Module 11: Permagardening for the Future

Goal

Farmers will implement techniques to enhance long-term health and continuous productivity of the Forest Garden.

Learning Objectives

1. Learn how to grow vegetables at non-traditional times of the year.
2. Learn how to use soil and water conservation techniques to stop, slow, sink and spread water as it flows through the field.
3. Learn how to stabilize earthworks by planting perennials.
4. Learn advanced pest management techniques and natural pest controls.

Venue and Timing

This module should be given during a time of year when gardens are not traditionally planted, to demonstrate how to grow plants at different times of the year. If the workshop is given during the rainy season and fruit trees seedlings are ready for outplanting, facilitate Module 7: Planting Fruit Tree Seedlings during Activity 2 in this workshop.

Relevant Technical Manual Chapters

Before this training event, the facilitator should read, review, and thoroughly understand the following chapters and sections in the Technical Manual:

- Chapter 5: Seedling Propagation (Soils section)
- Chapter 7: Outplanting Seedlings
- Chapter 13: Permagardening
- Chapter 16: Integrated Pest Management

Preparation

- Ask host farmer which annuals and perennials his/her family would like to plant during the workshop.
- Ask host farmer to find/recreate updated Forest Garden design to identify timber tree outplanting locations.
- Collect seeds and planting material.

- Inspect tree nursery to determine whether timber tree and fruit tree seedlings are ready for outplanting.
- Inspect field for pests and decide which natural pest control method to include in training.
- Translate the *Permagardening for the Future* story into the local language, using local names, greetings, vegetables, etc. where appropriate.
- Retrieve Seasonal Market Analysis chart from Module 8, if available.

Supplies

- Forest Garden design for host farmer's field
- Perennial planting material
- Ingredients to make natural pesticide
- 2 wheelbarrows for transporting seedlings
- 5 round shovels or appropriate digging tools
- 3 watering cans with water
- ½ wheelbarrow of wood ash
- ½ wheelbarrow of charcoal dust
- 1 wheelbarrow of compost or decomposed manure
- Sticks for marking planting rows
- 5 hoes
- String
- Bucket
- Flip chart
- Markers

Total Time

3-4 hours

Handouts in Farmer's Workbook

- Perennials & Off-season Vegetables

Module 11: Permagardening for the Future

Summary of Activities

Opener: Gardening for the Future story (30 mins)

- Volunteers read/act out story
- Debrief lessons learned from story

Activity 1: Earthworks for soil and water conservation (2 hours)

- Human rain drop
- Facilitator explains how to conserve soil and water in the Forest Garden
- Design earthworks plan for the permagarden
- Form small groups and practice constructing berms, swales and other earthworks techniques in the Forest Garden

Activity 2: How to grow vegetables in the offseason (30 mins)

- Explain best practices for planting and growing vegetables in the offseason

Activity 3: Planting timber trees and perennials and (flexible) grafted fruit trees (45 mins)

- Review Forest Garden design
- Outplant timber trees
- Review benefits of perennials
- Plant perennials on berms to stabilize soil

Activity 4: Pest Control (1 hour)

- Inspect the field for pest problems
- Discuss techniques to address common pest problems
- Practice making natural pest controls

Take Home Activity 5: Start your off-season garden and outplant timber trees and perennials and (flexible) outplant fruit seedlings (30 mins)

- Debrief gardening best practices, soil and water conservation and pest control
- Instruct farmers to plant perennials to stabilize berms, segment field and control pests
- Instruct farmers to outplant timber tree seedlings and slow-growing fruit tree seedlings in the Forest Garden
- Follow-up

Opener: Gardening for the Future story

Description

Three volunteers read a story that demonstrates the benefits of using permaculture techniques to create a garden that provides nutritious food for the family throughout the year. Emphasize the benefits of permaculture for: providing healthy food for the family, improving the soil quality, and reducing the use of costly fertilizer and dangerous pesticides.

Instructions for Farmers

1. **Volunteers read/act out story (on the following page).**
   Can three volunteers, one man and two women, come to the front and read a story about two families and their farms? After we hear the story, we will discuss it.

2. **Debrief lessons learned from story.**

   - What did you think of the story?
   - What is the neighbor doing that is making his life difficult? Why is it making life difficult?
   - What are the husband and wife doing in the story that is good for the health of their family?
   - What are the husband and wife doing in the story to increase the productivity of their Forest Garden?
   - What are the husband and wife doing that reduces the cost of inputs for the Forest Garden?

The Story of Two Families Growing Vegetables

Have three participants read the story. Replace the names with names appropriate for the community.

Wife: Husband, I am so happy we went to that training last year and changed the way we made our permagarden. We were able to grow and sell more in our garden and at the same time we spend less time working in the garden!

Husband: Yes, my wife. I am happy too. Instead of working harder, we are working smarter.

Neighbor: Greetings neighbors. Oh! I am so tired! I kept my kids home from school today so that they could help me till and plant in our home permagarden and we still have much work to do!

Wife: You look very tired indeed! Here, take some water. What are you growing this season?

Neighbor: We are growing all [local vegetable] again this season. Last season the prices we got in the market were not good because there were so many people selling [local vegetable] at the same time. Also, last season we had a big problem with pests and we had a smaller yield than the year before. So this season I sold a goat so I could buy pesticide and fertilizer from the agrochemical shop. We hope it will be better this time. Have you started to build your garden?

Husband: Last year we learned about a way to build our garden so we do not have to re-build it every season. It makes for less work to start the garden so we do not need the children to stay home from school to help us. Some of the plants we planted last season are still producing. And we were able to save more water in the garden so we could continue growing some vegetables in the off-season. We are able to produce a variety of nutritious vegetables to keep our family healthy and strong, even during the lean season. Every month of the year we are able to harvest something from our garden! Come take a look!

Neighbor: Wow! You have so many different types of plants growing here! That must require a lot of different pesticides to keep the pests away!

Wife: Actually, the plants work together as a team to improve the soil and keep some pests away so we are spending less money on buying expensive fertilizer and chemical pesticide than we did before. The marigolds you see there help keep pests away from our tomatoes. And those onions deter pests from our eggplants.

Neighbor: So you don't have any pests at all??

Wife: We have some, but we carefully observe our garden to catch pest problems when they are small and manage them with natural ways if we can. Even when we have pests, they usually only attack one of the many plants we have, so it is not that bad.

Husband: Those agrochemicals are very dangerous for the children and for us if we don't handle them properly. So we want to use them only as a last resort if the other things we try don't work.

Neighbor: How can I learn how to build a garden like this for my family?

Husband: We are happy to come and share what we learned with you!

Neighbor: Thank you and bless you! I want to learn well so I can have a garden like yours!

Activity 1: Earthworks Techniques for Soil and Water Conservation

Description

Farmers construct soil and water conservation techniques, such as berms and swales, in the permagarden.

Instructions for Farmers

1. **Human rain drop**
   Heavy rains can wash away the nutrient-rich topsoil from your Forest Garden. I would like 5 volunteers to come to the front. I will position you to represent different features on the field—mounds, slopes, ditches. Then I will act as a drop of rain moving through the field.

   - How does water move through your field?
   - Where does it move fast?
   - Where does it slow down?
   - What are three benefits of controlling the way water flows through your field?

2. **Facilitator explains how to conserve soil and water in the Forest Garden**
   We can control the way water flows through our permagardens—and slow it down so it is absorbed by the soil underneath the beds—with the 4 S's of water control: stop, slow, sink and spread. The 4 S's are achieved by constructing swales, berms, pathways and holes out of soil, rocks, and other debris, in the appropriate places, to slow down the water and direct it to where we want it go, then stopping it so that it can spread underneath the garden beds and tree roots and sink deep into the soils.

   - What is a berm? Where and why do you construct a berm?
   - What is a swale? Where and why do you construct a swale?
   - What techniques can you use to control water around trees in the Forest Garden?
   - What are two benefits of mulch?

3. **Design earthworks plan for the permagarden**
   Based on the features in the field and location of the permagarden, how should we use the soil and water conservation techniques we discussed to direct water to the garden?

   - Where does water move the fastest? (look for heavy erosion/gullies) Is this a problem?
   - How can we slow it down and direct it to where we want it to go (e.g. to our garden, trees, water catchments, underground, etc.)?

- Which soil and water conservation techniques should you use? Why? Where?
- Why does planting a variety of crops help you save water in the field? (i.e. better use of space, more shade from trees)

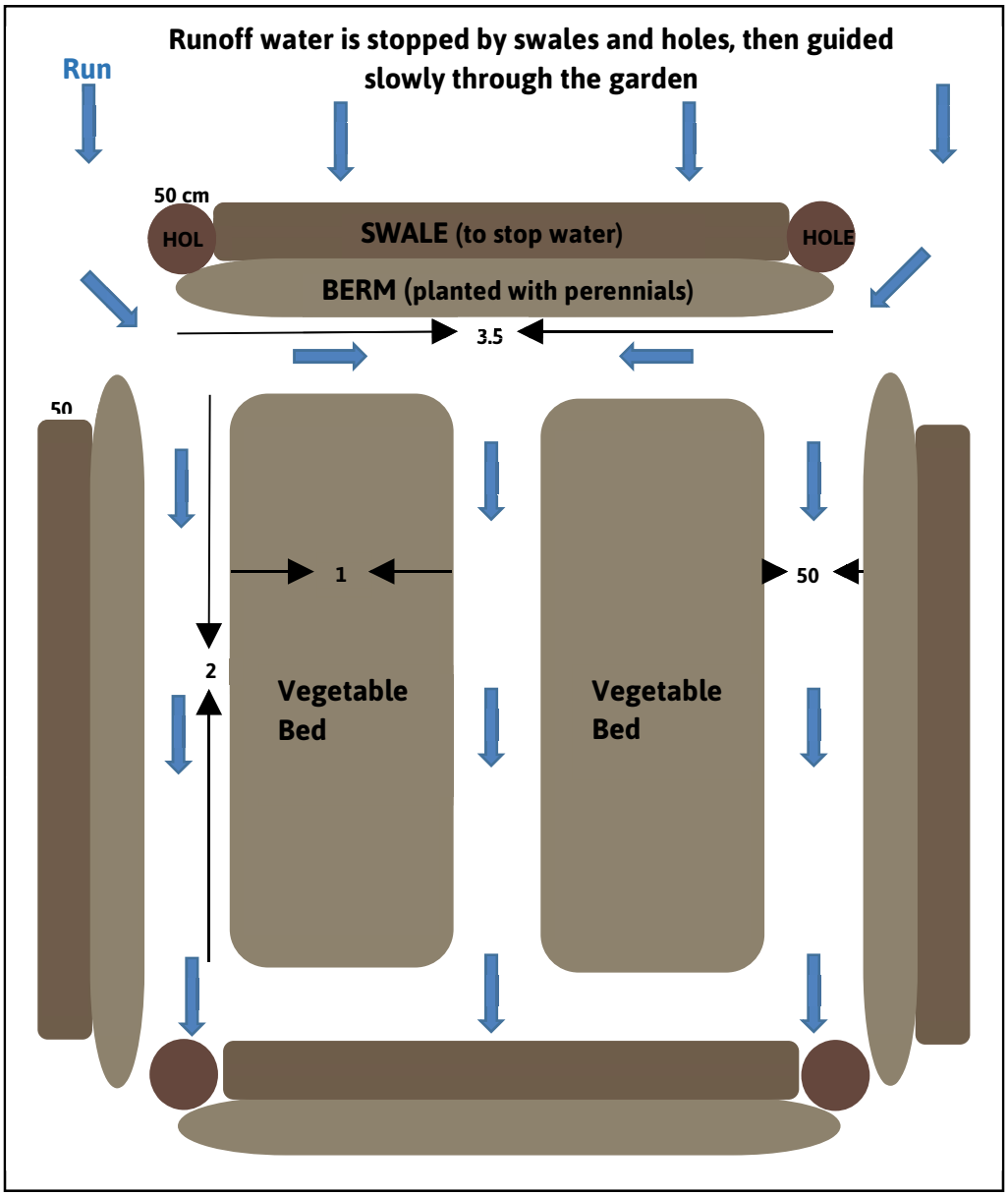
4. **Form small groups and practice constructing berms, swales and other earthworks techniques in the Forest Garden**
   Form small groups and I will assign each group a soil and water conservation technique to practice on a section of the Forest Garden, based on our design. After some time, I will have you all rotate to a different section so that you will be able to practice all of the techniques we learned today.

   - How do you slow water?
   - How do you stop water?
   - How do you sink water?
   - How do you spread water?

5. **Plant perennials in nursery**
   In the last workshop we talked about perennial plants you can add to your Forest Garden to make it more productive. Perennial plants can also help benefit your field in other ways: they can help with soil and water conservation, you can use perennials to segment the field, and perennials can help control pests. We will plant some perennials in the nursery so that in the next workshop we can outplant them in our Forest Garden—on the berms we constructed today to stabilize and in other areas based on the Forest Garden design.

   - What are characteristics of plants that help stabilize soil?
   - What are a few perennials that would be good to plant on your berms? Why?
   - What are characteristics of plants that can help protect your field from pests?
   - What are a few perennials that would be good to plant for pest control? Why?
   - What are characteristics of perennials that would be good to plant to segment the field?
   - What are a few perennials that would be good to plant for segmentation? Why?
   - How do you propagate them? (seeds, cuttings)
   - Do you need to nurse the plants? For how long?
   - Can you plant cuttings?
   - Where do you get them? How do you plant and care for them?
   - What is the spacing for this type of plant?
   - What is the best time of day to water the field? Why?
   - What can you do to keep the sun from drying out the soil? (mulch)
   - What available materials can we use as mulch?

Figure 1: Permagarden design showing earthworks techniques



Activity 2: How to Grow Vegetables in the Offseason

Description

The facilitator discusses best practices for growing vegetables in the current season.

Instructions for Farmers

1. **Explain best practices for planting and growing vegetables in the current off-season.**
   Many vegetables that you grow in your gardens can be planted at other times of the year as well, if you prepare the land in a different way.

   - What do you grow during this season?
   - What can you grow during this season? Which varieties of the vegetable grow best during this season?
   - What would you like to grow during this season?
   - What is most valuable to sell during this season? (refer to seasonal market analysis from Module 8, if available)
   - How do you normally prepare a bed for this type of vegetable?
   - How should you prepare a bed for this type of vegetable in the current season?
   - How should you water this type of vegetable? (example: onions in sunken beds, don't overwater, just keep moist)

Activity 3: Planting Timber Trees & Perennials and Grafted Fruit Trees (flexible)

Description

During this activity, farmers will outplant timber trees and perennials previously planted in the nursery. If grafted fruit trees are ready for outplanting, facilitate **Module 7: Activities 2 and 3** during this activity. The facilitator reviews the benefits of perennials for soil and water conservation, field segmentation and pest control. Then farmers go into the field to inspect and reshape the berms constructed in the previous workshop and plants perennials on the earthworks to stabilize soil.

Instructions for Farmers

1. **Review Forest Garden Design**
   During the last two workshops we talked about adding short plants, medium height plants and tall trees to use more of the vertical space in your Forest Gardens. Today you will plant perennials and timber tree seedlings in the field to optimize the vertical space. Let us review the Forest Garden design the host farmer created for his/her field so that you will know where to plant today.

   - What is a perennial?
   - Why is it good to plant timber trees in your Forest Garden?
   - Where will you plant timber trees? Why?
   - Where will you plant perennials? Why?

2. **Outplant timber trees**
   Form small groups. Each group will go to a different location in the field and prepare planting holes for the timber tree seedlings. Then go to the nursery and collect the seedlings to outplant.

   - What spacing should you use for the types of trees you are planting today?
   - Why is it good to space timber trees closer together initially?
   - If you plant near a fence, how much space do you leave between the fence and the tree?
   - How do you ensure proper spacing and that the planting follows the original design?
   - How wide do you dig the holes? How deep do you dig the holes?
   - How can you ensure there are plenty of nutrients in the soil for the young seedling?
   - What can you add to the soil before planting? If you do not have compost, what else can you add? Why do you add wood ash? Why do you add charcoal?
   - What qualities do you want your timber trees to have?

- How do you care for the timber trees once they are planted?

3. **Review benefits of perennials**
   In the optimization workshop we talked about perennial plants you can add to your Forest Garden to make it more productive. Perennial plants can also help with soil and water conservation.

   - What are some benefits of perennials for pest management?
   - What are some benefits of perennials for soil health?
   - What are some benefits of perennials for segmenting the field?
   - What are characteristics of plants that help stabilize soil?
   - What are examples of plants to use to stabilize soil?
   - How do you propagate this type of plant? (seeds, cuttings)
   - Do you need to nurse the plant? How long do you nurse the plant?

4. **Plant perennials on berms to stabilize soil**
   You will plant some perennials on the berms you constructed to stabilize the soil. You might need to reshape the berms before planting.

   - What is the spacing for this type of plant?
   - How do you care for the perennials you planted? Do you need to water? When and how much should you water?

Activity 4: Pest Control

Description

The facilitator discusses the concept of integrated pest management and explains natural methods for pest control, including natural pesticides, aromatic pest confusers, and insectary and nectary plants.

Instructions for Farmers

1. **Inspect the field for pest problems**
   Let us go walk around the Forest Garden and look for pests. In the same small groups you formed earlier, go into the field and do a transect walk. Every few steps, stop and inspect the health of the plants and soil and look for pests or evidence of pest attacks (e.g. holes, spots, wilting leaves, etc.). Take notes and/or collect the pests or evidence of attacks you see in the field. While you are in the field, look at the plants and observe their qualities—size, shape, coloring.

   - What is a pest?
   - What are common pests you find in your field?
   - Which plants have many pests?
   - Which plants do not have many pests?
   - What time of year brings many pests?
   - What insects do you know of that eat common pests?
   - What plants attract those insects (e.g. by providing food or shelter)?
   - Do you know of any plants that repel pests because of their smell? What?
   - What do you now do to prevent pests in the field?
   - What do you do now to get rid of pests that are already there?

2. **Discuss techniques to address common pest problems**
   - What damage from pests or disease did you see in the field?
   - Were the pests a large problem that needs action?
   - Were the pests attacking many types of plants, or just one or two?
   - What pests or diseases do you think will affect your garden this season?
   - What actions can you take to control the pests?
   - Do you think you need chemicals? What alternatives to chemicals can you use to reduce the pests?
   - Who has experience using these techniques?
   - What can you grow that is not as susceptible to pests? Are different varieties better to combat pest and disease?

3. **Practice natural pest control methods**
   I will teach you a natural way to control the pest you observed in the field today. Get back into your small groups and then come and collect the materials and I will demonstrate how to make a natural pest control.

Take Home Activity 5: Start your Off-Season Garden, Build Earthworks, and Outplant Timber Tree & Perennials and Outplant Fruit Seedlings (flexible)

Description

Farmers start their off-season gardens using the techniques learned in the workshop. Farmers also outplant timber trees, perennials and fruit seedlings, when ready.

Instructions for Farmers

1. **Debrief gardening best practices, soil & water conservation and pest control**
   After the workshop, you will start your own vegetable nursery. The lead farmer will come inspect your nursery within 2 weeks and then distribute the seeds.

   - What are the top 3 challenges you might face in your garden?
   - How and when do you water your garden?
   - How do you conserve/save water?
   - Why do you mulch?
   - When do you weed?
   - What natural methods can you use to control pests?
   - How do you improve the soil quality?

2. **Earthworks techniques**
   You will use the earthworks techniques you learned today in your own perm-agarden to stop, slow, spread, shade, and sink water as it flows through your field.

3. **Instruct farmers to plant perennials to stabilize berms, segment field and control pests**
   Inspect the berms in your field and reshape them, if necessary. Then outplant the perennials into your Forest Garden based on your design.

4. **Instruct farmers to outplant timber tree seedlings and slow-growing fruit tree seedlings in the Forest Garden**
   When your slow-growing fruit seedlings and timber tree seedlings are ready, you should outplant them in your Forest Garden according to the Forest Garden design.

Follow-up

The lead farmer will visit participant farmers' Forest Gardens within 2 weeks. When the garden area meets the criteria, the lead farmer will distribute the vegetable seeds for farmers to plant in their gardens. The lead farmer will also inspect the perennials, fruit tree and timber tree seedlings outplanted in the field.

Evaluation Checklist for Skills Learned in Module 11

At the end of the year you will be evaluated on the following practices that you learned and discussed during training events. Those in bold are topics that we discussed or practiced today. In demonstrating that you have completed the Year two evaluation criteria, you will be invited to continue into the fourth year of the project.

Year 3 Evaluation Criteria

- Green Wall
  - Three rows, fully surrounding the Forest Garden site
  - Gaps replanted
  - Well-managed
  - Dead fence surrounding green wall if still needed (for all projects where this is determined to be a requirement)

- Alley Cropping and/or Contour Planting
  - Optimum number planted
  - Gaps replanted
  - Well-managed

- **Fruit Trees**
  - **At least 4 species planted**
  - **At least 2 species grafted**
  - **Proper spacing between trees**
  - **Each tree mulched and weeded**

- **Timber Trees**
  - **At least 1 species planted**
  - **Proper spacing between trees planted**
  - **Each tree is weeded and mulched**

- Compost
  - Three active piles
  - Well-managed

- Permagarden
  - Multiple species
  - **Demonstrated use and explanation of at least 3 IPM measures**
  - Production timed for demand
  - **Demonstrated use of the 4 S's**
  - **Perennials planted on berms around garden**

Module 11: Facilitator's Notes

The facilitator should use the following pages to note down any questions or findings from the group that should be kept for or addressed at a later time. Depending on the module this may include species selection by group, crops identified in seasonal calendars, or anything else that should be noted.