. Add that when seedlings are in polybags, the taproot often grows beyond the poly bag into the soil, which means you **cut into the polybag**.

3. Ask everyone to stand around you in half a circle. **Demonstrate** how to prune the taproot: cut **diagonally** at about **20cm** length.

4. Say that careless handling and planting will often cause high mortality of seedlings. To prepare the seedlings, do the following steps:
   a. **Discard** all damaged, deformed and diseased seedlings. Make sure seedlings have well-developed root-balls.
   b. Seedlings brought from a distant nursery should be allowed to recover from transportation shock for two to four weeks at the planting site before out-planting. Do not water them on the day they will be out-planted because this will soften the soil and cause it to compact when planted.

5. Say that you will now demonstrate how to lift the seedling from the seedbed. **Gently lift** the seedlings from the bed with a shovel. **Prune the taproot and the crown** to reduce transpiration. **Cut back** any soft green shoots.

6. Say that planting of seedlings should be done at the **beginning of the rainy season**, but not after the soil has become fully moisture. **Demonstrate** out-planting:
   a. **Slice off 1cm** of the bottom of the plastic bag to eliminate any bent taproot.
   b. Hold the seedling **upright** in the dug hole. Avoid bending the taproot.
   c. **Mulch** newly planted seedlings to conserve moisture and keep the soil surface cool.

7. Ask the following questions:
   a. What is the **planting distance** for cocoa trees? It is **24 cm** by **24 cm**.
   b. Where should you plant trees in an already established cocoa farm? Farmers should locate **gaps** within the cocoa where there is **sunlight**. Trees can also be planted at areas where the cocoa has been thinned.
   c. When we plant different trees on wasteland or buffer zones, is there a certain order of planting tall short trees? Yes, they should be planted according to a height order: taller trees should follow short trees. Make a drawing on a flip-sheet to explain.
   d. Why should you never plant young trees under the cocoa canopy? They will not get sunlight to grow faster and taller.
Finish

**Summary:** Summarize by repeating the key points of how to prune the taproot, how to out-plant the seedlings and what to keep in mind when planting trees on a cocoa farm.

**Questions:** Ask if anyone has a question or comment.

**Evaluation:** Ask participants the steps to out-plant seedlings.

**Next step:** So far we have seen how to sow, and transplant and out-plant seedlings. In the next session we will look at maintenance of trees.

Distribute the handout to all participants.
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Topic 5
Maintenance of Trees
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Topic 5: Maintenance of Trees

Trees planted need to be cared for and maintained to grow better.

- **Remove weeds** around young trees regularly. Weeds compete for water and nutrients available for tree growth.
- **(Young) trees need protection from fire** by placing empty barrels or buckets around it. You can also create a fire belt around your farm by creating a buffer zone by removing all scrubs and other plants.
- **Also protect against animal damage** by building a small palm frond around them.

**Pruning**

Pruning is **trimming a tree** by cutting away dead or overgrown branches or stems, especially to encourage growth, to reduce shade and to allow air to move above and between cocoa trees.

- Prune trees on a **regular schedule** improves tree health, controls growth, and enhances flowering, fruiting, and appearance.
- Pruning should be done for the first time 2 to 5 years after planting and thereafter, every **5 to 7 years**. Dead, injured, diseased and infested branches should be pruned regularly.
- Pruning should be carried out towards the **end of the dry season** to the early parts of the rainy season, before new growth starts. This is because wounds close quickly as growth starts at the onset of the rains and insect and disease infestation are less prevalent.
- Branches and stems that are removed may be used for **firewood** and the leaves used as **mulch** on the farm or on nursery beds.
Prune as follows:

- **Do not cut more than 25% of the tree canopy** since this will only starve the tree, causing it to develop fast growing, weakly attached sucker growths, which will increase maintenance cost and break off easily in strong winds.

- Make the **final pruning cut** just outside the branch collar as indicated in the drawing above. The **branch collar** is a swelling situated at the point where the branch attaches to the trunk and it acts as a valve that closes off the cut.

- When removing **large branches** (see diagram above), make three or four cuts. Make the first cut on the underside of the branch about 18 inches from the trunk. Undercut one-third to one-half way through the branch, stopping before the saw binds. The second topside cut should be made 20 inches from the trunk. This cut cuts all the way through the branch. The third cut removes the stub by cutting next to the branch collar.

- Use a secateur, saw, cutlass or knife for low branches. Use a pruner for higher branches.
Additional Information for Trainer

VI. Biodiversity

**Topic 5:** Maintenance of Trees

The **branch collar** is a swelling situated at the point where the branch attaches to the trunk and it acts as a valve that closes off the cut. It contains a chemical zone that inhibits the spread of decay in the trunk. When decay occurs in the branch, it spreads down towards the base until it reaches the protected chemical zone (branch collar). Once there it forms a protective shield when the branch falls off. The branch collar functions only when the final cut is made just outside the branch collar perpendicular to the branch. If stubs are left after cut, the valve will not function and insects, diseases and rot will attack the core of the tree and weaken it against any form of strong wind.
Guidelines for Trainer

VI. Biodiversity

Topic 5: Maintenance of Trees

Learning objectives: By the end of this training, participants will know
- How to maintain trees
- Why and how to prune trees

Materials needed: Pruning equipment

Time needed: 60 min

Preparations: Find a tree that needs pruning to demonstrate pruning during the session

Set up

Attention: Say that we have seen how to grow and plant trees in the previous sessions.

Title: Tell participants that the title: Maintenance of trees.

Objectives: To know how to maintain trees.

Benefits: If trees are well maintained they will grow better and bear more fruits.

Direction: We will discuss general maintenance and pruning.

Delivery

Explanation, Demonstration, Exercise, and Guidance:

1. Say that weeds compete with trees for water and nutrient. Ask to what type of trees are weeds a higher competition: young or old trees? Young trees, because they need a lot of water and nutrients to grow. Ask how you can control weed on your cocoa farm? The best is to weed on a regular base. Add that if you weed on a regular base, you do not need to apply herbicides. Add that shade trees also control weed growth because the leaves act as mulch and prevent weed germination.

2. Say that you should also avoid that trees are getting damaged. Ask how trees can get damaged? From fire and animals. Ask how we can avoid fires? By placing empty barrels
or buckets around it. You can also create a fire belt around your farm by creating a buffer zone by removing all scrubs and other plants. Ask how we can protect against animals? By building a small palm frond around the trees.

3. Say that pruning is one of the most important ways to maintain your trees. Ask what is pruning? Pruning is trimming a tree by cutting away dead or overgrown branches or stems. Ask why is pruning so important? Pruning must be practiced to reduce shade and to allow air to move above and between cocoa trees. In addition it improves the tree’s health, controls growth, and enhances flowering, fruiting and appearance.

4. Ask when young trees should be pruned for the first time? Pruning should be done for the first time 2 to 5 years after planting and thereafter, every 5 to 7 years. However, dead, injured, diseased and infested branches should be pruned regularly. Ask during what time of the season pruning should be done? Pruning should be carried out towards the end of the dry season to the early parts of the rainy season, before new growth starts. This is because wounds close quickly as growth starts at the onset of the rains and insect and disease infestation are less prevalent.

5. Ask for a volunteer who is willing to demonstrate how to prune. Every time the volunteer does something, explain what he does and why he does it. Make sure to mention:
   a. Pruning is done with a secateur, saw, cutlass or knife for low branches. Use a pruner for higher branches.
   b. See the fact sheet on steps how to prune a cocoa tree.

6. Finally say that branches and stems that are removed may be used for firewood and the leaves used as mulch on the farm or on nursery beds.

Finish

Summary: Summarize why pruning is important and how it should be done.

Questions: Ask if anyone has a question or comment.

Evaluation: Ask participants why they should prune their cocoa trees. Ask the steps how to prune a cocoa tree

Next step: Pruning is extremely important because it reduces shade and allows air to move above and between cocoa trees. In addition it improves the tree’s health, controls growth, and enhances flowering, fruiting and appearance. If pruning is too difficult for you, you should ask or hire someone to do it for you.

Distribute the handout to all participants.
VI. Biodiversity

Topic 6
Ownership of Trees
VI. Biodiversity

Topic 6: Ownership of Trees

Who owns the trees on your land?
The farmer owns the trees on his land. However, the Forestry Commission has commercial rights over the trees even in the Off-Reserve areas. This means that they have to give a permit before a tree is cut. This permit can only be given if the owner of the land agrees.

Cutting trees

- No contractor has to right to cut trees from any farm without permission from the farmer.

- Farmers have to give permission to contractors before they can cut existing trees on their farm. Farmers have the right to refuse contractors from cutting trees on their farms. When farmers give permission to contractors to cut existing trees on their farm, they have the right to receive compensation on all damages caused on their farm as a result of cutting.

- Farmers must obtain permission from the Forestry Commission before cutting a tree, even if the tree is cut by a contractor. This is to give a proof to the Forestry Commission that the tree is from the owner’s farm and not stolen from the Protected Area or someone’s farm.

Important!
Farmers should collectively contact the Forestry Commission to register their trees planted. When this is done, the farmer owns the trees, just as he/she owns his/her cocoa, plantain or cassava.

Beware
Contractors are aware that farmers do not know these laws. That is why they use the name of the Forestry Commission to cut trees without permission of the farmer and any compensation on damage.
Guidelines for Trainer

VI. Biodiversity

Topic 6: Ownership of Trees

Learning objectives: By the end of this training, participants will know:

☑ What their rights are concerning cutting of trees
☑ The importance of registering trees at the Forestry Commission

Materials needed:

☑ Flip-sheet
☑ Markers to draw a tree

Time needed: 20 min

Preparations:

☑ Make a drawing of a tree on a flip-sheet
☑ Make a line on the ground (with masking tape, rope or any other material)

Set up

Attention: Show the drawing.
Title: Tell participants that the title: Ownership of trees.
Objectives: To explain who owns trees on farmland and who has to give permission to cut them.
Benefits: If you know your rights about trees, you can avoid that contractors will cut illegally from your land and you miss out on compensation.
Direction: We will not discuss different types of trees that are cut for different purposes. We will discuss trees in general.

Delivery

Explanation, Demonstration, Exercise, and Guidance:

1. Point to the tree and say that this tree stands in a cocoa farm. Ask **who owns this tree**. Collect a few answers. Explain that the farmer owns the trees on his land. However, the Forestry Commission has **commercial rights** over the trees even in the Off-Reserve areas. This means that they have to give a **permit** before a tree is cut. This permit can only be given if the owner of the land agrees.
2. Ask everyone to **stand up** and stand in the middle (away from their chairs). Say that you are going to ask them a question. They have to decide if the answer is YES or NO. If the answer is YES, they should stand on the right side of the line (point where that is). If the answer is NO, they should stand on the left side of the line (point where that is).

3. Ask: suppose a **contractor** comes to your farm and he says that he has a permit to cut your tree, should you allow him? Let everyone select a side.

4. Ask a few people from both sides to **explain their choice**: why do they think YES and why do they think NO. After a short discussion, give the correct answer: **no contractor** has to right to cut trees from any farm **without permission** from the farmer. Farmers have to give permission to contractors before they can cut existing trees on their farm. Farmers have the right to **refuse** contractors from cutting trees on their farms. When farmers give permission to contractors to cut existing trees on their farm, they have the right to receive compensation on all damages caused on their farm as a result of cutting.

5. Ask the second question: now you want to cut a tree on your land. Are you allowed to do that? Let everyone select a side.

6. Ask a few people from both sides to **explain their choice**: why do they think YES and why do they think NO. After a short discussion, give the correct answer: Farmers must obtain permission from the Forestry Commission before cutting a tree. This is to give a proof to the Forestry Commission that the tree is from the owner’s farm and not stolen from the Protected Area or someone’s farm.

7. Say that it is important that farmers should collectively contact the Forestry Commission to register their trees planted. When this is done, the farmer owns the trees, just as he/she owns his/her cocoa, plantain or cassava.

8. Finally say that they should be careful with **contractors**. Contractors are aware that farmers do not know these laws. That is why they use the name of the Forestry Commission to cut trees **without permission** of the farmer and any compensation on damage.

---

**Finish**

**Summary:** Repeat who owns trees on farmland and who should give permission before a tree is cut.

**Questions:** Ask if anyone has a question or comment.

**Evaluation:** Ask participants who owns the trees on your land. Ask who should give permission before a tree is cut.

**Next step:** Next time a contractor comes to your land and claims that he has permission to cut your trees, you know what you can do.

Distribute the handout to all participants.
VI. Biodiversity

Topic 7
Landscape Diversity
VI. Biodiversity

Topic 7: Landscape Diversity

Landscape diversification means a variety of living things in and around your cocoa farm. If you carefully landscape your cocoa farm and surrounding area, you can earn some extra income and it is good for the environment.

There are 3 important areas to diversify:

- The cocoa farm
- Around natural resources including water bodies, wetlands and forests
- Wastelands: areas where crops cannot grow

In every area the following can be planted to improve the landscape diversity.

Food crops

- Diversification with food crops can be done the early stages of the cocoa farm (from year 0 to 3) when farmers plant food crops like plantain, cocoyam, yam cassava, maize, etc. with cocoa seedlings. When the cocoa trees are too tall, they will overshadow the food crops and the food crops will not grow well anymore.
- Food crops can provide cocoa seedlings with temporary shade and prevent weeds from growing since food crops grow faster to suppress the weeds.
- Food crops also provide income and food for the household in the short term until the cocoa is ready for harvest.
- A portion of the land can be devoted to planting food crops to feed the household.

Fruit trees

- Another option is to plant or retain fruit trees (fruit bearing trees other than cocoa) like mango, oranges, avocado, cola nuts, oil palm etc., with cocoa.
- Farmers may plant fruits for food and for income. The fruit trees may be planted or retained in cocoa right from the first year or as a replacement for food crops after the third year.

Timber trees

- Farmers can plant or retain timber trees as permanent shade in cocoa for medium to long-term economic and agronomic gains.
- Mature timber trees can be left during initial establishment of cocoa or planted after the cocoa is established.
• Seedlings may also be allowed to regenerate naturally together with the cocoa.
• It is allowed to have 1 or 2 non-desirable trees per acre since they do not adversely affect the cocoa.
• Timber and non-timber forest products can be planted around water bodies and forests, and in wastelands that are not good for crop production. This can provide long term economic gain to farmers and help protect the environment.
Guidelines for Trainer

VI. Biodiversity

Topic 7: Landscape Diversity

Learning objectives: By the end of this training, participants will understand

- Why diversification is important
- How to diversify their cocoa farms and surrounding areas

Materials needed:

- Flip-sheets
- Markers in different colors

Time needed: 45 min

Preparations:

- Make a drawing with a black marker as indicated at the end of the topic as the first drawing.

Set up

Attention: Show the drawing to participants and say that we are going to discuss this drawing into detail.

Title: Tell participants that the title: Landscape diversification.

Objectives: To explain how different trees in and around the cocoa farm can benefit the cocoa farmer.

Benefits: Landscape diversification can earn you some extra income and it is good for the environment.

Direction: We will focus on three important areas to diversify: the cocoa farm, around natural resources including water bodies, wetlands and forests, and wastelands where crops cannot grow.

Delivery

Explanation, Demonstration, Exercise, and Guidance:

1. Ask participants to form half a circle around the drawing. Ask someone to point the cocoa farm, another person to point some of the natural resources and another person the wasteland. Say that natural resources include water bodies, wetlands and forests. Say that wastelands are areas where crops cannot grow.
2. Say that we will start to look at where we can plant **food crops**. You will use the drawing of a mouth (use a red marker) to indicate where we can grow food crops on the drawing. Ask the following questions:
   
a. **What type of food crops** we can plant? Plantain, cocoyam, yam cassava, maize, etc.

   b. Can we plant food crops on the **cocoa farm**? Yes, we can. Add with a marker a drawing of a mouth to the cocoa farm.

   c. In **what stage** of the cocoa farm can we plant food crops? In the early stages of the cocoa farm (from year 0 to 3). When the cocoa trees are too tall, they will overshadow the food crops and the food crops will not grow well anymore.

   d. What are the **benefits** when we plant food crops with young seedlings, apart from the crops they will give? Food crops can provide cocoa seedlings with temporary shade and prevent weeds from growing since food crops grow faster to suppress the weeds.

   e. In what **other areas** we can plant food crops? Wastelands generally do not support crops growth. They may be too waterlogged, too rocky, etc. to support any crop growth. Buffer zones cannot be cleared to grow food crops.

   f. Can we plant food crops **nearby natural resources**? You cannot clear the vegetation and plants near natural resources, but you can plant in addition. However, you are not allowed to use pesticides. In forest reserve you can never plant unless you have a special permit from the Forestry Commission.

3. Say we will continue with **fruit trees**. You will indicate where we can plant fruit trees with a blue banana. Ask the following questions:
   
a. **What type of fruit trees** can we plant? Mango, oranges, avocado, cola nuts, oil palm etc.

   b. Can we plant them on the farm? Yes, we can. Add a banana to the cocoa farm.

   c. In **what stage** of the cocoa farm can we plant fruit trees? The trees may be planted or retained in cocoa right from the first year or as a replacement for food crops after the third year.

   d. In what **other areas** we can plant fruit trees? Although food crops do not grow well on wasteland, you can grow trees. Buffer zones and areas around natural resources cannot be cleared to grow trees.

4. Continue with timber trees. You will indicate where we can plant timber trees with a green tree. Ask the following questions:
   
a. **What type of timber trees** can we plant? All the native species that we have listed under the session on shade trees (session 2).

   b. Can we plant them on the farm? Yes, we can. Add a tree to the cocoa farm. Add that it is allowed to have 1 or 2 non-desirable trees per acre since they do not adversely affect the cocoa.

   c. In **what stage** of the cocoa farm can we plant timber trees? Farmers can plant or retain timber trees as permanent shade trees. Mature timber trees can be left
during initial establishment of cocoa or planted after the cocoa is established. Seedlings may also be allowed to regenerate naturally together with the cocoa.

d. In what **other areas** we can plant timber trees? Timber and non-timber forest products can be planted around water bodies and forests, and in wastelands that are not good for crop production. This can provide long term economic gain to farmers and help protect the environment. Add a tree to the buffer zone, wasteland and natural recourses.

You should now have a drawing as the second drawing at the end of this topic.

5. Finally say that we can never plant food crops, fruit trees or timber trees in **protected areas**. Put a red cross through the protective area. Your drawing should look like indicated at the end of this topic.

**Finish**

**Summary:** Give a summary using your drawing.

**Questions:** Ask if anyone has a question or comment.

**Evaluation:** Ask participants where we can plant food crops? Where can we plant fruit trees? Where can we plant timber trees?

**Next step:** Now you have seen how you make extra money by diversifying your cocoa farm and surrounding areas with other trees.

Distribute the handout to all participants.
Drawing at the beginning of the session
Drawing at the end of the session
VI. Biodiversity

Topic 6
Wildlife Laws in Ghana
Category 1: PROHIBITED TO HUNT

Chimpanzee (Akatia)

Black and white colobus (Efoo)

Red colobus (Ebene)

Olive colobus (Asibe)

Diana monkey (Boapia)

Bossman’s potto (Aposso)

Bush baby (Aprenkensima)

Forest palm squirrel (Kontodoo)
Category 1: PROHIBITED TO HUNT

- Giant pangolin (Opra)
- Long tailed pangolin (Aprawabene)
- Elephant (Osono)
- Leopard (Osebo)
- Honey badger (Kwabrefo/Sisi)
- Clawless otter (Nsubodom)
- Ogilby’s duiker (Kabonkyi)
- Water chevrotain (Aberetwi)
Category 1: PROHIBITED TO HUNT

Bongo (Tromo)

Broad fronted crocodile (Kyekye)

Nile monitor (Mampam)

Pygmy hippopotamus (Susuno)

Spot necked otter

African linsang

Turtle (Apuhoro)
Other animals that are prohibited to hunt:

<table>
<thead>
<tr>
<th>Common name</th>
<th>Local name (Twi)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Tree pangolin</td>
<td>Aprawa</td>
</tr>
<tr>
<td>Falcons, hawk</td>
<td>Akromah</td>
</tr>
<tr>
<td>Eagle</td>
<td>Okodie</td>
</tr>
<tr>
<td>Owl</td>
<td>Patuo</td>
</tr>
<tr>
<td>Egret</td>
<td></td>
</tr>
</tbody>
</table>

Category 2: PROHIBITED TO HUNT between 1 August and 1 December

Giant forest hog (Ebew)

Gambian mongoose (Dompo)

Bay duiker (Odabo)

Yellow back duiker (Okwaduo)
Other animals that are prohibited to hunt between 1 August and 1 December:

<table>
<thead>
<tr>
<th>Common name</th>
<th>Local name (Twi)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cusimanse</td>
<td></td>
</tr>
<tr>
<td>Spotted hyena</td>
<td></td>
</tr>
<tr>
<td>Brush tailed porcupine</td>
<td>Kotoko</td>
</tr>
<tr>
<td>Red fronted gazelle</td>
<td></td>
</tr>
<tr>
<td>Black duiker</td>
<td>Oyuo</td>
</tr>
<tr>
<td>Maxwell’s duiker</td>
<td>Kabonkyi</td>
</tr>
<tr>
<td>Gray duiker</td>
<td></td>
</tr>
<tr>
<td>Flying squirrel</td>
<td></td>
</tr>
<tr>
<td>Wild cat</td>
<td></td>
</tr>
<tr>
<td>Red river hog (bush dog)</td>
<td></td>
</tr>
<tr>
<td>Bush buck</td>
<td></td>
</tr>
<tr>
<td>Buffalo</td>
<td></td>
</tr>
<tr>
<td>Reedbuck</td>
<td></td>
</tr>
<tr>
<td>Waterbuck</td>
<td></td>
</tr>
<tr>
<td>Maxwell’s duiker</td>
<td></td>
</tr>
<tr>
<td>Parrots</td>
<td>Ako</td>
</tr>
</tbody>
</table>
Category 3:
ALLOWED TO HUNT

Stripped ground squirrel (Amoakua)
Tree squirrel (Opuro)
Grasscutter (Akerantie)
Stone partridge, bush fowl (Akokohwedie)

Other animals that are prohibited to hunt between 1 August and 1 December:

<table>
<thead>
<tr>
<th>Common name</th>
<th>Local name (Twi)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Giant rat</td>
<td>Kusie</td>
</tr>
</tbody>
</table>

Rules on Hunting

- Hunting must be done only with a license at all times in the year.
- Hunting must not be done in protected areas.
- Hunting must not be done with the gin trap (called jack locally).
- Hunting must not be done using poison or poisonous weapons.
- The hunting, capturing or destroying of any young or adult accompanied by its young of any species is absolutely prohibited at all times.
APPLICATION FORM (to be completed by the farmer)

Particulars to be submitted in writing to the Chief Game and Wildlife Officer by applicants for a game license. To be accompanied by a fee of

APPLICATION FOR GAME LICENSE TO HUNT, CAPTURE OR DESTROY WILD ANIMALS

I, ........................................................................................................................... (NAME)
of (address) ........................................................................................................
hereby apply to be granted a Game License under Part II of the Wildlife Conservation Regulation, 1971.

Purpose of application (e.g. sport, sale of bush meat, trade in live animals, etc)
........................................................................................................................................

Purpose of current License to bear Firearms (to be completed by applicants intending to use firearms a means of hunting or destroying).
........................................................................................................................................

License No. ...................................................................................................................

Date issued. ...................................................................................................................

Type of firearm. ...........................................................................................................

Propose method of hunting or capture (to be completed by applicants intended to use any means of hunting or capture other than (b) above
........................................................................................................................................

Species which the applicant wishes to hunt, capture or destroy:
........................................................................................................................................

Previous conviction (s)

I have been convicted of the following offences under the Wild Animals Preservation Act 1961 (Act 43)
........................................................................................................................................ (state particulars of conviction if any)

I declare that all the information given above is correct.
.................................................................................................................................

(Signature or (L. T. P.)

Date ..........................................................................................................................
LICENSE (to be completed by the wildlife officer)

GAME LICENSE

In pursuance of the Wildlife Conservation Regulations, 1971 (L.I.685), I hereby license

Name ..............................................................................................................................

Address ..........................................................................................................................

*holder of a license to bear a firearm no.

..........................................................................................................................Dated

..........................................................................................................................to hunt/capture/destroy (delete

inapplicable words) the following species and in numbers specified on the attached form \9GW/2) subject however to the restrictions and special conditions in this license for a period of six months expiring on ......................................................day of

..........................................................................................................................19..........................dated

at......................................................This..........................................................

Day of......................................................19..........................................................

FEE PAID: ...........................................................................................................

Restrictions: Here state any special restrictions e.g. in relation to females and young or close season.

..............................................................................................................................

Authorised means of hunting/capturing/destroying (delete inapplicable words)

..............................................................................................................................

District of Operation

..............................................................................................................................

..............................................................................................................................

..............................................................................................................................

(Game Officer)

Rank .................................................................

For: Chief Game and Wildlife Officer
Guidelines for Trainer

VI. Biodiversity

Topic 6: Wildlife Laws in Ghana

Learning objectives: By the end of this training, participants will be able to

- Differentiate between different animals in terms of hunting laws

Materials needed:

- Red, green, blue and black marker
- Colored cards

Time needed: 45 min

Preparations:

- Good quality copies of the 12 animals listed in the Visuals (you have to cut them separately)
- Prints of the tree categories of hunting (see at the end of this topic)

Set up

Attention: Show participants a few of the pictures of the animals. Ask what they are. They are all animals

Title: Tell participants that the title: *Hunting laws in Ghana*.

Objectives: To explain which animals can be hunted and which you cannot hunt.

Benefits: Killing animals that are not allowed to be hunt can disturb your biodiversity and can cause plagues of animals that will destroy your farm.

Direction: During this session we will discuss 12 different animals. After the session we will give you a poster with more animals on it.

Delivery

Explanation, Demonstration, Exercise, and Guidance:

1. Ask if it is allowed to **hunt** any animal in Ghana. No, it isn’t. Tell participants that the Ghana Wildlife Department has divided all animals into **three categories**:

   a. **First category**: The hunting, capturing or destroying of any species listed in this category is absolutely prohibited at all time.
b. **Second category:** The hunting, capturing or destroying of any species listed in the category is absolutely prohibited between 1st August and 1st December in any year.

c. **Third category:** These animals can be hunted throughout the year.

2. **Ask why** some animals **cannot be hunted at any time** (category 1)? Some animals are completely protected because they are getting extinct. If any of these animals would disappear completely, the whole ecosystem would be affected.

3. **Ask why** some animals **cannot be hunted during a specific period** (category 2)? This is because the period from 1 August to 1 December is the breeding period of these animals. If they would be killed during this period, it can endanger the whole specie (they could become category 1).

4. **Ask why** some animals **can be hunted**? This is because they are prolific breeders and can give birth to large litters. Add that the hunting is only allowed if you follow the general hunting rules:

   a. Hunting must be done only with a **license** at all times in the year.
   b. Hunting must not be done in **Protected Areas**.
   c. Hunting must not be done with the **gin trap** (called jack locally).
   d. Hunting must not be done using **poison** or poisonous weapons.
   e. The hunting, capturing or destroying of any **young** or adult accompanied by its young of any species is absolutely prohibited at all times.

5. Put the three colored cards with the description of the three categories on the wall (leave enough space between the cards). Divide participants into **6 groups** and give each group 2 pictures. Each group has to decide **in which category** they would like to place the pictures. Let participants paste the pictures on the wall under the correct card.

6. **Discuss** each picture one by one and **correct** any mistakes. Ask:

   a. Why did you place this animal in this category?
   b. Do you see this animal often in your community?
   c. Do other groups agree it belongs to this category?

**Finish**

**Summary:** Mention the three categories and the specifics on each category.

**Questions:** Ask if anyone has a question or comment.

**Evaluation:** Ask participants why are some animals protected? Show a few pictures and ask in which category they belong.

**Next step:** In this session, we have discussed 12 animals. In the handout you will find more animals so you know exactly which animals can be hunted and which can’t.

Distribute the handout to all participants. If farmers are interested, show them the application form and license.
PROHIBITED TO HUNT
AT ANY TIME
NOT ALLOWED TO HUNT BETWEEN 1 AUGUST AND 1 DECEMBER
ALLOWED TO HUNT
Red colobus (Ebene)
Pangolin (all types)
Nile monitor (Mampam)
African civet (Kankane)
Royal antelope (Adowa)
Black duiker (Oyuo)
Hinged tortoise (Akyekyere)
Stripped ground squirrel (Amoakua)
Tree squirrel (Opuro)
Grasscutter (Akerantie)
Stone partridge, bush fowels (Akokohwedie)
Bosman’s potto (Aposso)
VI. Biodiversity

Topic 9
Community Resource Mapping
VI. Biodiversity

Topic 9: Community Resource Mapping

Resource mapping means drawing a layout of your cocoa farm or community. The map will give you an idea of what natural resources are present and how your activities on your farm can affect your environment. It can also give you ideas on how to reserve the natural resources around you.

How to map the resources of the community?

1. Take a large piece of paper and a pencil.
2. Walk in your mind through the community (you can also do an actual walk) and put the following in your drawing:
   a. Areas served for human purposes (houses, school, church/mosque, roads).
   b. Farmlands: areas where crops grow or could grow.
   c. Wastelands: areas where no crops can grow.
   d. Buffer zones: his is a defined natural or artificial strip of undisturbed area that serves the purpose of separating two land uses from each other.
   e. Protected areas: this is land especially dedicated to the protection and maintenance of biological diversity, natural and associated cultural resources, and managed through legal or other effective means.
   f. Forest
   g. Natural boundaries: physical things that divide the landscape such as rivers creeks, hills, mountains, forest, bushes, etc.
   h. Topography: shape of land in a given location including hills and slopes.
   i. Soil suitability: the ability of land to properly grow crops.
   j. Animal habitat: an area where wild animals including birds, bats, frogs, snakes live and move about.
   k. Endemic species: animals and plants found only in a particular place (is the opposite of cosmopolite species which are found everywhere).
   l. Threatened species: plants and animals which would disappear gradually if not protected.
   m. Location and type of vegetation: e.g. grassland, secondary forest, primary forest, swamp, etc.

The map can be used for discussions in the community or farmers’ group to raise awareness about the environment. The following questions can be asked:
1. What were the **key natural resources** in this area (natural boundaries, vegetation, protected areas, forest, rivers, creeks, mountains etc.) in the 1970s and now? What has changed over time? Why?

2. How do people **use the resources** in the area? What has changed over time? Why?

3. What are the **main land use changes** that have occurred since the 1970s? How have these changes affected wildlife?

4. Today, what proportion of the land use is under **closed forest**? Was that the case in the 1970s?

5. Which proportion of the closed forest outside the protected area will **disappear** if the current trend of land use change is maintained?

6. What will be the effect of these changes on **wildlife**?

7. What **effect** does **agriculture** have on the forest?

8. What **effect** does **hunting** have on the forest?

9. What are some **problems in managing** the different land use zones (river, forest, agricultural land)?

10. What do you think will happen if certain **resources** (wildlife, forest, rivers etc) will **disappear** in the future (for wildlife, indicate endangered species such as elephants, chimpanzees, Diana monkey, deer, forest frog, wild birds, etc.)?

11. What can the community and individuals **do** to make sure that these resources (wildlife, forest, rivers, etc.) continue to exist?

Equally two maps can be drawn. A map in the past and a current map and the community is made to compare and discuss the questions above.
VI. Biodiversity

Topic 9: Community Resource Mapping

Learning objectives: By the end of this training, participants will be able to
- Map their environment
- See how the environment is changing

Materials needed: Flip-sheets
- Markers in different colors

Time needed: 1 hour

Preparations: Make sure to have an idea of what participants will draw (the best way to know is to walk around in the community).

Set up

Attention: Tell participants that we are going to draw this this session.
Title: Tell participants that the title: Community resource mapping.
Objectives: Resource mapping means drawing a lay out of your cocoa farm or community. During this session we will learn how to draw such a map.
Benefits: The map will give you an idea of what natural resources are present and how your activities on your farm can affect your environment. It can also give you ideas on how to reserve the natural resources around you.
Direction: We are going to draw two maps: one of the situation as in the ’70s and one map with the current situation.

Delivery

Explanation, Demonstration, Exercise, and Guidance:
1. Divide participants into two groups. Give each group enough markers and flip-sheet. Each group needs to make a drawing of their community and the surrounding areas.
One group should make a drawing of the situation as it was in the ‘70s, while the other group should draw the current situation.

2. Guide the groups step by step. Say that they should draw all areas served for human purposes (houses, school, church/mosque, roads). When the groups are done, tell them to draw all farmlands in and around the community. When the groups are done, tell them to draw all wastelands. Continue step-by-step with all points mentioned in the fact sheet. Make sure everyone understands what needs to be drawn.

3. When everything is drawn ask the groups to paste their drawings on the wall next to each other. Discuss the results. Ask all questions mentioned in the fact sheet and have a discussion. Make sure different people of each group participate.

Finish

Summary: Summarize how to draw a resource map.
Questions: Ask if anyone has a question or comment.
Evaluation: None.
Next step: Say that they can take their maps with them and have similar discussions with more people in the community.

Distribute the handout to all participants.