A Facilitator's Handbook

~ for ~

PERMACULTURE

Solutions for Sustainable Lifestyles

Developed by IDEP Foundation with PERMATIL and GreenHand

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THE AIM OF THIS BOOK IS...

To provide a wide range of practical and comprehensive guidelines, tools, and techniques for delivering effective Permaculture workshops. It includes over 200 presentations, creative thinking exercises, and practical hands-on exercises, which can be used by local facilitators to design and implement effective courses appropriate to the needs in their area. It has been designed to work in conjunction with the companion books **"A Resource Book for Permaculture – Solutions for Sustainable Lifestyles"** and **"The Facilitator's Resource Book for Permaculture Training and Assessment."**

These workshop techniques include knowledge and practical techniques for environmental rehabilitation and sustainability, strengthening community resilience and local economies. The contents of the book are based on concepts of deep ecology, the inter connectedness of our environment and culture, and the principles and ethics of sustainable community development.

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We have tried to be as factual and accurate as possible. We hope that this book will provide many benefits for those that use it. However, any problems that occur as a result of practical use of the information is not the responsibility of Permatil, IDEP Foundation, or of the book's authors, artists, contributors, or publisher.

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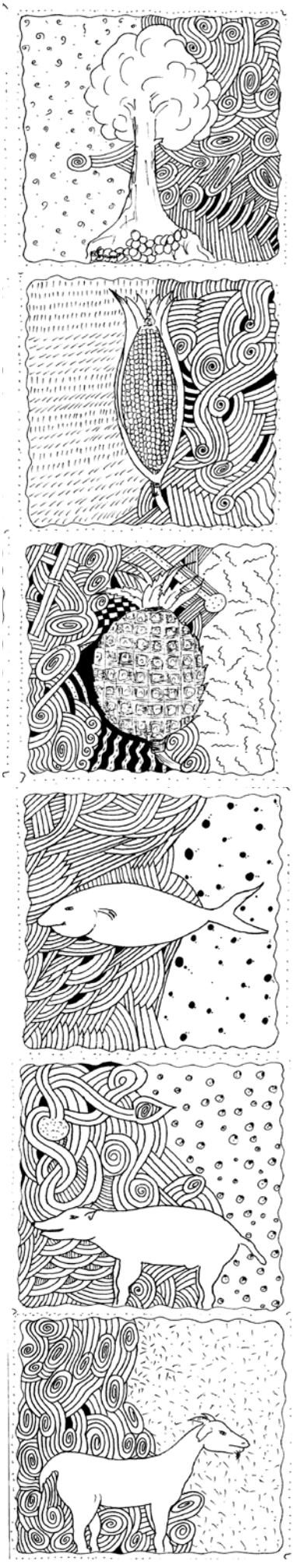

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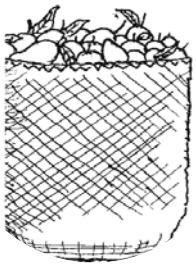


Forward

Permaculture is not simply a "back to nature" movement, it is a system for sustainable development based on natural principles. It is a practical and effective way to use natural patterns and natural principles for increasing sustainability and quality of life. This Permaculture Facilitator's Manual has been developed to assist Permaculture facilitators, trainers, and designers to use and share these principles and methodologies through their work, and increase the benefits of natural methods for development. Everyone can study and apply Permaculture by learning from and cooperating with nature while preserving natural resources.

This Permaculture Facilitator's Handbook is designed to work in conjunction with 'The Permaculture Reference Book', which covers a wide range of information about the Principles of Permaculture and how they can be applied in many practical ways. It was developed for Permaculture trainers, facilitators, and designers to be able to deliver effective Permaculture workshops which will help people apply the practical ideas in the Permaculture Reference Book.

The practical and effective way that the contents of this handbook are presented are useful for any Permaculture teacher as a reference before, during, and after trainings are conducted.

This is an extensive handbook, it is systematic, user friendly, and has been developed to be easy to read and use so as to make it as practical as possible for Permaculture trainers.

The contents of the books in the Permaculture series have been derived from a wide range of experiences of Permaculture trainers and designers from many different areas, including local and international practitioners, over an extended period of time.

This handbook will be most effective if used for the purpose for which it was designed: as a Handbook for Permaculture design trainings.

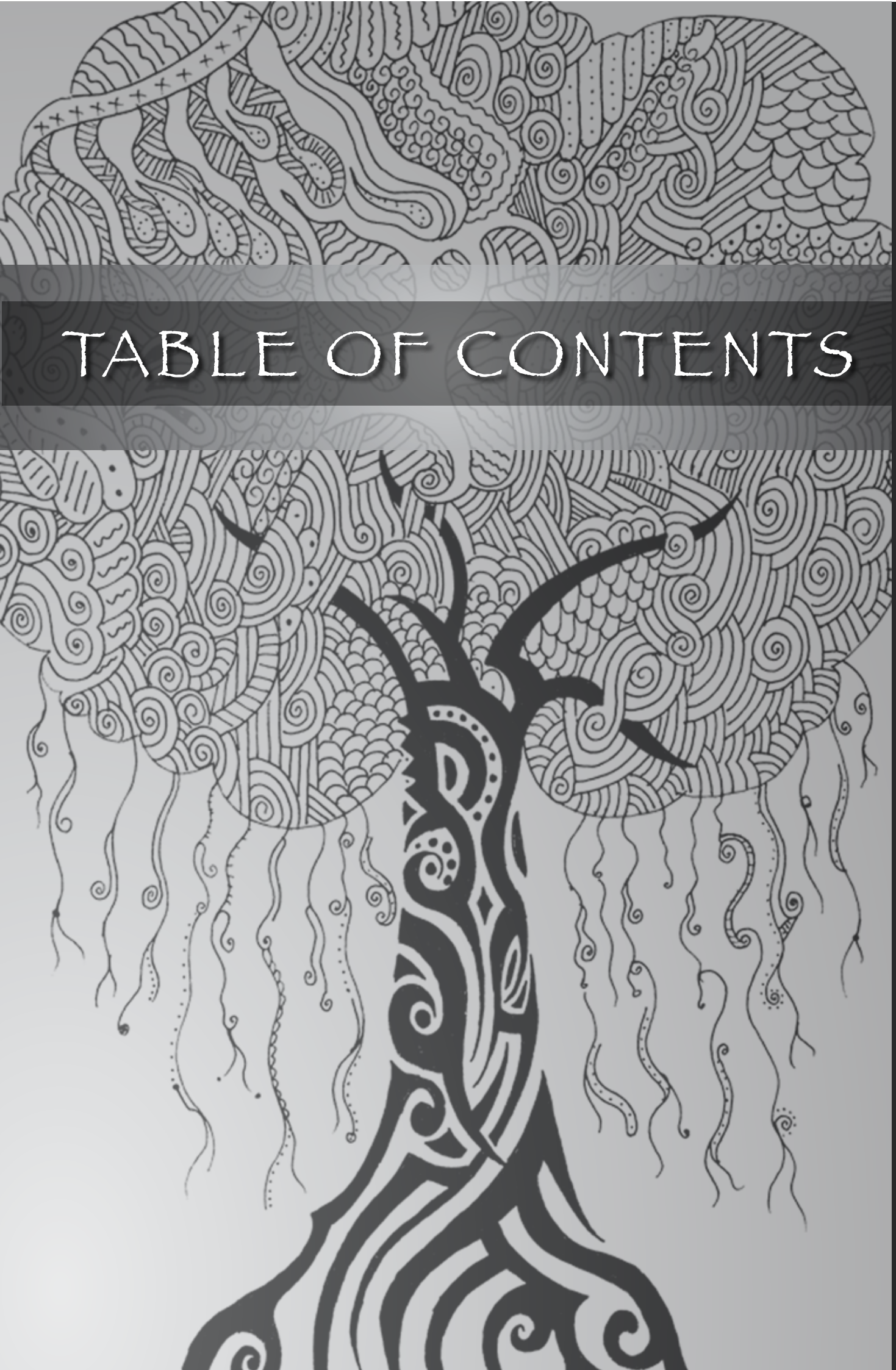
Even though the contents of this book have already proven effective in field application, this does not mean that the manual is complete, it is open for updates, inputs, and reviews. Just as nature is constantly in a dynamic process of change and evolution, this Facilitator's Handbook is very much a living document open to new ideas and inputs so that it can be made even more useful over time.

I hope that this Permaculture Facilitator's Handbook, and the companion Reference Book and Trainer's Resources Book will be a driving force for the important movement towards more sustainable living. The books are based on the philosophy of sustainability, which was so well explained by Mahatma Gandhi as "The earth provides enough to satisfy every man's need but not every man's greed."

Roberto Hutabarat

IDEP Aceh Recovery Programs Coordinator and Director GreenHand Field School

Notes...



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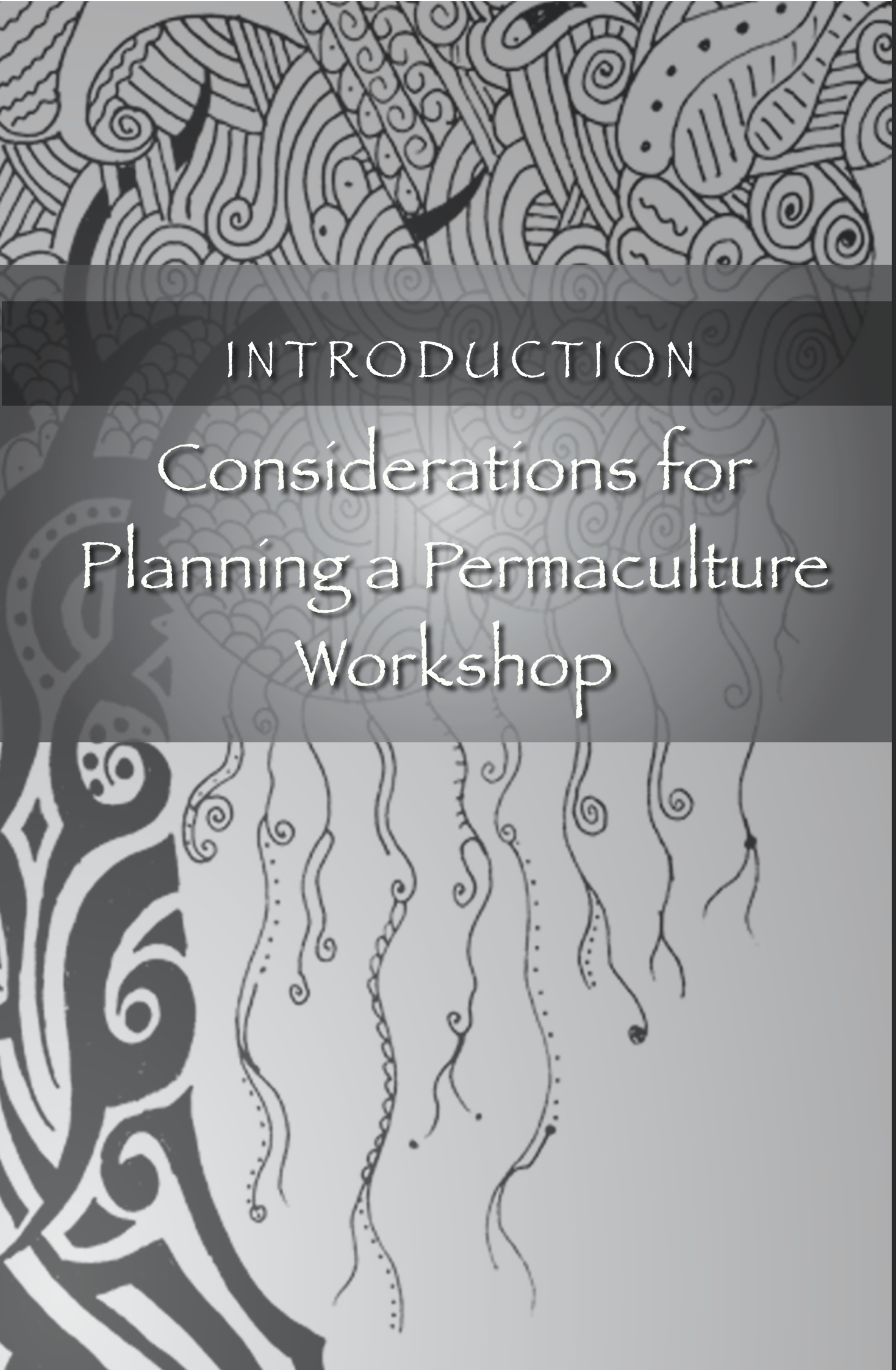


INTRODUCTION

Considerations for Planning a Permaculture Workshop

Notes...

What is a Permaculture workshop?

A Permaculture workshop is a modified Permaculture design course especially developed to enable people in Indonesian rural communities to become more self-reliant.

By applying the basic Permaculture design principles, methods, strategies, and techniques covered in this course, people can learn how to better provide for their basic needs using local resources in cost effective, culturally appropriate, healthy, and environmentally friendly ways.

Because the main focus of a Permaculture workshop is on integrating local best practices with proven practices from other communities in similar situations, it provides a common-sense approach to community self-development that can be adapted to suit any community or culture.

While each Permaculture workshop will vary in content and emphasis, according to the people, place, and time involved, the common goals of every Permaculture workshop are to give participants:

- A good understanding of Permaculture ethics and design principles.
- Practical, simple, meaningful ways to integrate Permaculture into their daily lives.
- Skills to develop viable alternatives to replace destructive local practices.
- Tools for shifting their communities toward more ecological and healthy lifestyles.
- Tools for developing more sustainable and environmentally sound income generating activities.

The success of a Permaculture workshop depends upon the real changes that occur as a result of the course. Therefore, successful implementation of the Permaculture workshop consists of:

1. Careful pre-course planning and preparation.

2. Delivery of appropriate training courses, including:

- The right subject materials for the target participants.
- At least 50% hands-on field practice per topic.
- The creation of practical demonstration projects by the participants.
- The completion of designs, by participants, which integrate the various modules covered in the course.

3. Post-course follow-up support

Section 2 of this handbook contains useful ideas about how to plan, prepare for, and lead a successful course, as well as how to provide ongoing post-course support to ensure that participants receive lasting benefit from the course by putting what they learn into action.

Who facilitates Permaculture workshops?

Ideally, qualified, hands-on Permaculture trainers: A Permaculture trainer is usually someone with both practical experience of Permaculture and specialized training in how to teach the Permaculture Design Certificate course to others. Such facilitators would be the most qualified to teach the complete contents of a Permaculture workshop.

It is equally important for them to have strong intercultural communication skills and a good grasp of local community practices, to ensure that courses are culturally appropriate and fully responsive to local needs.

However, Permaculture is relatively new to Indonesia and few certified Permaculture trainers meet these criteria and teach here on an ongoing basis; still fewer Indonesians have had the opportunity to attend a Permaculture certification training course overseas.

Fortunately, there are many people throughout Indonesia who do have hands-on experience in aspects of Permaculture and related approaches, such as grass root field workers, extension agents, eco-facilitators, and other innovators. These people often have a good knowledge of, and relationships with, the communities with whom they work and live. Such people may be equally or even more successful in applying the Permaculture workshop to facilitate community learning experiences. They are also in a good position to empower course participants to create lasting, culturally appropriate solutions to the complex social and ecological problems their communities are facing.

Whatever your background, a vital aspect of facilitating an Permaculture workshop is practical work and demonstration. During a Permaculture workshop participants will be getting their hands dirty building practical demonstrations; they will be learning the best practices by doing them. **Therefore, as a Permaculture workshop facilitator you need to be able to lead by example, both in the field as well as in a classroom.**

If you know Permaculture techniques and want to share them with others, but still have limited experience in teaching groups, take small steps to gradually build up your capacity and confidence.

Use the guidelines in Section 2 to organize a 1 hour introduction to Permaculture; then move on to several short classes, a 1 or 2 day workshop, an in-depth 12-14 day course, and beyond – perhaps in partnership with an experienced instructor whose knowledge complements your own.

Whatever your level of expertise, you can always invite or hire senior participants of past Permaculture workshops and/or respected local experts or community members with proven skills in specific areas – such as soil conservation, LEISA, small enterprise development, or appropriate technology – to participate in leading the course as co-facilitators, guest presenters, or assistants. This will enhance your course and its local relevance. You will be responsible for ensuring that guest presenters cover their selected topic(s) in the time provided in the lesson plan.

Remember to teach only what you know well and can demonstrate with ease.

Contact IDEP Foundation for information if you feel you need help to teach less familiar techniques offered in this book.

Who attends Permaculture workshops?

Permaculture workshops are mainly intended for rural men and women who make a living from farming small plots of land. This means that many of them may have difficulty reading and writing, or may lack confidence in their ability to learn.

If they have been educated through the formal school system, which is dominated by rote learning, they will be unaccustomed to engaging critical or creative thinking in a classroom setting. At the same time, they are likely to possess a wealth of life skills and cultural knowledge, acquired through informal family and community networks.

This often includes highly detailed knowledge of the flora and fauna, processes and cycles of the local ecosystem, as a result of direct and continuous interaction with nature.

Ideally, the participants selected for Permaculture workshops will come from all sectors of the community in which the course is held. The best participants are those who are ready, eager, and able to work towards positive change in their communities.

Local community and religious leaders and heads of women's, farmers', and youth groups can have a powerful influence on the rest of the community and should be included as participants whenever possible.

Participants from other areas and even other countries may improve the flavor of the course by bringing fresh perspectives from outside the community, although in some cases, the presence of foreigners may inhibit community members from fully participating in classroom discussions.

About women's participation

At least half the participants should be female.

A top priority of Permaculture workshops is to prompt the creation of lasting improvements in people's daily lives. This process works best when all parts of a community are represented in equal and balanced cooperation.

If women are excluded, the community is less likely to benefit from innovations in the crucial areas where women work, such as health, nutrition, and household enterprises.

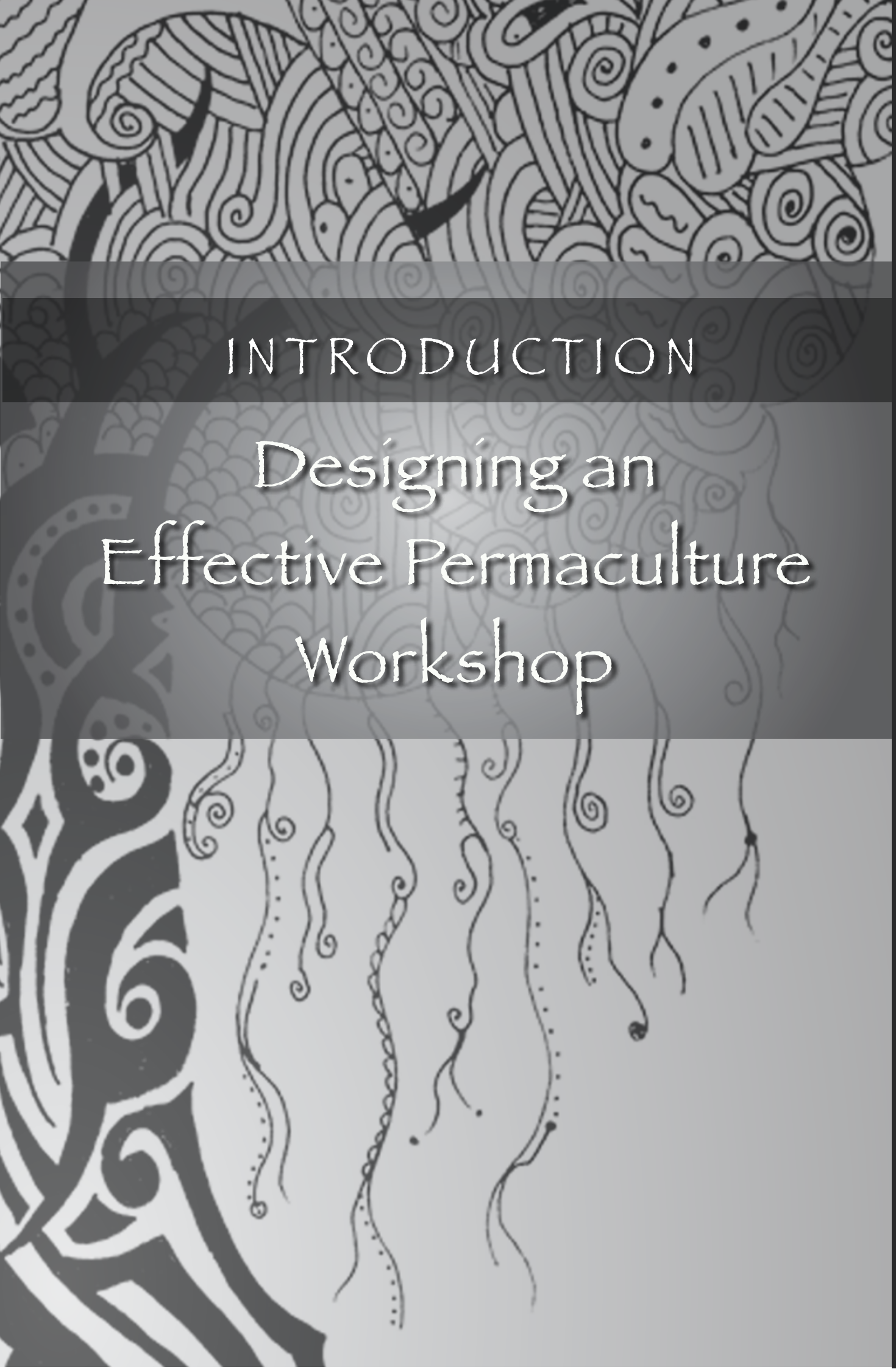
Unfortunately, women are typically overlooked in training projects, due to:

Less mobility and time constraints: Given their primary role in childcare and household management, women are unlikely to be able to travel to attend training outside their immediate areas. Women tend to have less free time than men because of their dual roles working at home and in the fields. Cooking, for example, is a major daily commitment that many women recognize as their sole responsibility. They may feel that the course would only add to their already heavy workloads.

Lower levels of education: On average, women tend to have fewer years of schooling and lower levels of literacy than men. As a result, rural people commonly believe that technical information is too complicated for women to understand, new skills too difficult for them to learn; thus, they are much less likely to be selected for training than men.

Give special attention to women's needs and make the arrangements necessary to enable their participation. An alternative solution is to run "women-only trainings" – especially tailored to women's schedules and focused on ways to lighten their workloads. Such trainings can significantly boost women's confidence.

See Section 2 for ideas about how to encourage the participation of women at every step in the process of designing and implementing Permaculture workshops.



INTRODUCTION

Designing an Effective Permaculture Workshop

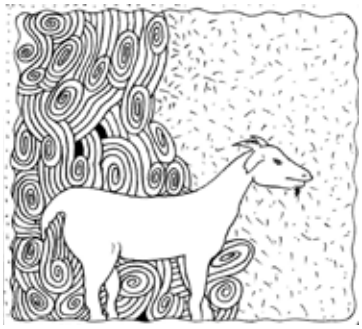
Notes...

The key steps to designing an effective Permaculture workshop:

1. **Field research and community consultation before the course.**
2. **Prioritize the course modules based on research results.**
3. **Choose the most applicable theme and exercises for the course.**
4. **Planning field practice that best illustrates the subject matter.**
5. **Creating a detailed lesson plan.**
6. **Developing and socializing the course outline.**
7. **Preparing the resources needed to run the course.**
8. **Facilitating the course.**
9. **Providing post-course follow-up.**

Step 1. Field research and community consultation before the course

An effective Permaculture workshop will be one that suits the needs of your course participants and brings practical, tangible results. Because of this, it is very important to meet the participants and find out what they need before you design the course, so as to make it as interesting and as applicable as possible for them.



Involve the participants in the planning process.

You can gather information through initial and follow-up meetings with local contact people and community leaders and through observation on field visits to the village where the course will be held. You can also organize small group discussions with prospective participants.

Making contact

The choice of participants and the area they come from may already have been decided, depending on your organization and its projects. If you are not from the village or area where the course will be held, a contact person or group of contact people can help set up meetings and liaise between you and the community. This will help to achieve a more successful implementation of the course.

If you use local liaisons, allocate at least 1 day to introduce the concept of the Permaculture workshop to them beforehand.

Initial introductory meeting with local community leaders

The starting point of any Permaculture workshop is to meet with local community leaders, such as the village head, leaders of religious groups, and men and women from influential local families. Encourage the attendance of as many high-status women as possible at this first meeting.

Once you gain the support of these community leaders, the Permaculture workshop will have a much better chance of success.

Open introductory meetings by introducing yourself and explaining your motivation for delivering the Permaculture workshop in the area. If you are a member of an NGO or other organization, give a brief background about your organization's vision, mission, and activities to date.

Explain that Permaculture is a multi-level approach to sustainable agriculture and community development that will support local family ethics, cultural practices, and community ways of life, and in no way undermine them.

Talk about Permaculture's focus on:

- Long-term sustainability and self-sufficiency.
- Farming methods that improve yields.
- Education that improves family health and quality of life.
- Cooperative and group solutions.
- Designs for improving housing and public spaces.

Take this opportunity to also explain the positive benefits of educating women in Permaculture, for example:

- Increasing women's knowledge about soil, planting, harvesting, and nutrition will mean better and more plentiful food for local families. Better food will mean stronger husbands and wives, smarter children, and healthier elderly.
- Teaching women about waste management and water conservation will help to preserve local resources, save costs, and reduce labor in the community.

If village leaders are going to give practical and moral support so that men and women have an equal opportunity to attend the training, they will need to see that Permaculture techniques work better than methods already in use. Take them to see demonstration gardens or projects if they are available in the area. Invite them to ask questions and to let you know their main agricultural and livelihood development concerns and objectives for their community.

Ask them to give you a tour of the village and make your own observations of the conditions of the land, houses, and public spaces to supplement the information they share with you.

Follow-up planning meeting with community leaders

If community leaders are interested in hosting a Permaculture workshop, you should hold a second meeting to begin specifying plans for the course.

This second meeting should cover all the organizational points for which you will need the community leaders' help and/or approval:

- What? The agreed upon course content, focus topics, and expected outcomes.
- When? Set dates. Consider seasonal and ceremonial calendars as well as public holidays, and propose the best scheduling options.
- Where? Decide where classroom activities will take place and choose an appropriate site in the village for demonstration projects and activities.
- Who? Make a list of possible participants.
- How?

Discuss support the community can provide, such as:

- Organizing free childcare for women participants during course hours.
- Cooking/catering support.
- Community contributions of tools and materials.
- Arranging for an interpreter in cases where the facilitator does not speak the local language of the participants.

Discuss support the facilitator and the facilitating organization can provide, such as:

- Food.
- Training.
- Learning materials.
- Tools.
- Post-course follow-up support.

Identifying the specific needs of the participants

Small, focused discussion groups – if appropriate, separate groups for men and women – can be a valuable opportunity for prospective participants to express their hopes and concerns prior to the course. This is also a very important opportunity for the facilitator to assess the learning needs and expectations of the participants.

Set a frame for their input by explaining that the Permaculture workshop is about teaching techniques that will help them to create their own solutions to the problems they are facing, rather than only providing tools or money, or telling them what to do.

Identify the division of labor between men and women and their main concerns in their everyday work. Ascertain the amount of time they spend working on which kinds of tasks each day.

At this time you can also discuss course scheduling and attendance. Ask the participants to share information about their commitments and any problems they may have attending, then fine-tune the proposed schedule accordingly.

The better participants express their needs, the better you can design the course to fulfill those needs.

Step 2. Prioritize the course modules based on research results

Once you have done enough research to give you a clear sense of what the participants need, you can begin to prioritize the contents of the course to make it as interesting and useful as possible for the participants.

Section 3 of this handbook, The Permaculture Workshop Modules, provides detailed summaries of possible materials that can be delivered during courses, divided into several modules.

When delivering Permaculture workshops, you should:

Keep in mind that sustainability is directly related to holistic integration of all aspects of community life. Therefore, each lesson delivered should address how the component presented works in the community system.

Also, ideally, the course should cover as many modules as possible, even if they are only touched upon briefly.

The main content of Permaculture workshops should focus on topics that address the participants' needs, demonstrate the course theme, and make use of the land and/or tools available for hands-on field practice (see steps 3 and 4 for more details on choosing themes and preparing field practice sites).

The opening and final components of the modules and the first module are compulsory; you can organize the other modules in whatever order and with whatever priority you feel will best suit the participants' needs.

The key modules of a Permaculture workshop are:

Opening Address and Introductions (compulsory)

Module 1 : What is Permaculture? (compulsory)

Module 2 : Patterns in Nature and Methods for Design

Module 3 : Houses, Water, and Waste Management

Module 4 : Healthy Soil

Module 5 : Seed Saving and Nurseries

Module 6 : Home and Community Gardens

Module 7 : Farming

Module 8 : Forests, Tree Crops, and Bamboo

Module 9 : Integrated Pest Management (IPM)

Module 10 : Animal Systems

Module 11 : Aquaculture

Module 12 : Appropriate Technology

Module 13 : Cooperatives and Enterprise Development

Final Design Project and Wrap Up (compulsory)

Step 3. Choose the most applicable theme and exercises for the course

Each Permaculture workshop will have its own theme.

- If a majority of the participants and community leaders express specific needs, the course content can focus on those needs.
- The environments of the participating communities may range from semi-urban to wetland or dry-land rural settings.
- The participants themselves may range from illiterate people living in isolated rural areas to college graduates from more sophisticated areas.
- Some participants may have extensive knowledge of traditional farming and resource conservation systems and others none at all.

All of these factors should be carefully considered when choosing a Permaculture workshop theme.

For example...

- If the community is located in a dry area, the theme may be dry-land farming.
- If the course is held in the mountains, the theme may be steep-slope agroforestry.
- If the course is held in a semi-urban or very densely populated village where food security is a big issue, then the course can give strongest attention to the home garden zone.
- If the participants are mainly commercial rice farmers, then the small farm zone will be the main focus, and LEISA, IPM, and enterprise development strategies would be explored in depth.

Each of the modules includes one or more creative thinking exercises to do in the classroom and hands-on practice exercises to do in the field. These learning activities are to help the participants to further understand and integrate the ideas and skills being taught into their own experience.

Some exercises can be assigned as homework if the available class time is insufficient.

More information and learning activities are provided in this handbook than can be assimilated into any single Permaculture workshop. Choose the activities most relevant to the workshop theme and decide on which specific combinations of activities will be most useful to the participants.

You may also have your own ideas for activities, which you can integrate into your lesson plans as options to replace or complement those suggested in this handbook.

Useful additions to enhance the Permaculture modules may include:

- Local stories and personal anecdotes that illustrate the concepts presented.
- Local versions of the exercises provided.
- Games to help remember and internalize the concepts and principles presented.

Step 4. Planning field practice that best illustrates the subject matter

Meaningful learning takes place in the context of authentic practice. It involves linking the hands, heart, and mind.

Working with your hands is critical: at least 50% of the Permaculture workshop should take the form of hands-on practice in the field. This field practice is as important, if not more important, than the classroom work.

Field practice bridges the gap between theory and practice.

This handbook contains numerous examples of hands-on field practice activities designed to help the participants assimilate the concepts presented in each module. These hands-on activities will give participants a chance to directly apply the concepts being taught, and in doing so gain practical skills they can continue to use later on.

Before the start of a Permaculture workshop you should plan a series of small but effective field activities that will be integrated into a larger project, for example, the design and construction of a demonstration garden or a wastewater treatment system, which the class should complete over the course of the training. You will need to gauge weather conditions and carefully consider the duration and feasibility of each field activity to avoid getting stuck with activities that cannot be completed in the time available.

A main demonstration site should be located on a piece of land close to the classroom and include as many integrated components as possible. For example, a home garden demonstration attached to a small farm, which has access to water and can be easily secured from roaming animals and poultry. The purpose of this demonstration is to unify and focus the course around a tangible demonstration of Permaculture in practice, as different components of the modules are applied during its construction.

A home garden demonstration will offer several opportunities to practice design methods, apply Permaculture design principles, and use specific mulching, composting, and pest control techniques.

As the course unfolds, participants can add new layers of learning to this living project day by day. They will see the garden evolving step by step, and come to appreciate the interconnections of the diverse components of the course.

The most successful garden projects tend to be those located in the home of one of the course participants, which the participant and his/her family will maintain and further develop after the course has ended. Such garden projects become living models that continue to inform the community long after the Permaculture workshop has ended.

Keep in mind that if the demonstrations initiated are not properly maintained after the course, they may become rundown and create a negative image. If this happens, the local community will not respect the training and the goal of running the course will be counteracted.

You should factor follow-up into your course plan, and during the Permaculture workshop, nominate people to serve as stewards of the ongoing garden project.

Step 5. Creating a detailed lesson plan

Once you have a rough idea of the course you want to create – including the theme, main field projects, key content, and time frame for the course – make a more detailed plan of the specific sequence of lessons you will teach to assist participants in learning the material.

Creating a carefully thought out, written lesson plan for each day in your Permaculture workshop will let you think logically through the content of each day before it happens and prepare what is needed in advance.

Without a well thought out lesson plan, you run the risk of losing track of your objective, confusing the participants, overloading them with too much theory, running out of time, and ending up with incomplete classroom exercises or field activities.

A lesson plan will also help you to stay on track as you teach by providing answers at-a-glance to the following questions:

- **Topics:** What are the main topics or key points I want to cover today?
- **Verifiable learning objectives:** What do I want the participants to understand or be able to do by the end of this learning activity or lesson? The objective should be stated in a verifiable form – a form that shows what results you would see or hear that would let you know the objective has been achieved – by the

end of the lesson, the participants will be able to describe 3 ways to conserve water in their homes. By the end of the lesson participants will be able to demonstrate the use of Permaculture principles in the design of a kitchen. By the end of the lesson participants will be able to make 2 different kinds of compost.

- **Learning activities:** What kind and what sequence of activities will I use to reach these objectives? E.g. large group presentations; creative thinking or brainstorming exercises in small groups; field practice activities.
- **Procedures:** What are the key points I want to cover in my presentation? What are the key steps to carrying out this classroom exercise or field activity? What instructions will I need to give to introduce and guide the activities?
- **Time:** How long will each activity last? How much time do I have available for this activity if I want to fit in the others as well?
- **Learning resources:** What tools, materials, visual aids, or handouts are needed?
- **How will the space be arranged?**
- **Anticipated problems and solutions:** What might go wrong and how will I respond? Is my lesson plan flexible enough? If people are tired or unresponsive, do I have an energizer or other creative exercise to use as a backup? Or if a particular lesson proves to stimulate a productive discussion, can it be expanded to allow this process to come to a productive conclusion?
- **Self-assessment (to fill out after the lesson is finished):** How well overall did I achieve the objectives? Which aspects worked well? Which aspects didn't work as well as expected? What could I do to improve this session in the future?

After the course, this lesson plan will serve as a record of what you taught and a means to evaluate your results so you can continuously improve the quality of your courses.

When designing your lesson plan, remember to:

- Ensure that at least 50% of the course is hands-on practice activities that are appropriate to the situation and can be implemented using available space and resources.
- Keep classroom lectures brief and combine them with varied small group dialogue, visual examples, and design tasks which let people integrate information in a fun, relaxed manner.
- Allow extra time for interpretation into a second language.
- Allow for flexibility - See Step 8: "Facilitating the course" for tips about how to create effective learning environments and adapting your plan to respond to participant feedback during the course.

Example of a Facilitator's Lesson Plan - 12 day Permaculture Course

Permaculture Workshop Lesson Plan

Course Name : *Permaculture Village Development Course*

Course Location : *Banjar, Pengosekan, Ubud*

Course Dates : *December 1 - December 14, 2006*

Course Objective:

Participants learn the basic principles and practices of Permaculture Design & they Create a Demonstration Garden / Nursery

Time	Method & Activity / Lesson	Objective & Notes	Resources	Self-assessment
DAY 1 of 12 - Introduction to Permaculture				
1 hour (9.00)	**Presentation :** Opening address and introductions	Facilitator introduction	Images of projects, clock, facilitator's book & Ref Book	*Good start up extra participants arrived so we will need more work groups*
	Participant introductions	Introduce the person to left or right	Meta board / cards, markers	
	Fill in the contact sheet	Participants info for networking / follow up	Workshop Contact Sheet	
	Overview of planned activities	Participants learn workshop agenda	Enough Course Outlines for all the participants	
	Create working agreements	Everyone agrees on workshop guidelines	Big sheets of paper, white board & markers	
1 hour (10.00)	**Presentation :** Introduction to Sustainability	Participants understand concepts of sustainability & unsustainability	Board, images sustainability & unsustainability	*Not clear enough - Participants still confused*
10 am - BREAK 15 minutes				
15 mins (10.30)	**Create workgroup** : Animal scramble	Workgroups are formed	White board and markers	
30 mins (11.00)	**Creative Thinking :** Forum on problems & solutions	Participants understand sustainable & unsustainable practices	Meta board / cards, markers, Supporting Images	*Well received! Use again*
45 mins (11.45)	**Creative Thinking :** Discussion about "Quality of Life"	Participants re-evaluate what create "A good quality of life"	White board and markers	*Good understanding*
15 mins (12.00)	**Presentation :** What is Permaculture?	Participants gain basic understanding of Permaculture	Images of Permaculture projects	*Need more images to explain*
12 pm - LUNCH BREAK 1 hour				
30 mins (1.30)	**Presentation :** Permaculture Ethics	Participants understand and consider the foundation of Permaculture - ethics	Flip Charts of ethics & principles of Permaculture	*Need more images of daily activities reflecting the ethics & principles of Permaculture*
30 mins (2.00)	**Creative thinking :** List local ethics support sustainability	Participants consider and re-value sustainable practices from their culture	Big sheets of paper, white board & markers	
1 hour (3.00)	**Presentation :** Permaculture design principles	Participants gain understanding about how to practice Permaculture	White board and markers, images FACT SHEETS for ALL	
3 pm - BREAK 15 minutes				
15 mins (3.30)	**Creative Facilitation** : Energizer	Establish fun learning environment, Re-energize the participants		
30 mins (4.00)	**Creative thinking :** Brainstorm Permaculture's principles	Participants exchange ideas & create principles appropriate to the area	Big sheets of paper, white board & markers	*Participants enjoyed the sessions and gave lots of inputs but were not sure how the materials relate to their practices, need more emphasis and images to demonstrate practical applications*
15 mins (4.15)	**Presentation :** Patterns in Nature	Participants gain understanding about why natural patterns are important	Images of patterns in nature	
30 mins (4.45)	**Field activity :** Pattern observation & analysis walk	Participants re value observation, natural pattern & how nature works	Big sheets of paper, white board & markers	
15 mins (5.00)	**Wrap up :** Explain tomorrow's agenda & review today	Participants remember what they have learned & are prepared for tomorrow		
DAY 2 of 12 - Patterns in Nature and Peramculture Zones, Maps				
15 mins (8.15)	**Evaluation :** Q & A about yesterday's activities	Evaluate level of understanding of yesterday's workshop materials	Big sheets of paper, white board & markers, related images	*Good review session many questions!*
30 mins (8.45)	**Presentation** : Planning & methods of design	Participants understand plans & design can save them lots of time, cost & labor		*Participants still not convinced about design being so important need more examples & local demos*
45 mins (9.30)	**Field activity :** Observation walk	Participants understand about observation to identify local resources	Note pads & pens for participants	
30 mins (10.00)	**Creative thinking** : Present results of Observation walk	Participants present the results of the local resources they have found	Big sheets of paper, white board & markers	
10 am - BREAK 15 minutes				
15 mins (10.15)	**Presentation :** Various way to create maps	Participants gain basic understanding on how to read & create maps	Images of various types of maps	*Good session use again*
1 hour (11.15)	**Field activity :** Making & using A frame to measure contours	Participants understand how to make and use an A frame	Sticks, strings, rock, measuring tape	*Participants very enthusiastic*
45 mins (12.00)	**Field activity :** Methods for measuring & right angles	Participants gain understanding of simple techniques for measuring	Farming tools, strings, tape measuring, pegs	
12 pm - LUNCH BREAK 1 hour				
30 mins (1.30)	**Field activity :** Creating scaled map with elements	Participants learn how to make maps	Big sheets of paper, white board, mm pad, pencil, eraser & markers	*Many still don't understand*
15 mins (1.45)	**Presentation** : Introduction to Permaculture zones	Participants understand zones & how to divide up their own projects into stages		*Well received*
15 mins (2.00)	**Creative Facilitation :** Form Groups	Participants are divided into work groups		
1 hour (3.00)	**Creative thinking :** Groups build simple zone model	Exchange ideas of sustainable practices, value other people's ideas	Model making tools & materials	*Very successful!*
3 pm - BREAK 15 minutes				
40 mins (3.40)	**Creative thinking :** Groups present their zone models	Participants explain designs & practice presentation skills (max 10 mins each!)	Big sheets of paper, white board & markers, related images	*Great start on presentations*
20 mins (4.00)	**Presentation** : Introduction to the Permaculture village zone	Participants gain more understanding of best practices in the village zone		*Well received*
30 mins (4.30)	**Creative thinking :** Uses of community land	Participants come up with appropriate solutions for their village / community		*Many good ideas emerged, follow up with Pak Mayor*
15 mins (5.00)	**Wrap up :** Explain tomorrow's agenda & review today	Participants remember what they have learned & are prepared for tomorrow		*Ibu Unruly can't come tomorrow save handouts*

DAY 3 of 12 - Waste Management, Water and Housing

15 mins (8.15)	**Evaluation :** Q & A about yesterday's activities	Evaluate level of understanding of yesterday's workshop materials	Big sheets of paper, white board & markers	*Good feedback from women's group about chicken coops*
15 mins (8.30)	**Presentation :** Pollution in water, soil & creatures	Participants gain a better understanding about problems faced due to pollution	Meta board / cards, markers FACT SHEETS for ALL	*Participants concerned about lack of infrastructure and cost for waste pick up*
30 mins (9.30)	**Creative thinking :** Groups create a list of pollutants	Participants understand pollution is a problem & are encouraged to solve it	Big sheets of paper, white board & markers	
10 am - BREAK 15 minutes				
15 mins (10.15)	**Presentation** : Dealing with wastes	Participants gain basic understanding of waste management	Big sheets of paper, white board & markers, images of water systems, impacts of long term bad waste management FACT SHEETS for ALL	*Not enough time Participants still confused*
30 mins (10.45)	**Creative thinking :** Community garbage math	Participants gain understanding on how much waste they create		*These sessions helped to consolidate the learning, increase time on opening presentation next time*
75 mins (12.00)	**Creative thinking :** Community waste recycling & disposal	Participants develop ideas for practical waste management in their area		
15 mins (13.00)	**Presentation :** Houses & their environment	Participants gain understanding about integrated house design	Images of good house designs	*Good images! Say thanks to Gede :)*
12 pm - LUNCH BREAK 1 hour				
10 mins (1.10)	**Creative Facilitation** : Energizer	Re-energize and refocus the participants after lunch		*Very well received*
15 mins (1.25)	**Presentation :** Sustainable & non sustainable materials	Participants understand about the benefits of using sustainable materials	Big sheets of paper, white board & markers, related images	*Introduction was too long the participants got bored*
20 mins (1.45)	**Creative thinking :** Sustainable house design ideas	Participants exchange ideas of more sustainable housing development		*Many good ideas emerged, follow up with Ibu Wendi*
15 mins (2.00)	**Presentation :** Healthy & practical kitchen	Participants gain understanding of the connection between cleanliness & health		*Good session many questions*
15 mins (2.15)	**Presentation :** Water strategies	Participants understand that water is precious and they need to preserve it		
45 mins (3.00)	**Creative thinking :** Managing & storing drinking water	Participants exchange ideas on practical ways to manage & store drinking water	Big sheets of paper, white board & markers	
3 pm - BREAK 15 minutes				
1 3/4 hour (4.45)	**Field activity :** Create a safe water storage system	Participants understand how to store water & the importance of clean water	Farming tools, water tank, pipes & glue	*Great activity good results*
15 mins (5.00)	**Wrap up :** Explain tomorrow's agenda & review today	Participants remember what they have learned & are prepared for tomorrow	Big sheets of paper, white board & markers	

DAY 4 of 12 - Water, Soil & Housing Design

15 mins (8.15)	**Evaluation :** Q & A about yesterday's activities	Evaluate level of understanding of yesterday's workshop materials	Big sheets of paper, white board & markers	*Participants are getting tired not so many questions today*
1 hour (09.15)	**Field activity :** Cleaning water	Participants gain understanding on how to clean water using locals resources	Farming tools, nets, buckets & gloves	*Need more neem leaves next time*
45 mins (10.00)	**Presentation :** Waste water treatment system	Participants understand how waste water pollutes & endangers people's health	Big paper, white board & markers FACT SHEETS for ALL	*Good response, requested special training and demo*
10 am - BREAK 15 minutes				
2 hours (12.00)	**Field activity** : Create filter for waste water	Participants gain understanding in how to treat water using locals resources	Farming tools, net, buckets, gloves, natural tree fiver	*Need to make sure someone in charge of system afterwards*
12 pm - LUNCH BREAK 1 hour				
10 mins (1.10)	**Creative Facilitation** : Energizer	Re-energize and refocus the participants after lunch		*Didn't work so well need to practice this technique*
15 mins (1.25)	**Presentation** : Types of composting toilets	Participants gain understanding of various designs for composting toilets	Big sheets of paper, white board & markers, related images	*Participants worried about hygiene*
20 mins (1.45)	**Creative thinking** : Plan to eliminate stagnant water	Participants exchange ideas about local plants to help clean & oxygenize water		*Great ideas! Keep notes for future reference*
1.25 hour (3.00)	**Field activity** : Design a Permaculture house	Participants design an integrated house design in a creative way	Tools, buckets, gloves, tape measure, wooden pegs	*Good results, yes!*
3 pm - BREAK 15 minutes				
15 mins (3.15)	**Presentation** : Soil improvement	Participants understand about healthy soil and how to improve soil	Big sheets of paper, white board & markers	*Not enough time Participants still confused*
45 mins (3.45)	**Field activity** : Simple method for soil testing	Participants learn how to test soil	Farming tools, buckets, gloves, glass	*Always a winner*
30 mins (4.45)	**Creative thinking** : Identifying nutrient deficiencies in soil	Participants learn about soil quality and nutrient deficiencies and the solutions	Big sheets of paper, white board & markers	*Good comprehension*
15 mins (5.00)	**Wrap up :** Explain tomorrow's agenda & review today	Participants remember what they have learned & are prepared for tomorrow		

DAY 5 of 12 - Soil Improvement & Garden Preparation

15 mins (8.15)	**Evaluation :** Q & A about yesterday's activities	Evaluate level of understanding of yesterday's workshop materials	Big sheets of paper, white board & markers, related images	*Lots of questions from yesterday, great*
15 mins (9.00)	**Presentation :** Mulching for soil improvement	Participants gain understanding about how important it is to mulch soil		*Need to remind everyone to bring hats next time*
45 mins (09.45)	**Field activity** : Mulching gardens bed	Participants learn how to mulch soil using local materials	Farming tools, mulch materials, gloves	
15 mins (10.00)	**Presentation** : Legumes & how to use them	Participants gain basic understanding in nitrogen fixing trees & how to use them	Big paper, white board & markers HANDOUTS for ALL	*Well received! Use again*
10 am - BREAK 15 minutes				
30 mins (10.30)	**Creative thinking** : List legume type & their uses	Participants identify and learn about local varieties legumes	Big sheets of paper, white board & markers	*Lot of responses*
15 mins (10.45)	**Creative Facilitation** : Form groups	Participants are divided into work groups		
1 hour (11.45)	**Field activity :** Various methods for using legumes	Participants learn about and practice various methods for using legumes	Farming tools, buckets, gloves, legumes cuttings	*Watch the small guys that don't get involved*
15 mins (12.00)	**Presentation :** About natural fertilizers	Participants understand about principles & benefits of natural fertilizers	Big sheets of paper, white board & markers, samples	*Well received! Use again*
12 pm - LUNCH BREAK 1 hour				
15 mins (1.15)	**Creative Facilitation** : Energizer	Re-energize and refocus the participants after lunch		
30 mins (1.45)	**Presentation :** Various natural fertilizers techniques	Participants gain basic understanding in how to make natural fertilizers	Big sheets of paper, white board & markers HANDOUTS for ALL, related images	*Not enough time Participants still confused*
30 mins (2.15)	**Creative thinking :** List natural fertilizers types & their uses	Participants identify local varieties of natural fertilizers & their uses		
45 mins (3.00)	**Field activity :** Make a quick compost heap	Participants learn how to make & maintain a compost heap	Tools, buckets, gloves, manures, carbon materials	*Great results*

3 pm - BREAK 15 minutes				
45 mins (3.45)	**Field activity :** Make liquid fertilizer	Participants learn how to make & maintain liquid compost	Buckets, gloves, manure, carbon, tank, compost, sugar	*Good results, yes!*
15 mins (4.00)	**Presentation :** About worms for healthy soil	Participants understand the connection between worms & healthy soil	Big paper, white board & markers FACT SHEETS for ALL	*Participant had bad experience previously give worm stock*
45 mins (4.45)	**Field activity :** Use liquid fertilizer	Participants learn how to use liquid fertilizer	Liquid Fertilizer, buckets, gloves, sprayers	*Always a winner*
15 mins (5.00)	**Wrap up :** Explain tomorrow's agenda & review today	Participants remember what they have learned & are prepared for tomorrow	Big sheets of paper, white board & markers	

DAY 6 of 12 - Worms & Seed Saving

15 mins (8.15)	**Evaluation :** Q & A about yesterday's activities	To evaluate level of understanding of yesterday workshop	Big sheets of paper, white board & markers	
1.15 hour (9.30)	**Field activity** : Make a worm farm	Participants learn how to make a worm farm	Tools, buckets, gloves, manure, compost, worms	*Note enough scraps to feed need to make sure later*
30 mins (10.00)	**Creative thinking** : List worm's foods	Participants identify & learn about local resources that can be used for worm food	Big sheets of paper, white board & markers	*Very good result*
10 am - BREAK 15 minutes				
15 mins (10.15)	**Presentation :** How seeds are reproduced	Participants understand plants, flowers, seeds & pollinating insects	Images of various natural plant propagation systems	*Session too short need more time*
15 mins (10.30)	**Presentation** : About GMOs	Participants gain basic understanding in unsustainable farming practices	Big paper, white board & markers FACT SHEETS for ALL	*Good images! Say thanks to Toby for Sulawesi pics*
30 mins (11.00)	**Creative thinking :** What are GMO?	Participants learn about GMOs and how they are made & potential problems	GMO game cards	
30 mins (12.00)	**Presentation** : Seed saving	Participants have more knowledge about how and why to save seeds	Big paper, white board & markers, related images	*Good response*
12 pm - LUNCH BREAK 1 hour				
10 mins (1.10)	**Creative Facilitation** : Energizer	Re-energize and refocus the participants after lunch		
20 mins (1.30)	**Creative thinking :** How to save & store seeds	Participants gain basic understanding in techniques for saving & storing seeds	Big paper, white board & markers FACT SHEETS for ALL	*Good response, requested special training and demo*
15 mins (1.45)	**Presentation** : Seed dryer design	Participants learn how to design / make a seed dryer	Big paper, images of seed drier white board & markers	
30 mins (2.15)	**Creative thinking :** Design a community seed saving group	Participant consider developing a community seed saving group	Big sheets of paper, white board & markers	*Sessions too short need more time*
45 mins (3.00)	**Field activity :** Make a seed dryer	Participants learn and practice constructing & using a seed dryer	Farming tools, transparent plastic, bamboos, nails	
3 pm - BREAK 15 minutes				
45 mins (4.00)	**Field activity** : Seed collection & storage	Participants learn and practice collecting, saving & storing seeds	Farming tools, buckets, gloves, cutter	*Good results, yes!*
45 mins (4.45)	**Field activity :** Test & document seed viability	Participants gain basic understanding in how to test & document seed viability	SEED CHECK LISTS for ALL, pens	
15 mins (5.00)	**Wrap up :** Explain tomorrow's agenda & review today	Participants remember what they have learned & are prepared for tomorrow	Big sheets of paper, white board & markers	

DAY 7 of 12 - Nurseries & Farming

15 mins (8.15)	**Evaluation :** Q & A about yesterday's activities	Evaluate level of understanding of yesterday's workshop materials	Big sheets of paper, white board & markers	*Participants had some previous training and were able to respond and pick up ideas quickly*
15 mins (8.30)	**Presentation** : Different types of agricultural system	Participants understand unsustainable & sustainable practices like LEISA	Big paper, white board & markers, images of farms	
30 mins (9.00)	**Creative thinking :** Compare agricultural system	Participants better understand unsustainable & sustainable agriculture	Big paper, white board & markers FACT SHEETS for ALL	
15 mins (9.15)	**Presentation :** Well Designed Integrated Nurseries	Participants understand how to construct & use an integrated nursery	Big sheets of paper, white board & markers HANDOUTS for ALL, related images	*Lots of inputs and enthusiasm follow up with Pak Maudin*
45 mins (10.00)	**Creative Thinking :** Ideal Trees for Local Nursery	Participants identify & learn about local varieties of valuable trees for a nursery		
10 am - BREAK 15 minutes				
1 1/4 hours (11.30)	**Field Activity :** 3-D Model of well designed Nursery	Participants make an integrated nursery which will save them labor & time	Tools, buckets, gloves, cardboard, cutter, glue	*Great design work*
30 mins (12.00)	**Field Activity :** Make Good Quality Potting Soil	Participants learn how and practice making good quality potting soil mixes	Farming tools, buckets, gloves	*Always a winner could use more carbon & finer sand*
12 pm - LUNCH BREAK 1 hour				
10 mins (1.10)	**Creative Facilitation** : Energizer	Re-energize and refocus the participants after lunch		
35 mins (1.45)	**Field Activity :** Plant Propagation Techniques	Participants increase knowledge about techniques for plant propagation	Farming tools, buckets, gloves	*Need to remember to ask participants to bring tools*
1 1/4 hours (3.00)	**Field Activity :** Start a Nursery	Participants practice making an integrated nursery	Farming tools, carpenter tools, buckets, gloves	*Good comprehension*
3 pm - BREAK 15 minutes				
1.5 hours (4.45)	**Field Activity :** Start a Nursery continued	Participants practice making an integrated nursery	Farming tools, carpenter tools, buckets, gloves	
15 mins (5.00)	**Wrap up :** Explain tomorrow's agenda & review today	Participants remember what they have learned & are prepared for tomorrow	Big sheets of paper, white board & markers	

DAY 8 of 12 - Nutrition, Garden Design and Beds

15 mins (8.15)	**Evaluation :** Q & A about yesterday's activities	Evaluate level of understanding of yesterday's workshop materials	Big sheets of paper, white board & markers FACT SHEETS for ALL, related images	
15 mins (8.30)	**Presentation :** Home Gardens	Participants gain basic understanding in why and how to start home gardens		*Excellent response from PPK group members*
15 mins (8.45)	**Presentation :** Good Nutrition	Participants increase their understanding about good nutrition & health		
30 mins (9.15)	**Creative Thinking :** Good Nutrition from a Garden	Participants learn about how nutrition can be enhanced with a home garden		
45 mins (10.00)	**Creative Thinking :** Design a Food Calendar	Participants learn local plants for food and how to create a food calendar	Big paper, white board & markers HANDOUTS for ALL	
10 am - BREAK 15 minutes				

15 mins (10.30)	**Presentation :** Food Storage & Preservation	Participants understand good hygiene & techniques for food preservation	Related images & samples	*Remember to talk about ongoing maintenance of the demo gardens at the end of the workshop*
30 mins (11.00)	**Creative Thinking :** Food Storage & Preservation Ideas	Participants share ideas & learn about various ways to store & preserve food	Big sheets of paper, white board, mm pad, pencil, eraser & markers	
1 hour (12.00)	**Creative Thinking :** Garden Location & Design	Participants understand multi functions, locations & energy efficient designs		
12 pm - LUNCH BREAK 1 hour				
10 mins (1.10)	**Presentation :** Garden Maintenance	Participants understand key principles of good garden maintenance	Big sheets of paper, white board, mm pad, pencil, eraser & markers, related images	*Forgot to copy the fact sheets give them out tomorrow*
10 mins (1.20)	**Creative Facilitation** : Energizer	Re-energize and refocus the participants		
10 mins (1.30)	**Presentation :** Making Use of Space & Time	Participants understand how to maximize the space & time in gardens		*Good garden designs, will need more seedlings soon*
1 1/2 hour (3.00)	**Field Activity :** Creative gardens using Natural Patterns	Participants practice creating pest resistant, efficient garden designs	Farming tools, buckets, gloves	
3 pm - BREAK 15 minutes				
15 mins (3.30)	**Presentation :** Designing & building a garden system	Participants learn designing & building an integrated garden system	Big paper, white board, mm pad, pencil, eraser & markers	*Results quite different from earlier, check why*
30 mins (4.00)	**Field Activity** : Design a garden system	Participants design an integrated garden system	Farming tools, buckets, gloves	*Excellent*
45 mins (4.45)	**Field Activity :** Make raised garden beds	Participants practice techniques for raising beds and the many benefits		
15 mins (5.00)	**Wrap up :** Explain tomorrow's agenda & review today	Participants remember what they have learned & are prepared for tomorrow	Big sheets of paper, white board & markers	

DAY 9 of 12 - Sustainable Farming

15 mins (8.15)	**Evaluation :** Q & A about yesterday's activities	Evaluate level of understanding of yesterday's workshop materials	Big sheets of paper, white board & markers FACT SHEETS for ALL, related images	
15 mins (8.30)	**Presentation :** About sustainable farming (LEISA)	Participants gain basic understanding in sustainable farming (LEISA)		*Farmers concerned about water, give special handouts about water saving techniques tomorrow*
30 mins (9.00)	**Creative Thinking :** Farming chemicals pollution & cost	Participants have increased awareness of impacts of unsustainable farming		
15 mins (9.15)	**Presentation :** Windbreaks for farming	Participants gain basic understanding in the many benefits of using windbreaks	Big sheets of paper, white board & markers HANDOUTS for ALL, related images	
45 mins (10.00)	**Creative Thinking** : List of productive windbreak plant	Participants identify local trees for windbreaks / fruit & fodder etc.		
10 am - BREAK 15 minutes				
15 mins (10.30	**Presentation :** Natural fertilizer for farming	Participants understand appropriate natural fertilizers & their benefits	Big sheets of paper, white board & markers, related images	*Too theoretical, Pak Gedur asked if we could stay an extra couple of days and go over his farm, suggest anyone interested can join extra sessions*
15 mins (10.45)	**Presentation :** Mulch for farming	Participants understand mulch & why its so important to use them		
45 mins (11.30)	**Field activity :** Farm observation & analysis walk	Participants learn first hand about good & bad farming practices	Note pads & pens for participants	
30 mins (12.00)	**Field activity :** Identify windbreak location	Participants practice identifying the best locations for windbreaks	Note pads & pens for participants	
12 pm - LUNCH BREAK 1 hour				
10 mins (1.10)	**Creative Facilitation** : Energizer	Re-energize and refocus the participants after lunch		*Use this opportunity to do some work over at Pak Gedur's*
20 mins (1.30)	**Creative Thinking** : Integrating farm systems & crop rotation	Participants share ideas about integrating systems and rotating crops	Big sheets of paper, white board & markers	
1 1/2 hour (3.00)	**Field activity :** Create terraces & swales using an A frame	Participants practice using an A frame, and create terraces & swales	Farming tools, buckets, gloves	
3 pm - BREAK 15 minutes				
10 mins (3.20)	**Presentation :** Weed control	Participants gain basic understanding in various natural methods for weed control	Big paper, white board & markers, related images	*Use this opportunity to do some more work over at Pak Gedur's*
25 mins (3.45)	**Field activity :** Weed control	Participants practice and adopt the natural weed control methods	Farming tools, buckets, gloves	
1 hour (4.45)	**Creative Thinking :** Make a 3-D model of small farm	Participants integrate their learning and share ideas through model making	Tools, buckets, gloves, cardboard, cutter, glue	*Good design results thanks to Pak Gedur's demos!*
15 mins (5.00)	**Wrap up :** Explain tomorrow's agenda & review today	Participants remember what they have learned & are prepared for tomorrow	Big sheets of paper, white board & markers	

DAY 10 of 12 - Community Forests, Bamboo & IPM

15 mins (8.15)	**Evaluation :** Q & A about yesterday's activities	Evaluate level of understanding of yesterday's workshop materials	Big sheets of paper, white board & markers HANDOUTS for ALL, related images	
15 mins (8.30)	**Presentation :** Community forest	Participants understand why forests are so important & their benefits		*Need to get more of the illegal logging images from Francesco people don't seem to understand the gravity of the situation in the area yet*
15 mins (8.45)	**Presentation :** Natural forest - The conservation zone	Participants understand conservation and why it is so important	Big sheets of paper, images of forest, white board & markers, related images	
30 mins (9.30)	**Creative Thinking :** Forest destruction	Participants sense of responsibility and urgency about resource conservation		
30 mins (10.00)	**Creative Thinking :** List of non timber forest products	Participants identify products that can derived from forests without damaging	Big sheets of paper, white board & markers	
10 am - BREAK 15 minutes				
15 mins (10.30)	**Presentation :** Tree planting & maintenance	Participants gain basic understanding in tree planting & maintenance	Images of damaged / healthy trees	*Spent some extra time on reasoning for conservation as this issue needed more reinforcement*
30 mins (11.00)	**Creative Thinking :** List of trees for reforestation	Participants identify species of multi functional trees in their area		
1 hour (12.00)	**Creative Thinking :** Forest management plan	Participants explore ideas for forest management that will work in their area	Big sheets of paper, white board & markers	
12 pm - LUNCH BREAK 1 hour				
10 mins (1.10)	**Creative Facilitation** : Energizer	Re-energize and refocus the participants after lunch		
15 mins (1.25)	**Presentation :** Bamboo propagation & uses	Participants understand bamboo propagation & uses of bamboo	Big sheets of paper, white board & markers HANDOUTS for ALL, related images	*Bamboo very popular in this area remember to refer Pak Faidi for follow up*
15 mins (1.40)	**Presentation :** Bamboo treatment	Participants gain basic understanding in effective bamboo treatment techniques		
20 mins (2.00)	**Creative Thinking :** List of best bamboo & uses	Participants identify new uses for bamboo appropriate in the area		
1 hour (3.00)	**Field activity :** Visit forest & tree crop examples	Participants get a first hand understanding about good forest systems	Note pads & pens, water & food, transportation	

3 pm - BREAK 15 minutes				
20 mins (3.35)	**Presentation :** IPM	Participants understand about benefits of using IPM & basic methods	Big sheets of paper, white board & markers HANDOUTS for ALL, related images	*Participants still skeptical that IPM will work, may need to put up signage at the demo plot as a reminder*
20 mins (3.55)	**Creative Thinking :** List of local natural predators & pesticides	Participants identify local pest predators and natural pesticides		
50 mins (4.45)	**Creative Thinking :** Create local companion planting chart	Participants identify local companion planting species & combinations		
15 mins (17.15)	**Wrap up :** Explain tomorrow's agenda & review today	Participants remember what they have learned & are prepared for tomorrow	Big sheets of paper, white board & markers	

DAY 11 of 12 - Animal & Aquaculture systems & Appropriate Technology

15 mins (8.15)	**Evaluation :** Q & A about yesterday's activities	Evaluate level of understanding of yesterday's workshop materials	Big sheets of paper, white board & markers HANDOUTS for ALL, related images	
15 mins (8.30)	**Presentation :** Animals & animal system	Participants gain basic understanding about animal systems and their benefits		*Well received and good results*
15 mins (8.45)	**Creative Thinking :** Animals needs	Participants share ideas on best practices for addressing animals needs		
15 mins (9.00)	**Presentation :** Integrated animal systems	Participants learn about the benefits of using integrated animal systems		
1 hour (10.00)	**Creative Thinking :** Community Animals management plan	Participants come up with ideas for a community animal management plan	Big paper, white board & markers HANDOUTS for ALL	
10 am - BREAK 15 minutes				
45 mins (11.00)	**Field activity :** Build an animal tractor	Participants understand how to make and use an animal tractor	Tools, buckets, gloves, tape measure, bamboos, net, nails	*Always a winner*
30 mins (11.30)	**Presentation :** Aquaculture	Participants understand about sustainable and efficient aquaculture	Big paper, white board & markers HANDOUTS for ALL	*Very useful to be able to take group to Mas Leno's place*
30 mins (12.00)	**Presentation** : Integrating Aquaculture with other systems	Participants understand about benefits of integrated aquaculture systems	Big sheets of paper, images, white board & markers	
12 pm - LUNCH BREAK 1 hour				
15 mins (1.10)	**Creative Facilitation** : Energizer	Re-energize and refocus the participants after lunch		
1 hour (2.15)	**Creative Thinking :** Design 3-D model Aquaculture system	exchange ideas on aquaculture integrated design	Tools, buckets, gloves, tape measure, board, tape, cutter	*Good results*
45 mins (3.00)	**Field activity :** Pond construction	Participants learn about and practice sustainable aquaculture construction	Farming tools, buckets, gloves, tape measurement	
3 pm - BREAK 15 minutes				
15 mins (3.30)	**Presentation :** Appropriate technology	Participants gain basic understanding in appropriate technologies	Big sheets of paper, white board & markers HANDOUTS for ALL, related images	
15 mins (3.45)	**Creative Thinking** : Local appropriate technology	Participant exchange ideas about locally applicable appropriate technologies		*Participants wanted to also make a solar cooker but no time, ask Lena if she will do training pro bono next month*
15 mins (4.00)	**Presentation :** Appropriate technology oven & stove	Participants understand how & why to use app tech oven & stoves		
15 mins (4.15)	**Presentation** : Food Storage & Preservation	Participants understand how & why to use app tech food preservation		
30 mins (4.45)	**Field activity :** Create a solar drier	Participants work together to make an appropriate tech solar dryer		
15 mins (5.00)	**Wrap up :** Explain tomorrow's agenda & review today	Participants remember what they have learned & are prepared for tomorrow	Big sheets of paper, white board & markers	

DAY 12 of 12 - Cooperatives & End of Course Design Project

15 mins (8.15)	**Evaluation :** Q & A about yesterday's activities	Evaluate level of understanding of yesterday's workshop materials	Big sheets of paper, white board & markers, related images	*Great! Looks like they will start the seed coop, hook them up with Ibu Komangs group in buleleng*
15 mins (8.30)	**Presentation :** cooperatives / small enterprises	Participants gain basic understanding in cooperative / small enterprises		
30 mins (9.00)	**Creative Thinking :** products for coops / small enterprises	Participants gain basic understanding in cooperative / small enterprises		
1 hour (10.00)	**Creative Thinking :** coops/small enterprise for seed saving	Participants design a coop for seed exchange for community needs	Big sheets of paper, white board & markers	
10 am - BREAK 15 minutes				
2 hours (11.30)	**Creative Thinking :** End course design project (all Zones)	Participants review information from the workshop and create integrated designs	3-D model making tools and materials	*Bring more mini figurines next time*
12 pm - LUNCH BREAK 1 hour				
1 1/2 hour (2.30)	**Presentation Exercise :** Each group present their design	Participants present integrated design models (max 15 mins each!)	Big sheets of paper, white board & markers	*Great design, it worked!*
30 mins (3.00)	**Creative Thinking :** Future actions & network building	Participants exchange ideas and discuss plans for course follow up & networking	Big paper, white board & markers, images of farms	*Hook this group up with Lno's group for solar cooker stuff*
3 pm - BREAK 15 minutes				
30 mins (3.45)	Forum on problems & solutions review	Assess participants' understanding change since the course	Big sheets of paper, white board & markers	*50% increase in understanding*
30 mins (4.15)	**Course Evaluation**	Participants give their written inputs for better future workshops	Participant Feedback Form for ALL	*Missing 3 forms???*
45 mins (5.00)	**Presentation :** Wrap up & congratulation	Sense of pride and accomplishment	Certificates, Prizes for silliest idea and best outfits :)	

Party & celebration :)

Permaculture Workshop Lesson Plan

Course Name : *Intro to Permaculture & Waste Management*

Course Location : *Desa Waliberna, Singakertu*

Course Dates : *January 1 - January 2, 2006*

Course Objective:

Participants learn & adopt the ethics of Permaculture & learn good practices for Household / Community Waste Management

DAY 1 of 12 - Introduction to Permaculture

Time	Method & Activity / Lesson	Objective & Notes	Resources	Self-assessment
30 mins (8.30)	**Presentation :** Opening address and introductions	Facilitator introduction	Images of projects, clock, facilitator's book & Ref Book	*Good*
	Participant introductions	Introduce the person to left or right	Meta board / cards, markers	
	Fill in the contact sheet	Participants info for networking / follow up	Workshop Contact Sheet	
	Overview of planned activities	Participants learn workshop agenda	Enough Course Outlines for all the participants	
	Create working agreements	Everyone agrees on workshop guidelines	Big sheets of paper, white board & markers	
30 mins (9.00)	**Presentation :** Introduction to Sustainability	Participants understand concepts of sustainability & unsustainability	Board, images sustainability & unsustainability	*Good response*
10 mins (9.10)	**Create workgroups** using creative facilitation technique	Workgroups are formed	White board and markers	
30 mins (9.40)	**Creative Thinking :** Forum on problems & solutions	Participants understand sustainable & unsustainable practices	Meta board / cards, markers, Supporting Images	*Well received! Use again*
20 mins (10.00)	**Creative Thinking :** Discussion about "Quality of Life"	Participants re-evaluate what create "A good quality of life"	White board and markers	*Good understanding*
10 am - BREAK 15 minutes				
15 mins (10.30)	**Presentation :** What is Permaculture?	Participants gain basic understanding of Permaculture	Images of Permaculture projects	*Need more images to explain*
30 mins (11.00)	**Presentation :** Permaculture Ethics	Participants understand and consider the foundation of Permaculture - ethics	Flip Charts of ethics & principles of Permaculture	*Need more images of daily activities reflecting the ethics & principles of Permaculture*
30 mins (11.30)	**Creative thinking :** List local ethics support sustainability	Participants consider and re-value sustainable practices from their culture	Big sheets of paper, white board & markers	
30 mins (12.00)	**Presentation :** Pollution in water, soil & creatures	Participants gain a better understanding about problems faced due to pollution	Meta board / cards, markers FACT SHEETS for ALL	*Participants feel sense of urgency, many questions*
12 pm - LUNCH BREAK 1 hour				
30 mins (1.30)	**Creative thinking :** Groups create a list of pollutants	Participants understand pollution is a problem & are encouraged to solve it	Big sheets of paper, white board & markers	*Not enough time Participants still confused*
15 mins (1.45)	**Presentation** : Dealing with wastes	Participants gain basic understanding of waste management	Big sheets of paper, white board & markers, images of water systems, impacts of long term bad waste management FACT SHEETS for ALL	
30 mins (2.15)	**Creative thinking :** Community garbage math	Participants gain understanding on how much waste they create		*These sessions helped to consolidate the learning, increase time on opening presentation next time*
45 mins (3.00)	**Creative thinking** : Waste recycling & disposal	Participants develop ideas for practical waste management in their homes / area		
3 pm - BREAK 15 minutes				
1 hour (4.15)	**Field Activity** : Construct a Banana Pit	Participants learn about using banana pits for waste recycling		
30 mins (4.45)	Forum on problems & solutions review	Assess participants' understanding change since the course	Big sheets of paper, white board & markers	*90% increase in understanding! Great*
30 mins (5.15)	**Course Evaluation**	Participants give their written inputs for better future workshops	Participant Feedback Form for ALL	
30 mins (5.45)	**Presentation :** Wrap up & congratulation	Sense of pride and accomplishment	Prizes for silliest idea and best outfits :)	

Example of a Facilitator's Lesson Plan - 2 day Seed Saving Course

Permaculture Workshop Lesson Plan

Course Name : *Intro to Permaculture & Seed Saving*

Course Location : *Desa Karunagam, Batubaru*

Course Dates : *July 11 - July 12, 2004*

Course Objective:

Participants learn & adopt the ethics of Permaculture & learn good practices for Household / Community Seed saving

DAY 1 of 2 - Introduction to Permaculture & Seed Saving

Time	Method & Activity / Lesson	Objective & Notes	Resources	Self-assessment
30 mins (8.30)	**Presentation :** Opening address and introductions	Facilitator introduction	Images of projects, clock, facilitator's book & Ref Book	*Good*
	Participant introductions	Introduce the person to left or right	Meta board / cards, markers	
	Fill in the contact sheet	Participants info for networking / follow up	Workshop Contact Sheet	
	Overview of planned activities	Participants learn workshop agenda	Enough Course Outlines for all the participants	
	Create working agreements	Everyone agrees on workshop guidelines	Big sheets of paper, white board & markers	
30 mins (9.00)	**Presentation :** Introduction to Sustainability	Participants understand concepts of sustainability & unsustainability	Board, images sustainability & unsustainability	*Good response*
10 mins (9.10)	**Create workgroups** using creative facilitation technique	Workgroups are formed	White board and markers	
30 mins (9.40)	**Creative Thinking :** Forum on problems & solutions with seeds	Participants understand sustainable & unsustainable practices	Meta board / cards, markers, Supporting Images	*Well received! Use again*
20 mins (10.00)	**Creative Thinking :** Discussion about "Quality of Life"	Participants re-evaluate what create "A good quality of life"	White board and markers	*Good understanding*
10 am - BREAK 15 minutes				
15 mins (10.30)	**Presentation :** What is Permaculture?	Participants gain basic understanding of Permaculture	Images of Permaculture projects	*Need more images to explain*
30 mins (11.00)	**Presentation :** Permaculture Ethics	Participants understand and consider the foundation of Permaculture - ethics	Flip Charts of ethics & principles of Permaculture	*Need more images of daily activities reflecting the ethics & principles of Permaculture*
30 mins (11.30)	**Creative thinking :** List local ethics support sustainability	Participants consider and re-value sustainable practices from their culture	Big sheets of paper, white board & markers	
30 mins (12.00)	**Presentation :** Pollution in water, soil & creatures	Participants gain a better understanding about problems faced due to pollution	Meta board / cards, markers FACT SHEETS for ALL	*Participants feel sense of urgency, many questions*
12 pm - LUNCH BREAK 1 hour				
30 mins (1.30)	**Presentation** : How Seeds are Reproduced	Participants understand plants, flowers, seeds & pollinating insects	Big sheets of paper, white board & markers HANDOUTS for ALL, related images	*Very animated discussion about these topics, participants want to know how to identify GMOs*
15 mins (1.45)	**Presentation** : Genetically Modified Organisms (GMO)	Participants gain basic understanding in unsustainable farming practices		
15 mins (1.30)	**Creative Thinking** : What are GMOs?	Participants learn about GMOs and how they are made & potential problems	GMO game cards	
30 mins (2.00)	**Presentation** : About Seed Saving	Participants have more knowledge about how and why to save seeds	Big paper, white board & markers, related images	*Good response*
1 hour (3.00)	**Field Activity** : Seed Collection & Storage	Participants learn and practice collecting, saving & storing seeds	Farming tools, buckets, gloves, cutter	*Good results, yes!*
3 pm - BREAK 15 minutes				
30 mins (3.45)	**Creative Thinking** : How to Save & Store Seed	Participants gain basic understanding in techniques for saving & storing seeds	Big paper, white board & markers FACT SHEETS for ALL	*Participants understood how to use the check list but need to follow up in a few months after harvest time*
45 mins (4.15)	**Field Activity** : Test & Document Seed Viability	Participants gain basic understanding in how to test & document seed viability	SEED CHECK LISTS for ALL, pens	
30 mins (4.45)	**Creative Thinking** : Design a Seed Saving Group	Participant consider developing a community seed saving group	Big sheets of paper, white board & markers	
15 mins (5.00)	**Wrap up :** Explain tomorrow's agenda & review today	Participants remember what they have learned & are prepared for tomorrow	Big sheets of paper, white board & markers	

DAY 2 of 2 - Seed Saving Practical & Nurseries

15 mins (8.15)	**Evaluation :** Q & A about yesterday's activities	Evaluate level of understanding of yesterday's workshop materials	Big sheets of paper, white board & markers	*Participants had good comprehension*
15 mins (8.30)	**Presentation** : Well Designed Integrated Nurseries	Participants understand how to construct & use an integrated nursery	Big sheets of paper, white board & markers	*Lots of inputs and enthusiasm follow up with Ibu Sunari*
30 mins (9.00)	**Creative Thinking** : Ideal Plants for a Local Nursery	Participants identify & learn about local varieties of valuable plants for a nursery		
1 hour (10.00)	**Field Activity** : 3-D Model of Well Designed Nursery	Participants put into practice new knowledge in a creative way	3-D model making materials	*Good results, yes!*
10 am - BREAK 15 minutes				
15 mins (10.30)	**Creative Facilitation** : Create work groups	Work Groups are formed	Creative facilitation section from resource book	*Good use again*
1.1 hour (11.40)	**Field Activity** : Practice plant Propagation Techniques	Each workgroup practices a different technique of plant propagation	Tools, buckets, gloves, potting soil, seeds, container material	*Grafting group was confused need better explanation*
20 mins (12.00)	**Group presentations** : Results of propagation exercise	(max 5 mins each!)	Big sheets of paper, white board & markers	
12 pm - LUNCH BREAK 1 hour				
1 hour (2.00)	**Field Activity** : Make a seed dryer	Participants commit to establishing a simple seed exchange program	Big sheets of paper, white board & markers	*Very well received*
30 mins (2.30)	**Field Activity** : Make Good Quality Potting Soil	Participants commit to establishing a simple seed exchange program	Farming tools, buckets, gloves, potting soil, seeds, container material	
30 mins (3.00)	**Field Activity** : Making Natural Potting Containers	Participants commit to establishing a simple seed exchange program		
3 pm - BREAK 15 minutes				
30 mins (3.45)	**Focus Discussion Group :** Starting a seed saving group	Participants commit to establishing a simple seed exchange program	Big sheets of paper, white board & markers	*Enthusiastic, looks like it will work, follow up with Ibu Su*
30 mins (4.15)	**Creative thinking :** Forum on problems & solutions review	Assess participants' understanding change since the course	Big sheets of paper, white board & markers	*90% increase in understanding! Great*
30 mins (4.45)	**Course Evaluation**	Participants give their written inputs for better future workshops	Participant Feedback Form for ALL	
15 mins (5.00)	**Presentation :** Wrap up & congratulation	Sense of pride and accomplishment	Prizes for silliest idea and best outfits :)	

Permaculture Workshop Lesson Plan

Course Name : *Intro Permaculture & Wastewater management*

Course Location : *Desa Banubola, Kerengan*

Course Dates : *May 29 - May 30, 2005*

Course Objective:

Participants learn & adopt the ethics of Permaculture & learn good practices for Household / Community Wastewater Management

DAY 1 of 2 - Introduction to Permaculture & Wastewater Strategies

Time	Method & Activity / Lesson	Objective & Notes	Resources	Self-assessment
30 mins (8.30)	**Presentation :** Opening address and introductions	Facilitator introduction	Images of projects, clock, facilitator's book & Ref Book	*Good*
	Participant introductions	Introduce the person to left or right	Meta board / cards, markers	
	Fill in the contact sheet	Participants info for networking / follow up	Workshop Contact Sheet	
	Overview of planned activities	Participants learn workshop agenda	Enough Course Outlines for all the participants	
	Create working agreements	Everyone agrees on workshop guidelines	Big sheets of paper, white board & markers	
30 mins (9.00)	**Presentation :** Introduction to Sustainability	Participants understand concepts of sustainability & unsustainability	Board, images sustainability & unsustainability	*Good response*
10 mins (9.10)	**Create workgroups** using creative facilitation technique	Workgroups are formed	White board and markers	
30 mins (9.40)	**Creative Thinking :** Forum on problems & solutions with seeds	Participants understand sustainable & unsustainable practices	Meta board / cards, markers, Supporting Images	*Well received! Use again*
20 mins (10.00)	**Creative Thinking :** Discussion about "Quality of Life"	Participants re-evaluate what create "A good quality of life"	White board and markers	*Good understanding*
10 am - BREAK 15 minutes				
15 mins (10.30)	**Presentation :** What is Permaculture?	Participants gain basic understanding of Permaculture	Images of Permaculture projects	*Need more images to explain*
30 mins (11.00)	**Presentation :** Permaculture Ethics	Participants understand and consider the foundation of Permaculture - ethics	Flip Charts of ethics & principles of Permaculture	*Need more images of daily activities reflecting the ethics & principles of Permaculture*
30 mins (11.30)	**Creative thinking :** List local ethics support sustainability	Participants consider and re-value sustainable practices from their culture	Big sheets of paper, white board & markers	
30 mins (12.00)	**Presentation** : Houses and their Environments	Participants gain a better understanding about healthy home environments	Meta board / cards, markers, related images	
12 pm - LUNCH BREAK 1 hour				
20 mins (1.20)	**Presentation** : Healthy & Practical Kitchens	Participants understand key points about maintaining health & hygiene	Big sheets of paper, white board & markers HANDOUTS for ALL, related images	*People especially interested in saving & storing water systems, next time talk more about rainwater*
15 mins (1.35)	**Presentation** : Water Strategies	Participants gain basic understanding about how to conserve & recycle water		
25 mins (2.00)	**Creative Thinking** : Managing & Storing Drinking Water	Participants share ideas about safe storage of drinking water	Big paper, white board & markers, related images	
1 hour (3.00)	**Field Activity** : Create a Safe Water Storage System	Participants put into practice the knowledge & build a storage system	Tools, buckets, tank, ladder, gloves, purification tools	*Good response*
3 pm - BREAK 15 minutes				
15 mins (3.30)	**Field Activity** : Cleaning Drinking Water	Participants learn and practice cleaning & storing drinking water	Tools, buckets, tank, ladder, gloves, purification tools	*Good response*
15 mins (3.45)	**Presentation** : About Wastewater Treatment Systems	Participants learn about methods and benefits of wastewater treatment	Big paper, white board & markers FACT SHEETS for ALL	
1 1/2 hour (5.15)	**Field Activity** : Create a Biological Filter for Wastewater	Participants put into practice the knowledge & build a wastewater system	Tools, buckets, gravel, gloves, plants for systems	
15 mins (5.30)	**Wrap up :** Explain tomorrow's agenda & review today	Participants remember what they have learned & are prepared for tomorrow	Big sheets of paper, white board & markers	

DAY 2 of 2 - Community Wastewater Strategies & Design Project

15 mins (8.15)	**Evaluation :** Q & A about yesterday's activities	Evaluate level of understanding of yesterday's workshop materials	Big sheets of paper, white board & markers	*Participants had good comprehension*
1 3/4 hour (10.00)	**Field Activity** : Build a Compost Shower	Participants practice building a compost shower	Tools, buckets, gravel, gloves, plants for systems	*Lots of enthusiasm follow up with Pak Sujena*
10 am - BREAK 15 minutes				
15 mins (10.30)	**Presentation** : Types of Composting Toilets	Participants learn about various methods for making composting toilets	Big sheets of paper, white board & markers	*Need more images to explain systems*
15 mins (10.45)	**Creative Facilitation** : Create work groups	Work Groups are formed	Creative facilitation section from resource book	*Good use again*
1 1/4 hour (12.00)	**Creative Thinking** : Plan to Eliminate Stagnant Water	Participants consider community initiative to solve wastewater issues in the area	Big sheets of paper, white board & markers	
12 pm - LUNCH BREAK 1 hour				
1 hour (2.00)	**Work group Presentations** : Plan to Eliminate Stagnant Water	Participants present results of their plans & share ideas (max 10 mins each!)	Big sheets of paper, white board & markers	*Very well received*
1 hour (3.00)	**Field Activity** : 3-D Model of House w/ water water system	Participants put into practice new knowledge in a creative way	3-D model making materials	
3 pm - BREAK 15 minutes				
30 mins (3.45)	**Workgroup Presentations :** Results House models	Participants present results and share ideas (max 5 mins each!)	Big sheets of paper, white board & markers	*Good results, yes!*
30 mins (4.15)	**Creative thinking :** Forum on problems & solutions review	Assess participants' understanding change since the course	Big sheets of paper, white board & markers	*70% increase in understanding! Great*
30 mins (4.45)	**Course Evaluation**	Participants give their written inputs for better future workshops	Participant Feedback Form for ALL	
15 mins (5.00)	**Presentation :** Wrap up & congratulation	Sense of pride and accomplishment	Prizes for silliest idea and best outfits :)	

Notes...

Step 6. Developing and socializing the course outline

It is best if you can develop and provide the participants with a course outline before the Permaculture workshop begins. That being said, it may sometimes be difficult to stick to the outline schedule because of weather, transport problems, public holidays, unexpected events such as funerals, etc. **so it is best to keep the details on the course outline to a minimum.**

The course outline should be flexible enough so that the facilitator can maintain the momentum of the course no matter what disruptions may occur. It is always good to advise the participants that the course outline schedules are subject to change.

An intensive Permaculture workshop, which addresses all of the key components of Permaculture, takes about 12-14 days to run.

It can be run:

- Intensively over a 2 week period, with a refresher break of at least 1 day midway through the period.
- Or, it can be run over a longer period of time, using several shorter sessions.

The main advantage of an intensive schedule is that all those involved are thoroughly concentrated on the course and can learn the material at a rapid rate, making efficient use of time. That being said, people's abilities to retain large amounts of information delivered all at one time are variable. Both of these considerations should be factored when designing your course outline. Work with the prospective participants to design a course that best suits them and you.

Course outline schedules also need to be created with the participants' daily responsibilities in mind. Even with cooking and childcare support, it may not be possible for people to devote 2 whole weeks to a Permaculture workshop. Holding the course 2 days a week for 6 weeks, for example, may work better. Another advantage of an extended schedule is that it gives participants a chance to observe and make real changes as the course progresses.

On the next page is an example of a daily activity schedule used as a pre-course handout for participants. This is only an example! As a Permaculture workshop facilitator you should prepare your own schedule for each course you run. Beware of "information overload" – if you try to pack too much information into 1 day of training, the participants may become confused and stop learning.

An example of a Workshop Outline for a 12 day Permaculture course

Permaculture Workshop Outline

Course Name : *Permaculture Village Development Course*

Facilitator Name: *Ni Komang Diguramina*

Course Location : *Banjar, Pengosekan, Ubud* **Dates :** *Dec 1 - 14, 2006*

Please bring to the workshop :

Farming tools, sun hats, drinking water

DAYS OFF - December 7 & December 8

DAY 1 : December 1 (8am - 5pm)

Morning Introduction to Permaculture

BREAK FROM 12 pm - 1 pm

Afternoon Permaculture & Natural Systems

DAY 2 : December 2 (8am - 5pm)

Morning Methods for Design & Mapping

BREAK FROM 12 pm - 1 pm

Afternoon Permaculture Zones

DAY 3 : December 3 (8am - 5pm)

Morning Waste Management

BREAK FROM 12 pm - 1 pm

Afternoon Water Storage and Housing

DAY 4 : December 4 (8am - 5pm)

Morning Cleaning & Recycling Water

BREAK FROM 12 pm - 1 pm

Afternoon Housing Design & Soil Analysis

DAY 5 : December 5 (8am - 5pm)

Morning Soil Improvement

BREAK FROM 12 pm - 1 pm

Afternoon Garden Preparation

DAY 6 : December 6 (8am - 5pm)

Morning Worms & Seed Saving

BREAK FROM 12 pm - 1 pm

Afternoon Seed Testing

DAY 7 : December 9 (8am - 5pm)

Morning Nurseries

BREAK FROM 12 pm - 1 pm

Afternoon Plant Propagation & Farming

DAY 8 : December 10 (8am - 5pm)

Morning Nutrition & Garden Design

BREAK FROM 12 pm - 1 pm

Afternoon Making Good Gardens

DAY 9 : December 11 (8am - 5pm)

Morning Sustainable Farming

BREAK FROM 12 pm - 1 pm

Afternoon Sustainable Farming cont.

DAY 10 : December 12 (8am - 5pm)

Morning Community Forests

BREAK FROM 12 pm - 1 pm

Afternoon Bamboo & IPM

DAY 11 : December 13 (8am - 5pm)

Morning Animal & Aquaculture Systems

BREAK FROM 12 pm - 1 pm

Afternoon Aquaculture & Appropriate Technology

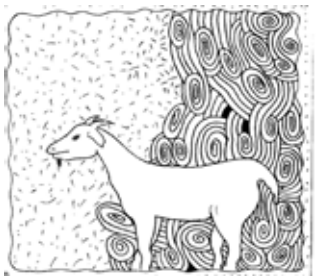
DAY 12 : December 14 (8am - 5pm)

Morning Cooperatives & Small Enterprises

BREAK FROM 12 pm - 1 pm

Afternoon End of course designs & evaluation

Step 7. Preparing the resources needed to run the course



To deliver a successful Permaculture workshop, it is important to make sure all the facilities, tools, and materials needed to support the course are ready before the course begins.

Prepare the training facilities and demonstration sites

Depending on the training facilities available, you may need to construct compost pit toilets and an open-air shelter. You will also need to prepare demonstration sites and examples of techniques in advance, such as liquid and dry compost at various stages of development, mulched and un-mulched garden beds, and 3-D models, according to your lesson plan.

Prepare the people

- **Organize logistical support for participants:** Arrange for childcare with the families of participants who need it.
- **Arrange meals for the participants during the training days.**
- Make sure the women participants will not be called home to cook for their families during course hours.

Interpreters

Locate and hire an interpreter if needed. Brief the interpreter by explaining the basic concepts and outline of the course and any complicated techniques or technical vocabulary in advance. If possible, arrange for the interpreter to see the training facilities and the demonstration garden or other sites which will be used during the course. You may also want to have the interpreter attend meetings with the local community and/or participate in other course preparations to get a better understanding of the course.

Important note about interpreters: Interpreters need to understand that their role is to transmit what is said without intervening in the class discussion. Otherwise, they may alter the content of the dialogue. This is especially the case if a man is translating for a group of women – it is best to use female interpreters for women-only courses.

Prepare the community

Hold a public meeting to inform the community about the course

Community leaders should announce, attend, and run this meeting. Introduce Permaculture and the objectives of the course, and explain what kinds of activities the participants will be doing.

Prepare the tools and materials needed to run the course

Tools and materials for specific activities: Each of the hands-on field activities and classroom exercises presented in this handbook includes a list of the tools and/or materials needed to carry it out, so you can create a tools and materials list according to your lesson plan. Below is a general checklist of the minimum requirements for a Permaculture workshop.

The minimum requirements for running an Permaculture workshop

A Permaculture workshop can be run anywhere, as long as the following support tools, facilities, and resources are available.

People

- A competent, well prepared facilitator.
- Interpreter, assistant facilitators, and resource people as required.

Place

- A sheltered space with comfortable seating and sun screens to serve as a classroom.
- Toilet facilities for both men and women.
- A large vertical surface where brainstorming results and drawings can be hung and displayed (other than the whiteboard).

Sustenance

- Healthy food for meals, morning tea, afternoon tea, and snacks.
- Fresh, clean, drinking water for in the field and in the classroom area.

Classroom tools

- A cloth bag to hold all the participants' classroom tools and course materials.
- A whiteboard or blackboard and markers.
- A map of the village, which can be acquired from the local village government office.
- Large sheets of paper, and optionally, flip charts, for brainstorming exercises and design projects to be carried out by small groups of participants.
- Sandboxes or parts of the classroom floor space where participants can build 3-D models for design projects, and 3-D model building materials such as sand, rice husks, sawdust, etc.
- Writing material for participants (e.g. an exercise book and pen for each person).

Demonstration tools

- An appropriate piece of land located close to the classroom which can be used for demonstration projects and can be maintained after the course is completed.
- Whatever tools and materials are needed to implement your demonstration project(s), which may include, but are not limited to the following:
    - Resources to make natural pesticides and fertilizers (garlic, neem oil, etc).
    - Seeds (tomato, celery, etc).
    - Composting materials including EM4 and manure (cow, pig, chicken, etc).
    - Mulching materials (sawdust, dry leaves, cardboard, etc).
    - A suitable tool bank for the fieldwork to cover most of the participants at once. Note: Beware of poor quality tools that break during training!

Some useful tools may include:

- Hoes or shovels (at least 1 per 3 participants).
- Tape measures and string.
- Buckets and baskets.
- Tarpaulins.
- Wheelbarrows.
- Rakes and shovels.

Additional options

The Permaculture workshop facilitator can enhance the course by also providing:

- A slide projector or laptop with a projector.
- Useful images and presentations may include:
    - "Before and after" images of places where Permaculture activities have been done.
    - Illustrations of the steps to specific techniques.
- Appropriate printed handouts to give to participants during the course, such as:
    - Photocopy-able IDEP fact sheets from the Permaculture Facilitator's Resource Book.
    - Note: Other useful handouts can be downloaded free of charge from the IDEP website: www.idepfoundation.org
    - Photocopies of relevant pages from the companion Permaculture Reference Book.
- Films.
- Books which relate to your course topics.
- Demonstration sites.
- Internet websites.

Step 8: Facilitating the course

As a learning facilitator, you are responsible for much more than just communicating a set of practices and techniques. You are responsible for the learning environment of your class. All participants should feel that their input is valuable and that they are able to voice their opinions and be heard and respected by others. The best way to create this kind of environment is to set an example. Welcome the participants and show them that what they think and feel matters to you. Really listen to what they have to say and try to give everyone a chance to speak. Encourage those who are shy. Encourage humor and a playful attitude.

A relaxed, open, and respectful atmosphere is vital, and there are several simple ways to support this:

- In large-group presentations you can reinforce this learning atmosphere by keeping lectures simple and brief, using pictures and lots of examples that the participants can relate with to illustrate your points.
- Let people know at the start of each day what the learning objectives are so they can participate in reaching them with you.
- Allow time for questions and comments about ideas or instructions that are unclear to the participants.
- Arrange the seating in the classroom, if possible, into a large circle, where everyone can be face to face, and you, as the facilitator, are part of the circle of learners, rather than separate from and above them. This will support more participatory involvement.
- For creative thinking exercises and design tasks you can divide the participants into small groups of 3-5 people. Doing this maximizes the time for each person to contribute and provides a more intimate setting, where people feel more comfortable sharing ideas than they would in front of a large group.
- Pose questions that empower people, make them curious and inspire them to use their imaginations. Emphasize that there are no "right" answers – everyone's perspective is unique and everyone's contribution is valuable. The most creative solutions often emerge from collective ideas – when everyone contributes to the conversation.
- Alternate between classroom work and field practice, and use creative classroom learning techniques to appeal to and engage all the senses. This will keep all participants alert and involved. For each topic, include a balanced combination of field practice and classroom lessons filled with lively, participatory exercises. Especially in sessions involving a lot of concentrated thought, technical information, or new concepts, brainstorming, energizers, games, and reflection help people to integrate new material in a fun, relaxed manner.

Note: A selection of effective formats you can use to energize group learning and activate learner creativity is provided both in the individual modules and in the Appendix of this book.

Pay attention to feedback from the participants and adjust what you are doing accordingly. You can gauge the effectiveness of each session based on ongoing participant feedback, interest, and enthusiasm.

- **How many questions are asked?**
- **Do people look alert and attentive or bored and restless?**
- **Ask participants questions to check whether they are following you.**

As noted in the section on creating a lesson plan, it is important to be clear about exactly what you aim to achieve before you start teaching. That being said, a lot of unexpected things will happen while you are teaching – you can never predict exactly how the participants will respond to a lesson. The most important thing is to teach the learners, not the lesson plan! Allow yourself to respond to participants' feedback, adapt, sometimes even abandon your plans as you go, in order to reach your objective through different means than you expected.

If you see that the participants are getting restless or tired, take a stretch break, run a short energizer exercise, or shift to a different activity. Adjust the length and order of activities in the plan as needed to ensure that the participants stay interested and don't get bogged down and unable to retain what you teach.

Give participants lots of positive feedback when they do things well.

Stimulate and support your own learning. As a facilitator you too are a learner. In fact, if you are not learning anything, chances are the participants are not learning much either. If you are curious, alert, open to new ideas, and enjoying their company, they are more likely to feel the same way.

Be especially curious to find out what works best. Allow yourself to experiment, and even make mistakes – mistakes have been the source of some of the world's greatest inventions! When you teach something, you can learn something new about how to do it even better. By observing participants' responses to the various Modules of the course you will learn what is most, or least, relevant. You are strongly encouraged to develop new additions and variations to the material in this handbook on an ongoing basis.

At the end of each session or day of the course, take a few moments to make a "self-assessment" – you can use the box at the bottom of the lesson plan to note how well each session was received and jot down any ideas you have about how to make it better next time. Do this as soon a possible, while the details are still fresh in your memory.

Step 9: Providing post-course follow-up

The delivery of the course is only the first part of a facilitator's work. In Permaculture, sustainability is what counts, so your job is not done until the participants are applying the practices as part of their everyday lives.

Follow-up is the key to a successful Permaculture workshop.

Ideally, for the first few months after the training you will follow-up on how the participants are doing every few weeks, and continue to make periodic visits at longer intervals after that.

- On each return visit you should monitor progress, document results, offer technical advice, and encouragement.
- Facilitate problem-solving processes by guiding the students to think through problems themselves.
- Your ongoing encouragement will also help the participants – especially the women participants – to appreciate the value of their own continued work and give them encouragement and confidence to try new techniques in the future.
- It is important to encourage them to form their own local Permaculture networking groups so they can help and advise each other on a regular basis.

What you learn from the results you see can also help you to update and improve your lesson plan so that it will be even more effective in achieving the goal of real actions in the communities where you are working. Follow-up is an invaluable learning opportunity for the facilitator as well as the participants.

On its own, a Permaculture workshop will not make a big difference to a community unless there is a long-term support strategy in place to promote Permaculture practice.

The facilitator and/or the organization hosting the course should be available to give further support and troubleshooting to the participants who are practicing what they have learned at the Permaculture workshop.

The Appendix of this manual includes some good tools and techniques for follow-up assessment.

Further support can be offered in several forms:

- Seeds, planting materials, and tools.
- Breeding stock for animals.
- Small cash grants for project start-up capital.
- Transport assistance for compost materials.
- Books or training videos and other educational materials.
- Storage will need to be ascertained and/or developed.
- Encouraging work groups to advance home projects.
- Additional training.
- Positive local publicity for outstanding achievements.
- Awards for best community project.

Given such support, the most outstanding participants will create local models of excellence that will encourage others to use Permaculture practices by example.

Remember, when people see it works it spreads.

Gardens and farms can be documented and used as references and demonstration sites for future Permaculture workshops.

The most generative changes happen when participants begin training fellow community members using their own working models. Special credit and encouragement should be given to participants who choose to become teachers themselves.

Permaculture workshops become more effective each time they are run in a community. As more community members put into practice what they have learned and more demonstration sites are successfully implemented, it becomes increasingly easier to prove to people what works and show the inter connectedness between various aspects of sustainable design.

However, if no models appear or people lose interest, the facilitator and the supporting organization should investigate where the problem lies, determine what went wrong, and most importantly, how their methods can be improved

Ideally, the development of these training modules is an ongoing, participatory process. We hope you will enjoy using them and invite you to contact us should you need assistance.

We will look forward to your feedback and welcome your ideas on ways to improve the modules and the learning activities they contain. Your active contributions will be much appreciated by facilitators across the region!

Please send any feedback you may have to:

info@idepfoundation.org

BEGINNING A WORKSHOP

Opening Address and Introductions

Notes...

Presentation : Opening address and introductions

Method : **Large group presentation and dialogue**

Tools : **Sign-up sheet, course outline, notebook and pen for each person**

References : **"Ice breakers " appendix**

Objective : **People will be introduced to the aims and rules of the course**

Facilitator introduction

At the very beginning of a Permaculture workshop, introduce yourself and tell participants a bit about your background and the work you have done to date, which relates to the course.

If you work for or are a member of an organization which runs programs relating to the course materials, take this opportunity to introduce your organization and its mission and activities so that the participants can get a sense of the group that you are representing as a facilitator.

If you are from another area or country, ask a local participant or organizer to help introduce you before you address the group.

Ice breaker and participant introductions

You can use an icebreaker to get everyone moving, interacting, and relaxed. This will help set the tone for a learning environment of open, respectful, and creative dialogue. See "Ice breakers" in the appendix for examples of fun ways to "break the ice". Once the participants are warmed up and enjoying themselves, ask them to gather in a circle and introduce themselves.

Ask each person to let the group know (in 2 minutes or less):

- Their name.
- Where they live.
- Family status (do they have kids, are they married, etc).
- Why they joined the training.
- What they hope to gain from the training.
- Prior experience they have relating to Permaculture.

These introduction can be organized is several ways:

- Each person can introduce the person to his/her left or right.
- They can choose a partner and each partner introduces the other.
- The participants can introduce themselves.

Filling in the contact sheet

At the appropriate time during the introductory sessions, or even before the course starts, you can circulate a contact sheet for everyone to fill in. This contact sheet serves many functions over time:

- Once it is filled in, it can be copied and given to everyone who participated in the course so that they can easily contact anyone they met during the course during the follow-up phase.
- It can be used to monitor course attendance.
- The trainer can use it if they wish to send additional resources, follow-up with any of the participants, or invite any of the exceptional participants to co-facilitate another course.

The course facilitators and organizers should also have their details listed on the sheet; this can be organized ahead of time.

Ask each of the participants to list their name, the name of the organization they work for (if applicable), address (useful if you wish to mail them something), and contact details on the sheet.

The sheet may look something like this:

Permaculture Workshop Contact Sheet

Workshop Name : *Permaculture Village Development Course*
Location : *Banjar, Pengosekan, Ubud*
Main Facilitator : *Ni Komang Diguramina*
Dates : *Dec 1 - 14, 2006*

No	Name	Organization	Address	Contact No 1	Contact No 2
1	Siti Sundari	PKK Lumayo	Br. Lumayo Desa Sukati	081 234 234xxx	0361 2434xx
2	Armansyah	Subak Wokerto	Br Lupal, Desa Wokerto	081 234 234xxx	0361 9015xx
3	Suroso	Subak Wokerto	Br Lupal, Desa Wokerto	987 xxx	021 35667xx
4	Made Nurbawa	Subak Wokerto	Br Lupal, Desa Wokerto	085 637 23xxx	0361 2434xx
5	Agus Samijaya	Subak Wokerto	Br Lupal, Desa Wokerto	987 xxx	022 57465xx
6	Dewanda G	Yayasan UPA	Br Budin, Desa Wokerto	082 361 23xxx	022 57465xx
7	Suharto B	Subak Wokerto	Br Budin, Desa Wokerto	tidak ada	022 57465xx
8	Maria Dolores	PKK Lumayo	Br. Lumayo Desa Sukati	081 344 34xxx	036 19015xx
9	Herman Purnomo	PKK Lumayo	Br. Lumayo Desa Sukati	987 xxx	0361 9015xx
10	Yuyun Raharja	Subak Wokerto	Br Budin, Desa Wokerto	081 191 59xxx	021 49903xx
11	Pieter Tambunan	PKK Lumayo	Br. Lumayo Desa Sukati	82 561 89xxx	021 49903xx

Overview of planned activities

Distribute copies of the course outline, notebooks, pens, clipboards, and any relevant course materials to the participants.

If you have prepared a cloth bag, all of these materials can be packed into it. This has the multiple advantage of:

- Giving a "gift" to your participants, which is always appreciated.
- Promoting the use of cloth bags instead of plastic.
- Helping the participants to keep their classroom tools and course related materials in one place – otherwise notes and references often get scattered throughout the course.

Allow everyone a few minutes to read through the course outline. Alternatively, you can read the outline, particularly in the case where literacy levels are problematic.

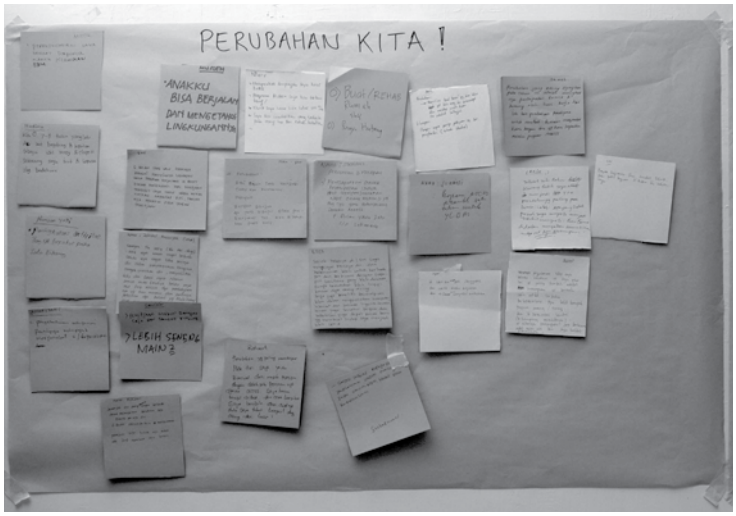
Give a brief overview of how the course is organized and what the participants can expect to achieve during the course. Invite the participants to ask any questions they may have about the course outline and plans.

This is also a good time to explain the course schedule, logistic details, etc.

Create working agreements for the course logistics

Ask the participants to suggest general house rules for the training, such as: no smoking in the classroom, arriving and starting on time, keeping hand phones on silent, etc.

Write the suggested rules on a white board for everyone to consider. Then the group can vote on the rules they agree to adopt. The agreed upon rules can then be written on a large sheet of paper, which can be posted somewhere in the classroom area throughout the course.



A fun component of this exercise can be to have the group come up with sanctions for breaking the rules, such as:

- When you come late you have to sing to the group during coffee break.
- If your phone rings during a session you will need to do a dance for everyone right after lunch.

Creative facilitation: Forming work groups

If the course lesson plan includes group work and brainstorms, at this point you can facilitate a process for grouping participants into dynamic working groups. For alternative more creative ways to form groups, see the following section "Creative Group Techniques".

Try to ensure there are equal numbers of men and women in each group. In areas where this is culturally inappropriate, or would prohibit women's abilities to speak up, separate women's and men's groups can be formed.

If you have a mixed level of expertise represented in the group, encourage a good distribution throughout each group of those people that may have special knowledge which would help other workgroup members in brainstorming or working processes.

Explain to the groups that throughout the course, whenever they work together on a project or exercise, they can nominate a spokesperson to present their group's findings to the class.

If it is appropriate for your lesson plan, you can take this opportunity to give each group a large pad of paper and a set of color markers they can use as a "group brainstorm journal" to draw and write on freely whenever they work together.

This is also a good time to talk about basic guidelines for group etiquette and creative cooperation, for example:

- Practice the principles of cooperation not competition.
- Give each person in the group an equal chance and time to speak.
- Listen – so that you can understand what each person in your group has to say.
- Contribute your own thoughts to the group when your turn comes.
- Connect group member's different ideas together.
- Notice what unexpected insights emerge from combining the ideas of the group.

Forming work groups - Creative method 1: Secret color

1. Work out how many groups you want to form and divide the number of participants into this amount.
2. Create small colored cards - as many colors as work groups needed for the exercise. For example, if you have 30 participants and need 5 groups, make 6 cards for each of these colors: Green, Red, Blue, Yellow, Purple.
3. Place the colored cards in a bag, basket, or box.
4. Ask each participant to take one color card and join the others with the same color.

Variation on this method: Instead of colored cards, you can also use sticks from different types of trees, stems of plants, small colored stones, small pieces of bamboo with markings, etc.

Forming work groups - Creative method 2: Animal scramble

This is an effective group formation game that is fun and particularly relevant for agricultural programs. This is a fairly quick exercise – it takes about 10 minutes.

1. Work out how many groups you want to form.
2. Create small 'animal cards' - as many types of animals as work groups needed. For example, if you have 30 participants and need 5 groups, make 6 cards for each type of animal: Rooster, Cow, Goat, Horse, Cat, and Dog. Try to choose animals that everyone knows.
3. Place the animal cards in a bag, basket, or box.
4. Ask each participant to take one animal card, but tell them that they are not allowed to read the card yet.
5. Ask each participant to read the word written on the card but to keep the word a secret.
6. Now the facilitator instructs the participants to find the rest of their friends – but there is no talking allowed. Instead they have to make the sound of the animal on their card. As soon as two participants find one another they should stick together and continue calling out until they find all of their animal friends.

Forming work groups - Creative method 3: Height sorting

- Work out how many groups you want to form.
- Ask the participants to organize and line up by their height.
    - The tallest and the shortest person joins group 1.
    - The next tallest and next shortest person joins group 2.
    - The next tallest and next shortest person joins group 3, etc.

Variation on this method:

- Line up in order by length of arm's reach.
- Line up alphabetically by first name.
- Line up in order of date of birth from January to December.
- Line up in order by number of brothers and sisters you have.
- Line up in order by age.
- Line up in order by number of animals you own.

Forming work groups - Creative method 4: Numbers count off

The quickest way to form work groups is to have the participants count off numbers and then join with others who have the same number.

For example, if there are 20 participants and you want to form them into 4 groups of 5 people each, then have the participants count off "1, 2, 3, 4; 1, 2, 3, 4" in turn, and then have all the people who called out the number 1 to form group 1, and those who called out number 2, 3, and 4 to form groups 2, 3 and 4.

Presentation : Introduction to sustainability

Method	**: Facilitator presentation, participatory brainstorm**
Tools	**: Handout 'Chain of Chemical Pesticides' - PC Book CH 9 - IPM** **White or black board and writing implements**
References	**: PC Book CH 1 - What is Permaculture?**
Objective	**: Participants understand the concepts of sustainable and unsustainable**

Sustainability refers to objects, actions, events, people, and places, anything at all.

If something is sustainable it means that it, or its effect, last a long time into the future and retains or even improves ins quality over time.

If something is unsustainable it means that it, or its effect, will not last a long time and it will create degradation and even destruction.

Our actions affect land, air, water, and people in our environment. Sustainable actions create positive developments. Unsustainable actions cause damage.

When deciding if something is sustainable or unsustainable, both the short-term and long-term effects need to be considered. Long-term means what effect the action will create after 5, 10, 50, and 100 years and even further into the future.

Do a group brainstorm with the participants. On the board create a table something like the following; leave the answers to the questions blank so that the participants come up with their own ideas. The answers listed here are only supplied for the facilitator if the participants need help for prompting ideas and discussions.

Compare the effects of a natural pesticide and a chemical pesticide, then decide together which one is sustainable and which one is unsustainable.

Compare the effects of…	Natural pesticides	Chemical pesticides
What is it made from? Where do these ingredients come from?	Ligundi bush, Samiroto	Chemicals, made in factories
How are the materials collected?	Leaves are collected for use	Mining, made in factories
How are they transported?	Grows locally	Trucks, trains, or boats
How is the pesticide made?	By juicing the leaves or planting next to a rice field	In different factories
How and where is it stored?	No storage needed as it is used fresh, or dried and burned to repel mosquitoes	Stored in containers in warehouses
Is pollution created when it is collected, made, stored, and transported?	No	Yes, a lot, except for storage
How much energy is used when it is collected, made, stored, and transported?	None or very little	A lot for every stage
How much does it cost?	Free, easily collected or grown	Rp. 20,000.- for a small bottle
When it is used, what are the short and long term effects on:		
The soil and soil health	Possible short term effects	Short-term: soil bacteria and animals are killed; long-term: major damage if used regularly
Animals, birds, etc	None, can be used as anti-parasitic for cows	Short-term: can cause sickness from eating dead insects; long-term: can kill if used regularly because poison builds up over time
Rivers, water supply, fish, and oceans	Very little short-term effects; no long-term effects	Short-term: can damage small river insects and animals; long-term: can kill or damage all river life and can damage oceans near river mouths as well
People	None	Farmers who use chemical pesticides can get sick, and even very ill over time, especially if no protective clothing is worn

If you have prepared the handout (chain of chemical pesticides - PC Book CH 9 - IPM) you can talk through the steps in the illustration with the participants.

Other types of topics can be used for the same type of exercise, such as comparing compost to chemical fertilizer, an egg produced by a free-range chicken in a village to a factory egg sold in a supermarket.

Creative thinking : Forum on problems and solutions

Method : **Work group meta plan brainstorm**

Tools : **Meta board, meta cards, enough markers for everyone**

Objective : **Participants understand sustainable and unsustainable practices**

Following is an example for running this session; the facilitator should modify this exercise to match the number of participants. In preparation for this exercise, the facilitator should prepare a meta board that is big enough for everyone at the course to read to match the table below.

Divide the participants into 4 work groups, and give them enough meta cards to write down their ideas about UNSUSTAINABLE practices:

- Group 1: 6 aspects of local unsustainable practices.
- Group 2: 6 aspects of local unsustainable practices.
- Group 3: 6 aspects of global unsustainable practices.
- Group 4: 6 aspects of global unsustainable practices.

Once the groups have completed their brainstorms, group representatives can pin the group's ideas onto the meta board and explain the ideas to the rest of the participants. **Participants can then give feedback and suggestions about the ideas.**

Ask the work groups to brainstorm and write onto meta cards their ideas about SUSTAINABLE practices. Note: It is best if the groups work on other aspects than they did in the first round:

- Group 1: 6 aspects of local sustainable practices.
- Group 2: 6 aspects of local sustainable practices.
- Group 3: 6 aspects of global sustainable practices.
- Group 4: 6 aspects of global sustainable practices.

Once the groups have completed their brainstorms, group representatives can pin the group's ideas onto the meta board and explain the ideas to the rest of the participants. **Participants can then give feedback and suggestions about the ideas.**

Following is the suggested format for the meta board layout; leave the answers to the questions blank so that the participants come up with their own ideas. The answers listed here are only supplied for the facilitator if the participants need help for prompting ideas and discussions. Ideally the participants can come up with their own topics.

Aspects	LOCAL PRACTICES		GLOBAL PRACTICES	
	Unsustainable	Sustainable	Unsustainable	Sustainable
Air quality	Smoke from burning	Reduce, and eventually stop burning, start recycling	Global warming from pollution builds up in air	Use natural electricity, less and better cars, plant more trees
Water quality and availability	Rubbish, detergents, and sewage in rivers	Compost toilets, sewage, and wastewater treated on site	Chemicals from factories enters rivers	Factories treat chemicals on site
Ecosystems and biodiversity	Deforestation	Education and protection of forests	Over grazing of animals creating deserts	Less animal grazing, better animal systems management
Oceans	Untreated sewage and plastic wastes	Sewage treated and reused as fertilizer, cloth bags replace plastic bags	Over fishing and bad fishing practices cause damage to ocean life cycle	Protection of fish breeding areas, better fishing practices
Health	Infertility caused by chemical use in rice fields and burning plastic	Use natural pest and fungus controls, waste management	Cancer and other diseases from unhealthy foods and pollution	More organic and less processed food and better pollution control
Agriculture	Using chemical fertilizers and pesticides	Using natural fertilizers and pesticides	Wasting water from over irrigation	Better irrigation and planting techniques
Culture	Too much competition, producing more than people need, reduction of social strength and connection	Encourage and teach children traditional cultural practices, especially sustainable and cooperation-based practices	Consumer culture is overtaxing and damaging resources and the environment	Educate about the damage done and the need to change from consumer to resourceful and self-reliant systems
Government	Corruption	Better transparency and accountability for government	War, globalization	More accountable governments that act in the best interest of the people
Economy	Buyers drive market rates, increasing gap between rich and poor	More cooperation and emphasis on local economies and products	Global economy run by very few who are very rich	Fairer trade systems, strengthening of local economies
Lifestyle	Consumer lifestyles creates pollution, waste, and overuse of resources	Using products that are made locally and do not create waste and pollution	Increasing exports for consumerism	Putting limits on exports and supporting the development of local production
Crime rate	Poverty leading to suffering and need	Cultural resilience and local ethics	Greedy economic practices that increase poverty and inequality	Fair trade and better welfare systems

Creative thinking : Discussion about the "quality of life"

Method : **Facilitator presentation, participatory brainstorm**

Tools : **White or black board and writing implements**

Objective : **Participants evaluate what creates a "good quality of life"**

Do a group brainstorm with the participants.

On the board create a table something like the following; leave the answers to the questions blank so that the participants come up with their own ideas.

The answers listed below are only supplied for the facilitator if the participants need help prompting ideas and discussions.

Quality	Can come from	How you can achieve high quality of life without money
Health	Good food, exercise, safe medicines, good healers	Grow your own food and medicine, eat local organic food
Wellbeing	Low stress, safe communities, cultural heritage	Don't be greedy, strengthen community cultural resilience, help each other
Happiness	Family, friends, peace of mind, cultural activities	Have time for family and friends, low stress, and support local culture
Education	Good education, real life skills, wisdom and experience	Supporting good education in our schools, learning real life skills from experience, valuing the knowledge and wisdom of elders

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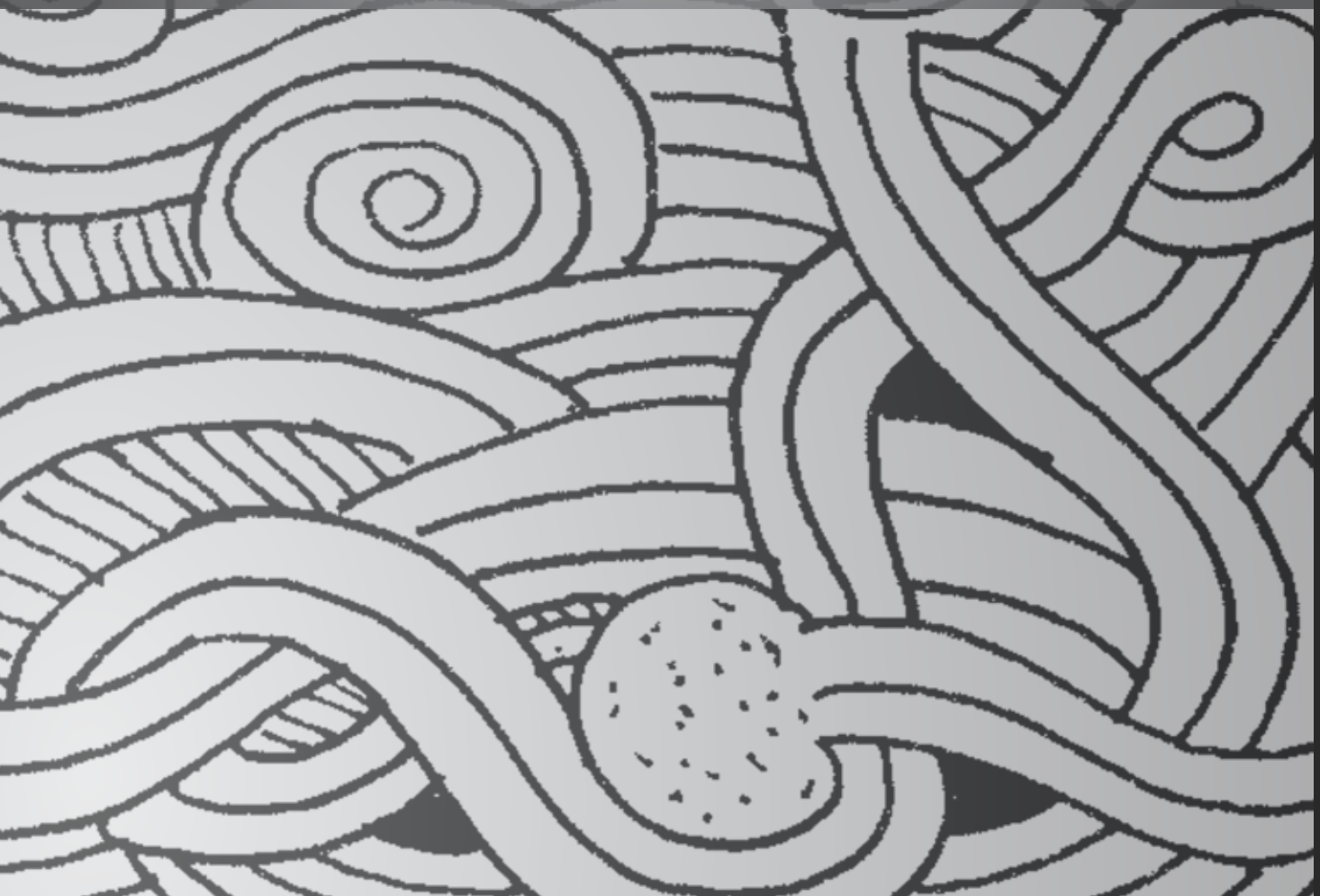
WORKSHOP MODULE No 1.

What is Permaculture?



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Presentation : What is Permaculture?

Method : **Facilitator presentation**

Tools : **Images of Permaculture projects worldwide**

References : **PC Book MOD 1 – What is Permaculture?**

Objective : **Participants gain basic understanding of Permaculture**

Permaculture offers techniques and ideas for sustainable community development.

Permaculture helps us to understand and create harmonious integration of landscapes and people in a sustainable way. It is applicable to both urban and rural contexts, and to any scale of design. It is about working with, rather than against, nature.

Permaculture is a holistic, ecological approach to designing and developing human settlements, which helps us to increase people's quality of life including:

- Food production.
- Structures.
- Technologies.
- Energy.
- Natural resources.
- Landscapes.
- Animal systems.
- Plant systems.
- Social and economic structures.

Permaculture strategies draw upon traditional practices of earth stewardship integrated with appropriate modern technology.

Two dedicated environmentalists, Bill Mollison and David Holmgren, coined the term 'Permaculture' in the 1970s. The term PERMACULTURE comes from:

PERMA-nent agri-CULTURE being directly related to PERMA-nent CULTURE

Today, Permaculture design and practices are being carried out in over 100 countries by thousands of Permaculture design graduates.

Presentation: Permaculture ethics

Method : **Facilitator presentation**

Tools : **Images of Permaculture ethics in action vs. bad practices**

References : **PC Book MOD 1 – What is Permaculture?**

Objective : **Participants gain basic understanding of Permaculture**

Action and change needs to come from all levels of society – government, business, workers, farmers, communities, families, men, women, and children. Future generations depend on it.

Permaculture offers techniques and ideas that can help us move towards a healthy environment, a healthy culture, and a healthy people. It is based upon a series of ethics and principles.

These ethics and principles speak of our responsibilities for own lives, our environment, and the future. They help us to design a more secure future for our families, our land, and our culture.

The ethics of Permaculture are:

1. CARE FOR THE EARTH

2. CARE FOR THE PEOPLE

3. CARE FOR THE FUTURE

Detailed description of the Ethics of Permaculture can be referenced from the PC Book MOD 1 – What is Permaculture?

Creative thinking : Local ethics that support sustainability

Method : **Group brainstorm**

Tools : **Large paper, and/or a white/black board, and markers**

References : **Images which illustrate local ethics which support sustainability**

Objective : **Participants identify, and revalue, sustainable local practices**

A brainstorm is facilitated where the participants identify local cultural practices and ethics that relate to sustainability. Ask them to come up with at least 3 examples of local ethics that relate to the 3 key Permaculture Ethics.

Do a group brainstorm with the participants. On the board create a table similar to the following; but leave the answers to the questions blank so that the participants come up with their own ideas.

The answers listed below are only supplied as ideas for the facilitator should the participants need help or prompting to develop ideas and discussions.

Write the results of the group brainstorm on large pieces of paper if possible. The results can then be posted around the teaching space for reference as the course unfolds.

Permaculture ethics	Local examples of Permaculture ethics in action
Care for the earth	Understanding natural principles and how nature works.
	Using cloth shopping bags, not plastic bags.
	Traditionally after harvesting rice fields farmers would return all rice stalks to the rice paddies to rot for 3 months.
Care for the people	Community support to community members in need (e.g. after someone dies, help build homes).
	Traditional village alarm systems which alerts community to a problem such as fire or theft, or to call the community to a meeting.
	Community groups - at each ceremony every group member contributes something small (coconuts, rice, etc).
Care for the future	Planting teak trees for future harvest.
	Local action groups that provide education and support solutions which relate to caring for the future.
	Cultural groups provide traditional children's dance lessons and other cultural education to help preserve cultural heritage.

Presentation: Permaculture design principles

Method : **Facilitator presentation**

Tools : **Images of Permaculture projects that show principles in action**

References : **PC Book MOD 1 - What is Permaculture?**

Objective : **Participants gain understanding of Permaculture principles**

The Permaculture principles should be applied to all sustainable community design projects. They are the key guidelines for implementing Permaculture. They can help to maximize efficiency and production, and improve and protect the land, environment, and people.

Permaculture principles encourage creativity and maximize results. Every place is different, every situation is different, and every family is different. Because of this, plans, techniques, plants, animals, and building materials may be different with each project. Even so, for every place and every project, big or small, the same principles apply.

The Permaculture principles are:

- Diversity.
- Edge effect.
- Energy planning.
- Energy cycling.
- Scale.
- Biological resources.
- Multiple elements.
- Multiple functions.
- Natural succession.
- Relative location.
- Personal responsibility.
- Cooperation not competition.
- See solutions, not problems.
- Observation.

More detailed description of the Permaculture principles can be referenced from the PC Book MOD 1 – What is Permaculture?

Creative thinking : Permaculture principles brainstorm

Method : **Group brainstorm**

Tools : **Handout – IDEP Permaculture Principles fact sheet, black/white board, markers**

References : **PC Book MOD 1 - What is Permaculture?**

Objective : **Participants understand principles by relating them to real examples**

Part 1: Connecting principles to a detailed example
Provide the lesson handout to the participants. Talk the students through the fact sheet. Take time to answer any questions and provide more details if necessary.

Part 2: Connecting local examples to the principles
List the Permaculture principles on a board; leave enough space to write in the participants' ideas. Together with the participants identify local relevant examples for each of the Permaculture principles.

Do a group brainstorm with the participants. On the board create a table similar to the following, but leave the answers to the questions blank so that the participants can come up with their own ideas. The answers listed below are only supplied as a reference for the facilitator to help prompt ideas and discussions.

Permaculture principle	Local example of the principle
Diversity	Diversity and inter cropping of fruit trees.
Edge effect	Rice paddy edges used to grow beans, grass for animal fodder, and legume trees.
Energy planning	Cow grazing land at top of rice paddy irrigation, the manure from the cows enters the water, using gravity.
Energy cycling	Using wind and water for chimes to scare away birds during harvest time. Using the energy of ducks in the rice paddies.
Scale	Small scale farms owned and operated locally.
Biological resources	Rice straw for mulch, rice husk for cooking smoked duck.
Multiple elements	Many water sources for each need.
Multiple functions	Bamboo (furniture, housing, medicine, etc), coconut (energy, food, medicine, ceremonies, etc).
Natural succession	Corn and bean rotation – corn grows, the cobs are picked, and then the stalks are used for trellising bean plants.
Relative location	Plant pest predator host plants near and among the crops to reduce pest problems.
Personal responsibility	Traditional social norms which supported through local cultures and religious beliefs.
Cooperation not competition	Traditionally, the concept that most people have the same needs, therefore they work together to achieve them (e.g. irrigation water and path maintenance).
See solutions, not problems	The way that water, a potential problem, can be controlled to provide a huge resource.
Observation	After growing food for the family, identifying the best plants that can be grow to sell.

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WORKSHOP MODULE No 2.

Natural Patterns and Permaculture Design

Permaculture Facilitator's Handbook Module 2. Natural Patterns and Permaculture Design

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Presentation : Patterns in nature

Method : **Group brainstorm**

Tools : **Images of patterns in nature and naturally shaped gardens**

References : **PC Book MOD 2 – Natural Patterns and Permaculture Design**

Objective : **Participants understand the value of working with natural patterns**

Our world is made up of patterns. Every aspect of the earth, from the smallest animal to the largest mountain, contains patterns.

When creating designs for your land, if you work with natural shapes you will achieve more productive results for the least amount of time and labor. This is because you will have much more edge for the same amount of land or water, which means more trees and plants can be planted around the edges.

Ask the participants to consider the following questions:

- Can you identify any straight lines in nature?
- Are there any straight or square parts in our bodies?
- Which is stronger, a curved wall or a straight wall?

See **PC Book MOD 2 – Natural Patterns and Permaculture Design** for more details, and for ideas of natural shapes of productive garden and pond designs.

Field activity : Patterns observation and analysis walk

Method	**: Field observation, analysis, and documentation**
Tools	**: Paper, pens, and a clip board for each participant**
References	**: PC Book MOD 2 – Natural Patterns and Permaculture Design**
Objective	**: Participants practice and value observations skills and creativity**

The observation skills of a designer are very important. An effective designer must be able to clearly identify what kinds of resources are sustainable and readily available for realizing their projects.

By carefully observing land, animals, and people the designer can also identify what may be needed to improve the existing situation.

A good Permaculture designer will be able to answer all of the following questions after a quick initial survey of the land.

Ask the participants to note down the following questions and then take them on a short observation walk to:

- Collect natural materials that contain patterns (leaves, shells, etc).
- Observe the land's natural patterns (they can make quick sketches).
- Where does rainwater collect on a piece of land? Why?
- Where is the soil naturally rich? Why?
- Where is the soil naturally poor? Why?
- What kinds of fruit trees are available in the area?
- What kinds of timber or craft trees are available in the area?
- Why does vegetation grow better in some places than other places?

After the observation walk, participants can share their findings with each other in a small forum.

Presentation : Planning and methods for design

Method : **Facilitator presentation**

Tools : **Images of "good" and "bad" designs in the field**

References : **PC Book MOD 2 - Natural Patterns and Permaculture Design**

Objective : **Participants understand the value and principles of designing**

This section and session contains ideas and methods for planning long-term designs for agricultural land, animal systems, houses, and other projects.

A plan gives you a frame. Like when you build a house, a strong frame will help to ensure that your house is strong and lasts a long time. It is necessary to create the frame before you build the rest of the house.

Having a good frame will give you more order and efficiency, while increasing your design's flexibility. Its important to remember that your plans can, and should, change as circumstances change. You can add more elements and change the plans as you learn more about your project. Each success or mistake that occurs during your project will help you decide how best to adjust the plan.

Planning is a combination of techniques and strategies:

- Techniques are HOW to do things; strategies are HOW and WHEN to do things.
- Designing a plan is like making a PATTERN with all the elements of your design.
- Work with your OBSERVATION of the land and elements to create a system.

When planning and designing projects, we needs to ask ourselves many questions, such as:

- What elements will be used?
- Where will the elements go?
- How can this element be placed so it will provide maximum benefits for the system?
- How many of the Permaculture principles have been covered with these design element and their placement?

See the **PC Book MOD 2 - Natural Patterns and Permaculture Design** for more details and ideas for planning and designing.

Field activity : Resources observation walk

Method	**: Group observation, analysis, and documentation walk**
Tools	**: Paper, pens, and a clip board for each participant**
References	**: PC Book MOD 2 - Natural Patterns and Permaculture Design**
Objective	**: Participants become aware of readily available natural resources**

Take the participants on a short walk and ask them to make a list of all the useful, available resources they can find.

The participants should come up with their own ideas. The answers listed below are only supplied for the facilitator to prompt ideas and discussions.

- Rocks – Which can be used for building houses, infrastructure, carving, etc.
- Manure – Which can be used for compost and liquid fertilizer.
- Mulch material – Which can be used for saving water and top soil.
- Planting stock and seeds – Which can be used for planting, trading, etc.
- Mud – Which can be used for terracing, pottery, and building.
- Fodder – Which can be used for animal food.
- Trees – Which can be used for carving, sculptures, food, medicine, etc.

After the observation walk, participants can share their finding with each other in a small forum.

Presentation : Various ways to create maps

Method : **Facilitator presentation**

Tools : **Images of different types of maps**

References : **PC Book MOD 2 - Natural Patterns and Permaculture Design**

Objective : **Participants learn about different ways to create maps**

Maps help us to create new things, and design better versions of what we have. By using maps we can look at our plans in a visual way, which helps us to think more creatively and link together different components of a design.

Each design will have different requirements for mapping and maps can be made in several different ways including:

- **Scaled 3-dimensional models –** A highly effective mapping method for community meetings and/or group discussions, which stimulates the participants' creativity and helps to create a more accurate model. You can represent mountain slopes and rivers, and even experiment with water flows using real water!
- **Creating maps using readily available natural resources –** Maps can be created in the dirt. This method is often easier for participants to understand and recreate later. Lines can be marked out using sticks and models can be created to represent the features on the land – trees, buildings, rivers, etc.
- **Graphic line drawings on paper.**

For a guide to map contents use the large map and map contents sections in the **PC Book MOD 2 – Natural Patterns and Permaculture Design.**

Field activity : Making and using an A-frame

Method : **Construct an A-Frame and use it in the field**

Tools : **See detailed description in the PC Book MOD 8**

References : **PC Book MOD 8 – Forests, Tree Crops, and Bamboo**

Objective : **Participants learn how to construct and use an A-Frame**

An A-Frame is a very practical and easy to construct measuring tool made out of wood or bamboo that will help you to map out the slopes in the environment and determine the best modifications to the area for maximum productivity.

Using an A-Frame will help people to map the landscape so they can design and create planting areas including orchards, swales, terraces, rice paddies, gardens beds, etc that are more productive and less prone to loss of soil and water.

An A-Frame is about 2m high and is built in the shape of the letter "A". It is used to mark the land where the swale will go. A-Frames are very easy to make and to use.

For detailed instructions on making and using A-frames including:

- Materials needed to make an A- Fame.
- How to constructing an A-Frame.
- How to use the A-Frame.

See the detailed description in the **PC Book MOD 8 - Forests, Tree Crops, and Bamboo.**

Field activity : Methods for measuring and right angles

Method : **Trial of simple measuring and right angle techniques**

Tools : **Tape measure and marking materials**

Objective : **Participants learn simple ways of measuring for making maps**

PARTICIPATORY FIELD ACTIVITY

Measure out 100m with a tape measure and get the participants to walk it and count their paces. Each participant will then know how many of their personal paces equals 100m.

Suggest other measurements such as using their arms, feet, hand lengths, sticks, lengths of rope, etc.

Ask the participants to suggest other local methods for measuring.

To make accurate maps we need to be able to calculate and identify right angles because right angles help us to identify the actual size and shape of the area.

With the participants, practice the simple method to measuring right angles (90°) described below:

1. Stand on the land that you want to map.
2. Pace out and measure a line, preferably on an edge of the land.
3. Mark out the line with stakes and string (line 1).
4. Stand at the end of the line with one arm outstretched along the line.
5. Stretch out your other arm in the exact opposite direction.
6. Looking ahead, your face will be at about a 90° angle to the line and your outstretched arms.
7. Bring your hands together, still outstretched, directly in front of your face.
8. Keep your hands together and look between your thumbs.
9. Pick out a landmark that is directly in your line of vision, such as a tree or a rock.
10. Mark out the point where you are standing with a stake.
11. Use string to draw another line between this stake and the landmark (line 2).
12. The angle between line 1 and line 2 will be very close to a 90° angle.

Field activity : Creating a scaled map with elements

Method : **Marking out land then drawing a scaled version on a map**

Tools : **String, sticks, paper, pens**

Objective : **Participants learn to document scaled maps and map elements**

In order to accurately plan projects, including estimating the location of elements in a design, the amount of materials needed, expenses, and integration of different systems, it is best if you have an accurate, scaled map to work from.

This exercise will help participants to plan ideas and their locations and then transfer that information accurately onto paper or 3-dimensional maps.

Depending on the size of the area to be mapped and the complexity of the design elements, this exercise can either be done with the entire group or the participants can be split into separate work groups to work on different areas of the design.

Step 1

- Identify and document the boundaries, scale, and center point of the map.
- Choose a piece of land to be mapped and mark the boundaries.
- Within the boundaries you have made, mark a rectangle (or 2 if the land is oddly shaped) using stakes and string.
- Make sure the corners of the rectangles are right angles using the "right angle" method explained in the previous exercise.
- Create an "x" by tying string from corner to corner across the rectangle(s).
- Measure the area using personal paces or another method described in the previous exercise.
- Ask the participants to draw the map boundaries, the rectangle(s), and the center point to scale on paper or on the ground. Choose a simple scale, such as 1cm = 1 pace. Note: you can adjust this calculation to match the area you are mapping and the size of the paper you are working on.

Step 2

- Identify and document the location and size of existing elements on the map.
- Identify existing elements already on the land, such as trees, buildings, etc.

- Measure the approximate size of each existing element on the land using the same method of calculation that was used to create the map boundaries (i.e. personal paces, etc).
- Measure the approximate location of each of these existing elements on the location using the rectangle and "x" as a reference point.
- Document the approximate size and location each of these existing elements on the map using the same method of calculation that was used to create the map boundaries.

Step 3

- Identify and document the location and size of your ideas for new elements on the map.
- Create a list of new elements you want to include in the design.
- Choose locations for the new elements you want to include, such as gardens, ponds, etc.
- Mark the location of the new elements using string, stakes, rocks, etc.
- Measure the approximate size of each of these new elements on the land using the same method of calculation that was used to create the map boundaries (i.e. personal paces, etc).
- Measure the approximate location of each of these new elements on the land using the rectangle(s) and "x" as a reference points.
- Document the approximate size and location each of these new elements on the map using the same method of calculation that was used to create the map boundaries.

Once the participants have completed their scaled maps they can present the results to the entire group for feedback.

Presentation : Introduction to Permaculture zones

Method : **Facilitator presentation**

Tools : **Images showing examples of the different zones**

References : **PC Book MOD 2 - Natural Patterns and Permaculture Design**

Objective : **Participants learn about the concept of zones in a community**

An effective way to start developing an Integrated Sustainable Community Design is to divide the community area and its surrounding land into 5 zones.

A fully Integrated Sustainable Community Design project considers each of these zones separately and creates practical methods for strengthening the interdependent relationships between the zones.

In the Sustainable Community Design method zones are defined as follows:

- Zone 1: The home and family garden.
- Zone 2: The village area.
- Zone 3: The small farms around the edge of the village.
- Zone 4: The semi-wild developed forests around the village farms.
- Zone 5: The ecology conservation zone.

More information about the zones can be found in the **PC Book MOD 2 – Natural Patterns and Permaculture Design.**

Creative thinking : Build a community zones model

Method : **Participatory model building of a zoned community area map**

Tools : **Dirt you can draw in, pre-made pictures, and/or 3-D map elements**

References : **Map from PC Book MOD 2 - Natural Patterns and Permaculture Design**

Objective : **Participants understand the concept and benefits of zoning**

Preparation

Create on paper and/or supply 3 dimensional models of various elements to be included in the zone map including, but not limited to:

- Vegetable gardens.
- Various animals.
- Homes and other buildings.
- Water storage.
- Water treatment.
- Fruit trees.
- Forest trees.
- Marketplaces.
- Power supply.
- Medicinal gardens.
- Animal enclosures.
- Aquaculture.
- Waste treatment.
- Various small industries.
- Windbreak trees.
- Farms and rice paddies.
- Schools.
- Etc.

Note: The following exercise is not a proper design exercise like the end of course design exercise. It is primarily a mapping exercise to show participants where different elements can be placed in different zones and how these elements can be integrated. It is an introduction to the design process.

Running the exercise

The facilitator works with the participant to draw a simple map of the area using a stick in the dirt. The map should be big enough to include all 5 zones, the components that will be added, and be clearly visible to all the participants.

Together with the participants, draw boundaries that delineate each of the 5 zones on the map. The participants can take turns placing the elements in different ways on the map, while discussing the benefits and reasoning for their choice of placement. The facilitator can offer input and ideas about how the various components interconnect and can be placed to fulfill the maximum amount of Permaculture principles.

Document the results of the mapping exercise either using images or by drawing the conclusions onto large sheets of paper, which can be posted in the classroom for ongoing reference throughout the course. This documentation will be useful for brainstorms and use in future trainings.

Presentation : Introduction to the village zone

Method : **Facilitator presentation**

Tools : **Images showing productive examples of the village zone**

References : **PC Book MOD 2 - Natural Patterns and Permaculture Design**

Objective : **Participants learn about the village zone and its components**

The village includes all community infrastructure, which can include these, as well as other private and shared facilities:

- Homes.
- Roads.
- Pathways.
- Religious buildings.
- Schools.
- Public land.
- Marketplaces.
- Home gardens.
- Administration centers.
- Waste management facilities.
- Public water access.
- Tourism attractions.

All villages can be greatly improved using the principles of Permaculture design.

Creative thinking : Uses for community land

Method : **Participatory map making and brainstorming**

Tools : **Dirt for the map, map models, paper, marker**

References : **PC Book MOD 2 - Natural Patterns and Permaculture Design**

Objective : **Participants understand to potential benefits of community land**

Community land is an important shared asset in every village. If utilized properly, it can provide many different functions for the community, including providing food, animal fodder, medicines, timber, bamboo, seeds, etc. It can also provide employment, infrastructure, and other opportunities.

Preparation

If available, a scaled map can be used for this exercise. Alternatively, a simple map of the community can be drawn in the dirt. Once you have a map of the area, conduct a participatory brainstorm to create a list of uses for the community land which will benefit the village. Small models can be created on paper and/or the participants can create 3-dimensional models of various elements to be included on the map, such as:

- Gardens.
- Community food gardens.
- Community medicinal gardens.
- Community buildings
- Water storage facilities.
- Water treatment facilities.
- Shade trees.
- Windbreak trees.
- Marketplaces.
- Community centers.
- Parks.
- Demonstration sites.
- Community animal enclosures.
- Community aquaculture.
- Waste treatment facilities.
- Community industries.
- Fruit trees.
- Farms and rice paddies.
- Schools.
- Power supply.

Note: The following exercise is not a proper design exercise like the end of course design exercise. It is primarily a mapping exercise to show participants where different elements can be placed in different zones and how these elements can be integrated. It is an introduction to the design process.

Running the exercise

Have the participants can take turns placing elements in different ways on the map, while discussing the benefits and reasoning for their choice of placement. The facilitator can offer input and ideas about how the various components interconnect and can be placed to fulfill the maximum amount of Permaculture principles. Document the results of the mapping exercise either using images or by drawing the conclusions onto large sheets of paper, which can be posted in the classroom for ongoing reference throughout the course. This documentation will be useful for brainstorms and use in future trainings. If the participants wish to do so, they can work together during or outside of the course to create action plans and cost estimates of what would be needed to implement their ideas.

Presentation : Pollution of water, soil, and living creatures

Method : **Facilitator presentation**

Tools : **Images of sources and impacts of various types of pollutants**

Objective : **Participant understand more about the impacts of pollution**

Depending on the level of pre-existing knowledge about pollutants in the group, the facilitator can present and/or discuss the affects of pollutants as follows:

- Each pollutant has a different amount of time that it takes to break down and become less harmful or in some cases harmless, ranging from a few weeks to many years, to never.
- Different types of pollutants have different levels of toxicity and effects.
- The frequency that pollutants enter the environment impacts their destructive effects.
- The effects of pollutants on air and all creatures that need air to live.
- Pollutants in the air can travel widely and have serious negative impacts for all living creatures.
- Even in small amounts pollutants can be harmful by changing the natural chemical balance of air – over time this can effect weather patterns and eventually leads to global problems, such as global warming.
- Pollutants are absorbed through skin, which can harm growth.
- Over time, as air becomes increasingly polluted and creatures and plants breathe and absorb the polluted air, the pollutants build up in their bodies. This can harm and even kill all types of creatures and plants.

Effects of pollutants on water and water creatures

The following negative effects of pollutants can occur in rivers, lakes, and oceans, mostly near coastlines. Pollutants from rivers will feed into larger bodies of water.

- Even in small amounts pollutants can be harmful by changing the natural chemical and pH balance of water – the living environment of many creatures.
- Pollutants are absorbed by natural water born bacteria, microscopic animals, and small and large water creatures, which can harm their growth.
- Over time, as the environment becomes increasingly polluted and water creatures eat polluted bacteria, microorganisms, and small water creatures, the pollutants build up in their bodies. This can harm and even kill all types of water creatures.

Effects of pollutants on soil and plants

The following negative effects of pollutants can occur in soil.

- Even in small amounts pollutants can be harmful by changing the natural chemical and pH balance of soil – the living environment of many plants and creatures.
- Pollutants in the soil are absorbed by plants, bacteria, microscopic creatures, and insects, which can harm their growth.
- Over time, the soil will become increasingly polluted, which can create "dead" soil where no life can exist. The result is that the land is less productive for any type of crop.
- Beneficial insects that improve the soil, pollinate plants, and eat pests can also be killed.
- If pollutant levels are high in the soil this can weaken, damage, or even kill plants.
- Pollutants can also enter and build up in the plants themselves which is dangerous for anyone or anything that consumes these polluted plants.

Effects of pollutants on people and animals

People and animals depend on water and food from plants and animals. Pollutants are directly passed on to people and animals in many ways:

- By eating food (plants and animals) that contains pollutants.
- By breathing air that contains pollutants.
- By consuming or bathing in water that contains pollutants.
- These pollutants will cause sickness and in some cases even serious illness or death.

Creative thinking : Create a list of pollutants

Method : **Participatory and work group brainstorms**

Tools : **Large paper or black/white board, markers**

Objective : **Participant understand pollution and explore solutions/alternatives**

Step 1

With the entire group, conduct a brainstorm about pollutants from human activities, including farming practices, which affect water sources.

List various types of pollutants, and their impacts - why these materials are polluting and toxic (table 1).

Write the participant's answers on large pieces of paper or on the white/black board so that everyone can see and comment.

Step 2

Once the list of pollutants and their impacts is completed, ask the participants to split up into smaller work groups (see the Appendices for ideas about using creative group techniques) to brainstorm and list various types of pollutants to focus on for work group brainstorms about:

(a) alternatives/solutions, and

(b) why these alternatives are more sustainable (table 2).

The answers in the tables (right) are only supplied as ideas for the facilitator to prompt ideas and discussions.

Pollutants and their source	Impacts
Soaps and shampoos from washing in streams and rivers	Polluted water, which can travel downstream Health problems in water plants and creatures, animals, and people
Soaps from washing vehicles in streams and rivers	
Soaps from washing machinery in streams and rivers	
Outflow from chemical farming inputs (fertilizers and pesticides)	
Toxic paints and other chemicals, including oil and grease from machinery and vehicles	Can harm and kill water creatures in rivers and oceans
Non-biodegradable wastes dumped into rivers and streams, like household wastes, plastic bags, plastic packaging from soaps and shampoos, etc	Blocked waterways Flooding Damaged irrigation systems Beautiful natural environments become ugly
Defecating in rivers and streams	Polluted water, which can travel downstream Spread of water born diseases

Table 1 - Pollutants and their impacts

Solutions/ alternatives	Why it is more sustainable
Use natural soaps and shampoos	Ingredients in natural soaps break down very quickly into harmless chemicals
Create separate washing areas with water treatment systems	Chemicals are treated and become harmless before they enter the river
Use natural farming techniques	No polluting chemicals enter rivers
Create special areas for paints, used oil, etc, if possible send to waste treatment	Stops damage to the rivers and the general environment
Avoid using plastic whenever possible Recycle whenever possible Don't dump ANY plastic waste in rivers Bury or burn plastic using fast burning rubbish systems	Waste is reduced Wastes are recycled Causes much less damage to the environment, stops damage to rivers
Use toilets whenever possible Create black water cleaning systems Use compost toilets	Stops the spread of diseases and pollution through water systems

Table 2 - Solutions/alternatives

Step 3

After each workgroup has drawn their conclusions about the solutions/alternatives, they can present the results to the entire group for feedback and other suggestions.

Note: The same processes described above can be used by the facilitator to work with the participants to brainstorm solutions about other types of pollution.

Presentation : Waste management

Method : **Facilitator presentation**

Tools : **Images of safe and unsafe waste disposal, IDEP waste factsheet**

References : **PC Book MOD 3 - Houses, Water, and Waste Management**

Objective : **Participant understand more about waste disposal options**

Wastes are continually increasing in our environment. Awareness about environmentally sound solutions to reducing and disposing of wastes is of major importance. Good systems for disposal are a major component of Sustainable Community Design.

Ask the participants to think about how much waste material they saw in their environment when they were children. Then ask them to think about how much waste they see in their environments now. Finally, ask them to imagine, if nothing changes, how much waste will be in their environment when their children have children.

The best options for waste management are:

- Reduce – The amount of waste that is bought and created.
- Reuse – Waste items such as plastic bags, bottle, boxes, and jars instead of using or buying new items.
- Recycle – Instead of throwing waste away or burning it.

Some wastes cannot be recycled, and some communities do not have access to recycling facilities. Some safer waste disposal methods for un-recyclable wastes, and the reasons they are safer:

- **Small scale burying –** Less build up of toxicity in the soil.
- **Safe, fast burning in controlled environments –** This will greatly reduce the amount of toxic smoke, gas, and chemicals released into the air compared to standard burning practices, which are EXTREMELY dangerous for people's health (especially children). Note: Description on this method is available in PC Book MOD 3 - Houses, Water, and Waste Management.

Unsafe waste disposal methods and the reasons they are unsafe:

- **Burning –** Toxic smoke, gases, and chemicals enter the atmosphere, harming people and the general environment, and adding to global warming.
- **Unchecked dumping –** As rubbish decomposes, toxic materials enter the soil. This causes contamination of the soil and can affect plants, animals, and people nearby. It is also very ugly.
- **Dumping into waterways –** As rubbish slowly decomposes it releases chemicals that can cause chemical imbalance in the water and a build up of materials that can harm water bacteria and microorganisms. It can also harm and kill water creatures in rivers and oceans, and is also very ugly.

See **PC Book MOD 3 - Houses, Water, and Waste Management** for more details.

Creative thinking : Recycling and disposal of community waste

Method : **Small group brainstorms, whole group discussion**

Tools : **Large paper, markers, black/white board, IDEP waste factsheet**

References : **PC Book MOD 3 - Houses, Water, and Waste Management**

Objective : **Participants understand the benefits of recycling and waste management**

Step 1

Do a group brainstorm with the participants to identify and list the different types of wastes that are created in their community. On the board create a table something like the following; leave the answers to the questions blank so that the participants can come up with their own ideas (Table 1.)

Step 2

Ask the participants to split up into smaller work groups (see the Appendices for ideas about using a creative group techniques) and brainstorm how those wastes could be recycled. Once each work group has completed their brainstorms, they can present their ideas to the whole group (Table 2.)

The answers listed below are only supplied as guidelines for the facilitator to prompt ideas and discussions.

Type of waste	Common disposal
Plastic bags, plastic rubbish	Dumped in yards and rivers, burned
Plastic bottles	Picked up by waste collectors, dumped, burned
Paper	Picked up by waste collectors, dumped, burned
Leaves	Burned or left to rot
Rice husks	Mostly burned, sometimes used for cooking
Tin cans and other metals	Picked up by waste collectors, dumped, burned
Kitchen wastes	Fed to pigs, dumped
Toxic chemicals (paints, oils), batteries	Dumped, burned
Glass bottles	Reused, sold, dumped

Table 1. Group brainstorm types of wastes

Recycling ideas
Sell to waste collectors, send to recycling facilities, or reuse
Sell to waste collectors, send to recycling facilities, or reuse
Sell to waste collectors, send to recycling facilities, make recycled paper
Use as mulch or compost
Use as mulch or compost
Sell to waste collectors, send to recycling facilities
Feed to pigs, use as compost
Special areas for paints, used oil, etc, if possible send to waste treatment facilities
Sell to waste collectors, send to recycling facilities

Table 2. Recycling ideas

Creative thinking : Community garbage math

Method : **Participant analysis**

Tools : **Paper and pens for participants**

References : **IDEP waste math factsheet**

Objective : **Participants gain awareness about the scope of waste problems**

The facilitator should write the following exercise on the board large enough for everyone to read and/or hand out the IDEP waste math factsheet to all the participants.

Ask the participants to either work individually or in groups to find the answers to the following questions.

- In an average small village 1 family produces about 1 plastic bag of garbage each day. If there are 2,000 families in a village, how many bags of garbage does that village produce each day?
- 1 garbage truck holds about 200 bags of garbage. How many trucks of garbage does the village produce each day?
- There are 365 days in a year. How many trucks of garbage does the village fill up each year?
- You can fit about 400 trucks in a football field. How many football fields of garbage does the village produce in just 5 years?

Once the participants have their answers they can compare results.

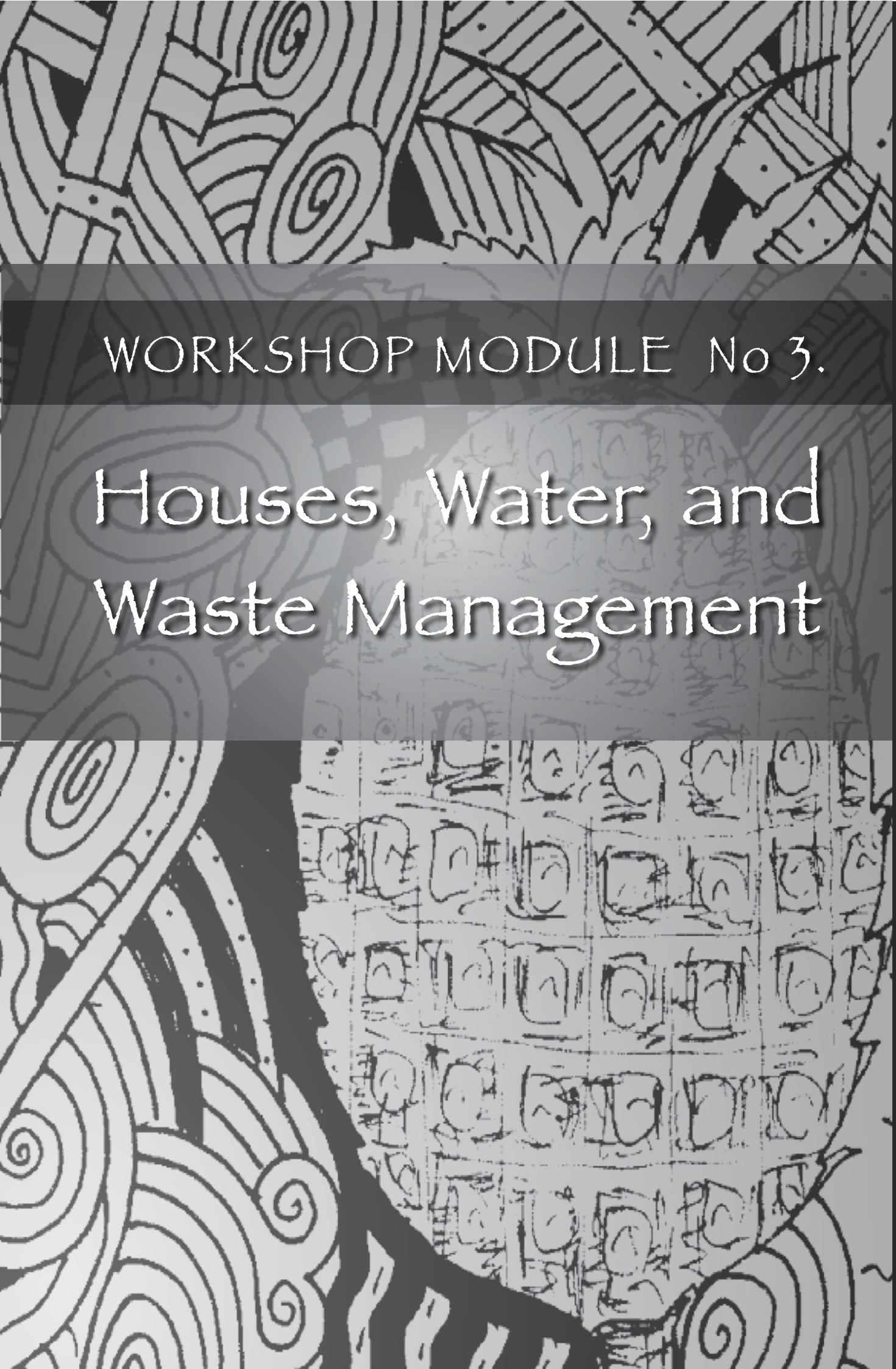
The facilitator may choose to conduct a group discussion about the issues that this exercise has raised in participants' minds.

Notes...

Notes...

WORKSHOP MODULE No 3.

Houses, Water, and Waste Management



Permaculture Facilitator's Handbook Module 3. Houses, Water, and Waste Management

Notes...

Presentation : Houses and their environments

Method : **Facilitator presentation**

Tools : **Images of good house designs, black/white board, markers**

References : **PC Book MOD 3 – Houses, Water, and Waste Management**

Objective : **Participants understand the impacts of houses and their environments**

Every house and its environment can be impacted by the land and environment around it. For example:

- Rainfall – Can create rot and mold.
- Erosion, floods, and mudslides – Can damage or destroy structures.
- Wind – Can wear out the house, damage roofs, and make life unpleasant.
- Temperature – Can make life unpleasant.
- Soil type and rocks – Can make the house unstable.
- Trees – Can fall on buildings and roots can damage foundations.
- Lack of readily available water supply – Can make extra work (carrying water).
- Mosquitoes and poisonous insects - Can cause serious health problems.
- Termites and ants - Can damage structures.

All these factors can be addressed to reduce work, improve the house and living environment, and reduce or prevent problems in the future.

Every house and its environment also impacts the land and environment around it. For example:

- Use of resources – Need for food, water, firewood or cooking fuel, building materials, medicines, electricity, cleaning materials, etc.
- Access – Need for vehicles and roads.
- Pollution – Smoke, rubbish, dirty water, human waste, etc.
- Gardens – Vegetable gardens, animals, etc.

A healthy house is a practical, long lasting house that uses minimal energy, resulting in easier and better living and reduced living costs. Making your house and its environment better doesn't have to cost more money. In fact many ways to improve house and living quality will save you money, while providing extra resources for your family, such as fertilizer for fruit trees, water for vegetables, food for animals, less firewood to buy.

By designing or renovating a home using Permaculture principles, sustainable building materials, and energy efficient design with appropriate technology we can improve the occupants' quality of living and reduce living costs.

Notes...

Presentation : Sustainable and unsustainable building materials

Method : **Facilitator presentation**

Tools : **Images of houses from sustainable materials, black/white board, markers**

References : **PC Book MOD 3 – Houses, Water, and Waste Management**

Objective : **Participants understand sustainable and unsustainable building materials**

It is important to choose good building materials that suit your local environment. The use of different types of building materials can have a big effect on the quality and comfort of a house, in both positive and negative ways.

When thinking about sustainability of building materials, consider:

- Where does the material comes from – Is the source sustainable?
- What is it made from – Is it natural or not?
- Will the material pollute the environment around it over time?
- Could it be dangerous for people? If so, how?
- How long will it last? How much waste would it create?

Sustainable building materials:

- Will moderate temperatures.
- Are long lasting and suit the local environment.
- Do not contain materials that can harm people or the environment.
- Come from local resources – support the local economy and reduce energy use and transportation costs.
- In hot areas sustainable building materials use light, low mass materials.
- In cold areas sustainable building materials use dense, high mass materials.

Unsustainable building materials:

- Come from non-renewable sources (cannot be replenished), which will cause permanent damage to ecosystems.
- Contain glues that can emit harmful gasses and toxins.
- Contain materials that can emit harmful gasses and toxins (like asbestos).
- Some paints contain lead and other toxins, which can cause health problems for people and the environment.
- Do not moderate temperature, therefore increasing energy costs.
- Do not last long which creates waste.

Creative thinking : List various building materials

Method : **Participatory brainstorm, group discussion**

Tools : **Paper, markers, black/white board**

References : **PC Book MOD 3 – Houses, Water, and Waste Management**

Objective : **Participants identify sustainable and unsustainable building materials**

A. List of sustainable building materials

Step 1

With the entire group, conduct a brainstorm to create a list of the best, most environmentally friendly (sustainable) building materials. Ideally, these materials would be produced from local resources (table 1). Write the participant's answers on a large piece of paper or on the white/black board so that everyone can see and comment.

Step 2

Once the list of sustainable building materials is complete, ask the participants to split up into smaller work groups (see appendix for ideas about using a creative group techniques) and work out (a) where the materials come from, and (b) how they feel those materials may be used. (table 2.)

The answers listed below are supplied for the facilitator only for prompting ideas and discussions if the participants need help.

Sustainable material
Bamboo
Rock
Grass thatch
Clay brick
Renewable timber
Palm fiber
Rattan

Table 1.

Where the material comes from	Various ways it can be used
Local area	Handicraft, fence, furniture, kites, roofing, building, incense stick, cooking fuel, rope
River, mountain	Building
Local area (rice field)	Roof, bed (use only the leaf, wash with water and whitening agent first)
Construction waste	Wall, floor, stove
Waste from construction and logging company	Dust can be use for triplex, incense, charcoal, cooking fuel. Timber can be use for furniture, construction, temporary house
Palm tree	Roof, rope
Forest	Furniture, handicraft

Table 2.

Step 3

After each workgroup has created their lists, they can present the results to the entire group for feedback and other suggestions.

B. List of unsustainable building materials

Step 1

With the entire group, conduct a brainstorm to create a list of the least environmentally friendly (unsustainable) building materials that are currently being used in local construction (table 1). Write the participant's answers on a large piece of paper or on the white/black board so that everyone can see and comment.

Step 2

Once the list of the least environmentally friendly (sustainable) building materials is done, ask the participants to split up into smaller work groups (see appendix for ideas about using a creative group techniques) and work out (a) where the materials come from, and (b) how they feel those materials may be used (table 2).

The answers listed below are supplied for the facilitator only for prompting ideas and discussions if the participants need help.

Unsustainable material	Where it comes from	What is it made from	Various ways it is used	Could it be a health hazard	How long it lasts
Asbestos sheeting/ roofing	Manufactured	Asbestos was once considered a "miracle mineral". Made from krisotil minerals	Roof, wall, floor, stove	Yes, example: Mesothelioma, lung cancer, possibly other cancers, Asbestosis, pleural injuries	10-40 years
Chipboard	Manufactured from recycled materials	Wood particle or flakes, resin and wax	Furniture	Yes. Flush eyes with water for at least 15 minutes if dust gets into eyes	5-10 years, less if wet
Triplex	Manufactured	Wood	Buildings, furniture	Yes. Dust from triplex can damage lungs	10-20 years, less if wet
Cement brick	Manufactured	Cement, sand, and stone	Walls, septic tanks, containers	Yes. By skin contact, eye contact, or inhalation	10-40 years
Rainforest woods	Forest	Trees	Buildings, decoration, furniture, handicraft,		10-40 years
Untreated woven bamboo	Local area	Bamboo	Handcraft, buildings, roof, walls	Yes. Dust from deteriorating bamboo can damage lungs	1-5 years

Table 1. **Table 2.**

Creative thinking : Sustainable house design ideas

Method : **Presentation and work group, participatory brainstorms**

Tools : **Images of house improvement, black/white board, big paper, markers**

References : **PC Book MOD 3 – Houses, Water, and Waste Management**

Objective : **Participants learn techniques to improve their houses and quality of life**

Step 1

Using something like the table below, and if available photo of examples, the facilitator introduces techniques that can improve houses and the quality of life for the occupants (table 1).

Step 2

Ask the participants to split up into smaller work groups to brainstorm and list as many local examples of ways to improve houses, including local plants and building materials that can be used. Once each workgroup has completed their brainstorms, they can present their ideas to the whole group (table 2).

The answers listed below are only supplied for the facilitator for prompting ideas and discussions if the participants need help.

Ways to improve houses	Effects
Build trellises or pergolas outside the house for planting productive vines	Cools the house and produces food
Plant productive shade trees on the western side of the house	Provides shade, cools the air around the house
Toilet and washing area outside and down-wind	Reduces bad odors
Wastewater flows through a productive filter garden	Cleans wastewater and directs it to productive plants

Local examples	Local plants and building materials
In Buleleng regency many people grow vines around their houses	Plants: rose apple, castro bean, passion fruit, pineapple, papaya, banana, cassava / Materials: bamboo, used wood, coconut leaf
In Banjar Dukuh, Sibetan villages, houses are surrounded by *salak* trees	Plants: Rambutan, mangos, avocado, palm, rose apple, guava, vines, orange
In Mendoyo Dauh Tukad, Bali people have toilets outside the house and position them based on wind direction	Plants that draw water: banana, galanga, elephant grass / Materials: bamboo, used wood
In some villages banana pits are used to deal with household wastewater	Plants: banana, vetiver, canna flower / Materials: clay, rice husks

Good ventilation and air flow through the house (hot air rises and leaves through high up ventilation and cool air enters from the bottom)	Keeps house much cooler for no cost
Insulation and sound-proofing	Moderates the temperature and reduces noise pollution
Mosquito proofing bedrooms, or the whole house	Reduces mosquito born diseases
Windows and skylights	Increases light in the house, reduces sight problems
In hot areas, use light, low mass materials, such as bamboo	Reduces heat storage in walls and floor
In cold areas, use dense, high mass materials, such as rocks or clay	Increases heat storage in walls and floor
In cold areas add a natural render for clay and brick houses	Moderates house temperature and makes it last longer
Appropriate windbreaks around houses, compounds, or villages	Reduces the risk of wind damage
Ponds near the house	Provides food, moderates temperature, solution for stagnant water (reduce mosquitoes), adds beauty

Table 1. Facilitator presentation

In Bali they have doors with ventilation called "krepiak" doors	Plants: flower, palm, decorative trees / Materials: bamboo, wood, coarse grass
In Sanur, Bali some houses plant trees as barriers	Plants: banana, papaya, palm / Materials: bamboo
Put up mosquito nets and screening	Materials: mosquito nets and screening
Bali house compounds follow temple in east and north corner	Plants: casuarina tree, yellow coconut, bottle palm / Materials: woven bamboo, coconut leaf, grass thatch
In coastal areas houses are made on platforms, with bamboo and thatch	Materials: bamboo, used wood, thatch
In mountain areas stones, rocks, and mud from rivers	Materials: clay, rocks, mud
In Penglipuran village Bangli, Bali houses are made from earth	Materials: earth, clay, bricks
Planting legumes and fruit trees around the house	Plants: mango, banana, papaya, rambutan, coconut
Aquaculture system at the IDEP Foundation Demo Site in Ubud Bali	Plants: water lily, canna flower, vetiver, banana / Materials: clay, rocks, cow manure, bamboo poles and leaves

Table 2. Group brainstorm

Step 3

After each workgroup has created their lists, they can present the results to the entire group for feedback and other suggestions. As the participants present their ideas, the facilitator may choose to strengthen the learning process by sketching the ideas that the group comes up with on a board or large piece of paper, while combining and building upon the techniques suggested.

Presentation : Healthy and practical kitchens

Method : **Facilitator presentation**

Tools : **Images of different kitchen elements, black/white board, markers**

References : **PC Book MOD 3 – Houses, Water, and Waste Management**

Objective : **Participants learn how to incorporate sustainability into kitchen design**

People, especially women and small children, spend more waking time in the kitchen than any other room in the house.

Therefore it is very important that the kitchen has a healthy, clean, and comfortable environment.

List or brainstorm the following key points with the participants, then write out the results on a large piece of paper for later reference by the participants when they begin the design exercise.

Well designed kitchens

A well designed kitchen is easy to clean and has as many of the following features as possible.

Animal and insect proofing

- A good door and meshed openings to prevent vermin and animals from entering.
- A storage cupboard that is rat and insect proof to prevent contamination, insect damage, and spoilage. Also seal up cracks and crevices where insects and vermin like to live.
- Chopping boards that can be hung up after cleaning - rats love to lick cutting boards and this can make people very sick!
- A dry-box for rice and other grains to protect them from vermin and animals, and to reduce insect damage and spoilage.

Water systems

- Piped clean water into the kitchen with a leak-free tap (to conserve water).
- A sink large enough for the family's needs with a plug and drain pipe.
- A system for channeling wastewater, which leads to a gray water cleaning system to treat and re-use the water as much as possible.

Cooking area

- An easy to clean food preparation area, which is off of the floor.
- A smoke-free cooking stove. If gas isn't possible then a well designed wood stove with ventilation. A well designed wood stove can also be a good addition to a kitchen in case of a disruption in cooking fuel like kerosene, gas, or electricity.
- Firewood storage area – wet or green wood produces A LOT more smoke.
- A hanging rack close to the stove for pots and pans.

Insulation and lighting

- An insulated roof.
- Low and high ventilation and fans to keep the kitchen cool and reducing smoke, kerosene fumes, and smells.
- Good lighting during the day, provided by windows and/or skylights.
- Bright lighting at night to protect people's eyesight.

Poorly designed kitchens

Poorly designed kitchens are unhealthy in many ways, including:

Disease spread by:

- Vermin, insects, or domestic animals contaminating food through droppings and other body fluids.
- Poor water quality and wastewater.
- Vermin walking over eating utensils.

Other problems:

- **Difficult to clean** and poor kitchen hygiene.
- **Wasted food** - Which has not been stored properly, spoiled, or has been eaten by insects, vermin, or domestic animals.
- **Damaged eyesight** - People who try to see in a dark kitchen.
- **Lung ailments** - From breathing smoke and toxic fumes in a poorly vented kitchen.

Presentation : Water strategies

Method : **Facilitator presentation**

Tools : **Images of good examples of water conservation strategies**

References : **PC Book MOD 3 – Houses, Water, and Waste Management;**
PC Book MOD 6 – Home and Community Gardens;
PC Book MOD 7 – Farming

Objective : **Participants understand the importance of water management**

Water is our most precious resource and it must be used wisely.

Every individual and community can help to ensure that local water supplies are not wasted, polluted, or lost. Current patterns of rainfall and water distribution are rapidly changing and unpredictable due to climate changes, deforestation, and poor land use. This is an increasing problem worldwide.

In many areas land is dry for part of the year, which can limit or even prevent annual food crop production. In other areas and at other times of the year, there is too much water which can also limit or even prevent annual food crop production.

All water – rivers, ground water, stored water, irrigation water, and household water – should also be kept as clean as possible, free of pollutants, dirt, bacteria, and mosquito larvae. This can be achieved by through good water use habits and systems.

There are many techniques we can use to optimize our water use efficiency and conserve fresh water.

Garden and farm techniques

- Water the garden in the early morning or late afternoon.
- Garden borders, made from rocks, bamboo, or wood help to hold more water in the soil.
- Always use mulch.
- Windbreaks around garden plots will save a lot of water.
- Use bamboo or plastic watering pipes in the soil to reduce evaporation.
- Use simple bamboo irrigation strategies.

See **PC Book MOD 6 - Home and Community Gardens** for more information about the above strategies.

Catch and store rainwater

Roof run-off can be stored in water tanks or drums.

Note: Depending on the roofing material used, water run-off may be contaminated with lead from roofing iron or asbestos sheeting. This water is not suitable for drinking water, but in areas with low levels of pollution roof water can be used for washing.

Use compost toilets

Compost toilets are an excellent way to reduce water use, especially in areas that have limited water supplies. Compost toilets do not need water to function and human wastes are converted through the composting process into valuable fertilizer that can be used on tree crops.

Use compost showers

Compost showers are a simple method for returning all shower wastewater directly into the ground to be used by productive plants and trees. It is a dug pit circle, approximately 2m wide and 1m deep, with a floor and a simple structure around the shower to give privacy and provide trellising for vines.

See PC Book MOD 3 - Houses, Water, and Waste Management for more information about the above strategies.

Protect water sources (springs, rivers, wells, etc)

Protect water sources from contamination from animals, soaps, rubbish, pollutants, dirt, and misuse. Create separate drinking areas for animals. See PC Book MOD 7- Farming for more information about the above strategies.

Creative thinking : Managing and storing drinking water

Method : **Participatory and work group brainstorms**

Tools : **Black/white board, large sheet of paper, markers**

References : **PC Book MOD 3 – Houses, Water, and Waste Management**

Objective : **Participants identify local solutions for storing drinking water**

Step 1

Using something similar to the table below, the facilitator can ask the participants to identify various sources of water in the community (table 1a), and methods that are used for storing drinking water (table 2a) in the community.

Then, ask the participants to suggest and write on the board different potential problems that can arise from these collection points and storage methods. The facilitator can help to fill out these answers if necessary.

The answers listed below are only supplied as guidelines for the facilitator for prompting for ideas and discussions should the participants need help.

Sources	Potential problems
River	Pollution
Well	Human waste, gray water
Pumped	Human waste, gray water
Spring	Fertilizer, erosion, logging
Rain water	Insects
Sea water	Salty

Table 1a. Water sources and problems

How drinking water is stored
Settling tank, dosing siphon, screening, vertical cell filtration with media gravel/sand, wet land plant, aeration, fish pond (biological indicator), disinfection with UV or boiled
Filtration with media gravel/sand, wet land plant, disinfection with UV or boiled
Filtration with media gravel/sand, wet land plant, disinfection with UV or boiled
Settling tank, disinfection with UV or boiled
Water tank, disinfection with UV or boiled
With distillation system

Table 1b. Solutions for sources

Sources	Potential problems
Wastewater	Human waste, gray water, animal waste

Table 2a. Water storage and problems

How drinking water is stored
Settling tank, dosing siphon, screening, vertical cell filtration with media gravel/sand, wet land plant, aeration, fish pond (biological indicator), disinfection with UV or boiled

Table 2a. Solutions for storage

Step 2

Ask the participants to split up into smaller groups and come up with creative solutions to the potential problems listed on the tables.

Step 3

After each workgroup has created their lists, ask them to write them on the board (tables 1b and 2b) while presenting the results to the entire group for feedback and other suggestions.

The following ideas are some key points that should be covered during this exercise, which can be used by the facilitator to prompt the participants if needed.

Water storage problems and solutions

- Only use clean buckets or clay pots with tight lids for storing drinking water - Label water buckets so that they are used for drinking water only. Clay pots will also help to keep water cooler but they need to be cleaned more often.
- Water tanks and water sources should to be shaded to keep water cool and healthy and provide shade for those who use them - Build a trellis over the tank to grow vine plants on.
- Drinking water contaminated with mosquito larvae can cause serious diseases such as malaria and dengue fever - Water tanks need to be protected from mosquitoes, and have secure covers. Use wire mesh screens to cover ALL insect entry points to a tank.
- Stagnant water can be a breeding ground for mosquitoes and bacteria. Overflow from water tanks can be diverted into animal drinking troughs and/or food production systems.

Water sources problems and solutions

- Stop dirty water and animals from contaminating wells – Build a circular wall around the edge of the well about 1m high with rocks and mortar or cement.
- Drinking water contaminated with mosquito larvae can cause serious diseases such as malaria and dengue fever - Covers for water wells will help to reduce mosquitoes breeding.
- Keep animals and poultry away from drinking water - Separate the water that is used for animals. It is a good idea to construct an animal watering system downhill from your water source.
- Stagnant water can be a breeding ground for mosquitoes and bacteria. Overflow from water sources can be diverted into animal drinking troughs and/or food production systems.

Field activity : Create a safe water storage system

Method	**: Participatory construction of safe water storage system**
Tools	**: See below**
References	**: PC Book MOD 3 – Houses, Water, and Waste Management**
Objective	**: Participants create an integrated, well managed water source**

Prior to running this exercise the facilitator should identify an appropriate water source exercise (i.e. a water tank, well, water pump, etc), which can be as outlined in this exercise.

This site should have the following criteria:

- Be prone to mosquito breeding.
- Have overflow/stagnant water problems.

Prepare the following tools and materials

- Trellis materials (bamboo, wood, rope, nails, etc).
- Vines for planting the trellis.
- Wire mesh screen.
- Water loving productive plants.
- Rocks, gravel, and sand.
- Materials for creating a cover (if the water source is a well).
- Tools and materials needed for implementing each of the following steps.

Running this exercise

Water source needs to be shaded to keep the water cool and to provide shade for those who use the water source.

Step 1

Create cooler water

Work with the participants to build a trellis over a water source. Planted the trellis with various types of vine plants (that will simultaneously provide shade and food production). Types of plants that are suitable for this include:

- Passion fruit.
- Choko.
- Climbing beans.
- Ask the participants to suggest others.

Note: Suggest to the participants that until the vines grow, coconut leaves can be used to cover the top of the terrace and provide shade. Drinking water that is contaminated with mosquito larvae can cause serious diseases. To protect the community, water sources and storage tanks need to be screened off from mosquitoes and have secure lids.

Step 2

Protect the water source

Work with the participants to protect the water from mosquitoes using the wire screens and/or lids that are appropriate for the water storage unit. Overflow from water sources can create stagnant water.

Step 3

Use overflow water to water gardens

With the participants, design a water overflow area that eliminates any stagnant water and re-uses it for growing productive plants. This can be a shallow trench that runs into a pit with some gravel and sand which creates an area for water to drain and water loving productive plants to grow. Types of plants that are suitable include:

- Banana.
- Taro.
- Water spinach.
- Ask the participants to suggest others.

Note: Suggest to the participants that an animal drinking container could also be created, but if they choose this method they need to take care not to create a mosquito-breeding place.

For more information and ideas see **PC Book MOD 3 – Houses, Water, and Waste Management.**

Field activity : Cleaning drinking water

Method : **Participatory trial of cleaning a local water source**

References : **PC Book MOD 3 – Houses, Water, and Waste Management**

Objective : **Participants learn simple techniques for cleaning drinking water**

These exercises use either clay water filter pots or moringa seeds to clean drinking water. For detailed instructions on preparing for and running this exercise, including:

- Materials needed.
- How to construct it step by step.
- How to use and maintain it.

See **PC Book Chapter 3 - Houses, Water, and Waste Management.**

Presentation : About wastewater treatment systems

Method	**: Facilitator presentation**
Tools	**: Images of wastewater filter systems, black/white board, markers**
References	**: PC Book MOD 3 – Houses, Water, and Waste Management** **IDEP Wastewater Gardens Fact Sheet**
Objective	**: Participants understand types and function of water filter systems**

All wastewater from houses can potentially be used for irrigating productive gardens and fruit trees.

Before wastewater is reused it needs to be cleaned using a wastewater treatment system.

There are two types of wastewater:

- **Grey water** – Water that was used for washing and cleaning.
- **Black water** – Water that was used for toilets.

The type of system that is needed will depend on the type of pollutants that need to be cleaned and the amount of wastewater.

Note: No poisons or bleach can be poured into wastewater that enters any type of water filtration systems because it will damage the system by killing bacteria and possibly plants as well.

There are several ways that grey water can be cleaned, including:

- Wastewater can be run into an absorption trench then into a pit in which plants are placed.
- On sloping land wastewater can be run via a pipe or small absorption trench, down into a swale in which plants are grown.
- Using a wastewater treatment garden (see below).

Note: For many areas of Indonesia where water is scarce the trench or swale methods will be most practical and easy to maintain.

For either grey water or black water, a system called wastewater gardens can be used. Wastewater gardens channel wastewater through gravel gardens, in which a wide range of water tolerant plants are grown. The plants absorb and use the excess nutrients in the wastewater rendering the water safe for irrigation.

The benefits of wastewater gardens include:

- They don't cost very much to make and require minimal maintenance.
- The outflow from the system is an effective fertilizer.
- They are sealed so no wastewater contaminates the soil, ground water, or coastal waters.
- They reduce the amount of pollutants from wastewater and make the water safe for irrigation.
- They remove the potential for stagnant wastewater around houses, which is a breeding area for mosquitoes and water born bacteria.

The facilitator can show images, which explain different types of wastewater treatment systems and explain in more detail a basic system for home use that can be replicated at low cost using local resources in villages.

See **PC Book MOD 3 – Houses, Water, and Waste Management**, and/or the IDEP Wastewater Gardens Fact Sheet for more details and illustrations.

Field activity : Create a biological wastewater filter

Method	**: Design and build a biological plant filter system for grey water**
Tools	**: See below**
References	**: PC Book MOD 3 – Houses, Water, and Waste Management**
Objective	**: Students build a biological plant filter system for grey water**

Note: This exercise is recommended for the treatment of grey water only. Safe treatment of black water needs to be done very carefully to avoid creating any contamination of local water supplies. If you are interested in working with black water systems, contact wwg@idepfoundation.org for more information.

Preparation

The facilitator should identify an appropriate site with wastewater.

The site should have:

- Grey water pollution only.
- A maximum of 500 liters per day of wastewater. Note: The facilitator should determine amount of water per day to be treated ahead of time.
- A grey water source which slopes down to the filtering area and continues to slope down to the final exit point.
- Sufficient sunlight to keep plants alive and healthy.

The facilitator should also prepare the following materials and tools:

- Water loving plants (non-edible).
- Gravel.
- Digging tools.
- Rocks.
- Impermeable layer materials.

Running this exercise

Take the participants on a walk to do a field survey of the area and explain the reasons it was chosen and how the amount of wastewater to be treated was calculated.

Work together with the participants to:

1. Calculate the size of the hole needed to hold at least 3 times the daily water flow that has been calculated.
2. Dig the hole.
3. Create an impermeable (water proof) layer using one of the following:
    - Clay (10-15cm thick).
    - Gley - cow manure (50 parts), organic matter (10 parts) and dirt (40 parts), mixed together (10-15cm thick).
    - Ferro cement (7-10cm thick).
4. Build an overflow point at the end of the system (using a pipe or a channel) to control the volume of water in the system. The height of the overflow point must be lower than the top of the system so that if needed it can be raised. This overflow point will channel any excess wastewater – the cause of which should be eliminated as soon as possible i.e. overflow point raised, system size increased, or use decreased.
5. Fill the hole with gravel and compost so that plants will have some nutrients before the system is fully functional.
6. Plant the gravel with at least 3 types of water loving plants per $1m^2$. The root lengths of the plants should be varied so that the entire system is filled with roots once the plants have grown. If you use any productive plants make sure that the harvested parts will never coming in direct contact with the wastewater, for example coconuts or bananas work well because the fruits are high up and far from the base of the plant.
7. Design an absorption trench or irrigation system into which the treated water will flow.

For more ideas, see **PC Book MOD 3 – Houses, Water, and Waste Management.**

Field activity : Build a compost shower

Method	**: Participatory construction of a compost shower**
Tools	**: See the compost shower section in the PC Book MOD 3**
References	**: PC Book MOD 3 – Houses, Water, and Waste Management**
Objective	**: Participants learn how to build a compost shower**

Preparation

Choose an appropriate site for the compost shower. It should be:

- Not within 3m of a building as it creates damp ground.
- Level or almost level ground.
- Not too close rivers or springs – soap may enter the water if within 5m.

Running this exercise

For detailed instructions on building composting showers including:

- Materials needed.
- How to construct it step-by-step.
- How to use and maintain it.

See **PC Book Chapter 3 - Houses, Water, and Waste Management.**

Presentation : Types of composting toilets

Method : **Facilitator presentation**

Tools : **Images of compost toilets, black/white board, markers**

References : **PC Book MOD 3 – Houses, Water, and Waste Management**

Objective : **Participants learn benefits compost toilets and how to make them**

Human manure is a valuable resource that can be turned into quality fertilizer. But it must be treated and composted properly so that diseases are not spread.

Compost toilets can provide many benefits, such as:

- Makes great fertilizer.
- Uses much less water, sometimes none at all.
- Reduces and prevents diseases.
- Prevents animals eating human waste – which can in turn cause diseases.

Using composting toilets is an example of turning a problem into a solution.

Key types of compost toilets are:

- Compost toilet pit.
- 2-box compost toilet.
- Single box continuous systems.

For most rural areas in Indonesia the compost toilet pit and the 2-box compost toilet are the easiest to build and maintain. The single box continuous system compost toilet is better for highly populated areas.

Before recommending or facilitating the use of composting toilets, it is important for facilitator to ensure that the participants understand how to use and maintain the toilets properly, or they can become a serious health hazard.

For more information about compost toilets, see the "Compost toilets" section in **PC Book MOD 3 – Houses, Water, and Waste Management.**

Creative thinking : Plan to eliminate stagnant water

Method	**: Field walk and discussion, small groups participatory brainstorm**
Tools	**: Large paper, or white/black board, markers**
References	**: PC Book MOD 3 – Houses, Water, and Waste Management**
Objective	**: Students understand problems and develop solutions for stagnant water**

Diverting and eliminating stagnant water is very important to help reduce mosquito born diseases and the spread of water born bacterial disease because it eliminates breeding sites.

Preparation

The facilitator should identify land with stagnant water prior to the exercise, which is an appropriate site for the participants to do the following study and analysis.

Make sure the participants have paper and pens that they can use during the observation walk to document their findings.

Running this exercise

Step 1

Take the participants on a walk to do a field survey of that area. Have the participants assess the area and write down the answers to the following questions:

- What kinds of insects or bacteria are breeding in the stagnant water?
- What diseases could they catch from those insects?
- What could be done to divert or eliminate the stagnant water?

Step 2

Return to the class and ask the participants to divide into smaller work groups (see the appendix) and brainstorm and list as many ways as possible to solve problems related to stagnant water.

The following ideas are some key points that should be covered by the participants' presentations. The facilitator can use the following checklist to prompt the participants if needed.

Checklist

- On flat land gravel pits or trenches work well to eliminate stagnant water.
- Ponds are a good solution if they contain fish that eat mosquito larvae.
- Diverting stagnant water from flat land to sloped land with contoured trenches.
- Adding neem leaves to ponds every 3 months will help prevent mosquitoes breeding.
- Always plant water loving plants in trenches and/or pits to help soak up the stagnant water. What is planted depends on whether the water is polluted or not.
- For non-polluted water use bananas, taro, water spinach, and other productive plants.
- For polluted water use bananas (or other tall plants with fruits) and non-edible water loving plants.

Step 3

Once each workgroup has completed their brainstorms, they can present the results to the entire group for feedback and other suggestions.

Note: If stagnant water is a big problem in the community, then the following exercise can be conducted to stimulate participatory problem solving and developing an action plan.

Step 4 (optional additional activity)

- Together with the participants draw a map or list other areas they know of in the community that have stagnant water where mosquitoes breed.
- As a group brainstorm community action plans to eliminate these problems.
- Write the ideas that the participants come up with on the board or on a large piece of paper so the entire group can offer feedback and other suggestions.

Creative thinking : Household waste disposal methods

Method : **Participatory work group brainstorm**

Tools : **IDEP waste management fact sheets as handouts for participants**
Large paper, or white / black board, markers

References : **PC Book MOD 3 – Houses, Water, and Waste Management;**
IDEP waste management fact sheets

Objective : **Participants learn about solutions for household waste management**

Step 1

Distribute the IDEP waste management fact sheets and have everyone read them.

Step 2

Using something like the table below, the facilitator can ask the participants to identify local household wastes and how they are usually disposed of. Then ask them to talk about whether these disposal methods are safe or not (table 1). The facilitator can help to fill out these answers if necessary. **The answers listed below are only supplied as guidelines for the facilitator if the participants need help or prompting for ideas and discussions.**

Household wastes	Disposal methods used	Is it safe or not? Why?
Kitchen wastes	Fed to pigs, dumped	If dumped, will produce liquid and bad odors
Newspaper, magazine, paper	Dumped	Reduces forest trees
Plastics, bottles, cans, iron	Dumped, burned	Needs at least 100 years to decompose
Batteries, toxic chemicals (oil, paint, etc)	Dumped, burned	Poisonous

Table 1. Household wastes

How could it be reduced, reused, or recycled
Fed to pig, compost
Make recycled paper, sell it to waste collectors
Recycled, reused
Special areas for paints, used oil, etc, if possible send to waste treatment center

Table 2. Solutions

Step 3

Ask the participants to split up into smaller work groups (see the appendix) and have each workgroup come up with creative solutions for reducing, reusing, or recycling the various types of household wastes that are listed on the table.

Step 4

After each workgroup has created their lists, ask them to write them on the board (table 2) while presenting the results to the entire group for feedback and other suggestions.

Field activity : Design a "Permaculture house"

Method : **Participants build a 3-D model of a healthy house**

Tools : **Materials for 3-D models, paper, markers**

References : **PC Book MOD 3 – Houses, Water, and Waste Management**

Objective : **Participants can create integrated designs of healthy houses**

Divide the participants into small groups using a creative group creation technique.

Provide the materials for the work groups, and ask them to make a 3-dimensional model of a healthy house. The participants can create on paper and/or 3-dimensional models. The various elements in the healthy house design should include:

- Sustainable building materials.
- Insulation and sound-proofing.
- Windows and skylights.
- Pergolas surrounding the house.
- Water source.
- Compost showers.
- Productive wastewater garden.
- Productive shade trees.
- Ponds near the house.
- Good ventilation and air flow.
- Mosquito proofing.
- Trellises with vine plants.
- Healthy kitchen.
- Safe drinking water storage.
- Compost toilets (outside, down-wind).
- Waste disposal and recycling.
- Windbreaks around house.
- Elimination of stagnant water.

Note: Remind the participants that their designs should suit a local budget and be made from local materials wherever possible.

Have the work groups present the results of their construction models and explain the house's features and building materials used to the whole group.

Document the results of the design exercise either using images or by drawing the conclusions onto large sheets of paper. This documentation will be useful for ongoing brainstorms and use in future trainings.

Notes...

WORKSHOP MODULE No 4.

Healthy Soil

Notes...

Presentation : Soil improvements

Method : **Facilitator presentation and group brainstorms**

Tools : **Images of healthy and unhealthy soils, and relative productivity**

References : **PC Book MOD 4 - Healthy Soil**

Objective : **Participants understand healthy, living soil and how to achieve it**

Healthy plants need nutrients to grow and produce; these nutrients are drawn from the soil.

Therefore, healthy living soil is the most important factor in all successful agriculture and gardening. If good techniques and management are used, soil quality will improve each year.

Healthy living soil needs to be:

- Replenished with fresh nutrients each season.
- Protected from erosion, to build up good topsoil.
- Protected from the sun and wind to preserve moisture.
- Alive with very small soil animals and plants (biota).

The facilitator can encourage a discussion with the participants about:

- The benefits of healthy living soil.
- What healthy living soil is.
- Techniques that can be used to achieve healthy living soil.

The answers listed below are supplied for the facilitator only for prompting ideas and discussions if the participants need help.

Some of the many benefits of healthy living soil:

- **Better soil quality will not only increase produce, but will also improve the quality of this produce.** This relates directly to good nutrition – better quality soil means better quality produce with more nutrients. And it tastes better too! This is a direct way of improving health. Improved health means fewer visits to the doctor, better concentration, more strength and energy, and a longer life. Good quality vegetables will also make people more full when they eat, and will keep them full for longer.
- **Plants are more drought, disease, and pest resistant** because they have all the water and nutrients needed to grow strong and healthy.
- **Less watering is needed** because the soil can hold and store more water and the soil doesn't become water logged in the wet season.

- **The soil will have millions of "soil workers"** that manage nutrient availability and storage, and increase the amount of air in the soil. Worms are particularly hard workers.
- **The soil is easier to dig and work with** because it is less compacted and includes more types of materials.
- **The inputs that are needed for healthy living soil are locally available** and organic, which saves money.

What is healthy living soil?

Healthy living soil contains humus, which:

- Provides food for soil biota, which breaks down humus and turns it into food for plants.
- Stores plant nutrients, such as liquid fertilizer.
- Helps to bind soil particles together, which improves soil structure.
- Soaks up and stores water like a sponge.

Humus is made up of:

- Broken down organic matter.
- Compost.
- Mulch.
- Manure.
- Decomposing plant roots.
- Decomposing plant material.

Healthy soil is alive - It contains billions of soil biota that turn organic matter and nutrients into plant food. Soil biota includes bacteria, micro-organisms, ants, earthworms, and very small organisms.

It contains a good mix of clay and sand particles; not too much of either - The clay holds minerals and the sand allows drainage.

It should hold together loosely when pressed - It is not crumbly like sand or sticky like clay.

It is composed of about 50% clay, sand, humus, and organic matter, and 50% air pockets - The air pockets are very important because:

- They provide space for the soil to hold more water.
- The air provides oxygen that the plant roots need to be able to access nutrients.
- They allow easy, fast, and deep root growth - therefore plant roots can gather more water and nutrients which makes plants bigger and healthier.

Healthy soils acts as a nutrient bank by storing nutrients that are ready for plant use - The nutrients are not leached out of the soil.

A healthy soil has a balanced pH level - This means that it is not too acidic (like vinegar) and not too alkaline (like salt).

Techniques that can be used to achieve healthy living soil

Most of these techniques are simple, do not require heavy work, and use local materials.

- **Use organic compost and liquid fertilizer** - These provide a range of nutrients, are cheap to make, increase the number of soil biota, and improve the soil structure and quality. Use them regularly to continually improve the soil quality.
- **Increase the number of soil biota, micro-organisms, bacteria, and fungi in the soil** - This can be done by using natural fertilizers, mulch, and EM (Effective Micro-organisms). This will improve soil quality and improve all forms of agriculture and animal production.
- **Use mulch** - To protect the soil from direct sun, save water, and increase the humus content of the soil.
- **Recycle nutrients** - By recycling plants and animal manures back into the system.
- **Use legumes** - There are many different legumes which provide nitrogen for the soil, mulch, and organic matter, food for humans and animals, windbreaks and soil retention, animal habitats, diversity, and more.
- **Rotate crop production** - Different plants need different nutrients to grow. Rotating crops and growing different plants together makes the nutrient use more balanced and easier to replenish.

These techniques are explained in detail through the creative thinking exercises and participatory field activities that follow.

Field activity : Simple method of testing soil

Method : **Participatory soil testing**

Tools : **Shovel, jars with lids or plastic bags & rubber bands, water, marker**

References : **PC Book MOD 4 - Healthy Soil**

Objective : **Participants learn how to identify various types of soil**

By using the following simple experiment you can identify the types of soil on your land.

1. Take 3 or more soil samples and place them in clear jars or bottles.
2. Fill the container ⅔ with soil, then add water until full.
3. Close the containers and shake them evenly.
4. Then, let the soil settle and you can see what type of soil you have:
    - Clay will settle on top.
    - Silt (sediments between clay and sand in size) under that.
    - Fine sand next.
    - Coarse sand will settle on the bottom.

From observing the contents of the containers and the ratio of different components in the soil you will know how much sand or clay is in the soil, which will help you to choose appropriate methods for improving the soil.

For specific soil improvement techniques for either clay or sandy soil, see the PC Book MOD 4 – Healthy Soil.

Note: There may be many other local techniques for soil improvement, which can be shared amongst participants.

Creative thinking : Identify nutrient deficiencies in soil

Method : **Participatory and group brainstorm**

Tools : **Black/white board or large paper, markers**

References : **PC Book MOD 4 - Healthy Soil**

Objective : **Participants learn about various types of soil deficiencies**

Step 1

Using something like the table below, the facilitator can ask the participants to identify different types of nutrients in the soil (table 1). The facilitator can help to fill out these answers if necessary.

The answers listed below are supplied for the facilitator only for prompting ideas and discussions if the participants need help.

Nutrient	How you can tell if it is missing
Nitrogen	Yellowing, paleness of leaves and new growth Early maturing and small size of fruit or flower
Potassium	Leaves are small, darker in color than normal, older leaves are blue/purple in color with yellow edges, plant growth is slow
Phosphorus	Fruit size is small and poorly colored, burnt leaf edges and yellowing of old leaves
Magnesium	Leaves have yellow spots and edges, with green veins, brown spots on leaves can also occur, old leaves drop off trees early
Sulphur	All leaves are dull in color
Calcium	New leaves and new shoots grow badly and are underdeveloped, fruit growth can be unusual

Table 1. Indicators of nutrient deficiencies

Sources of nutrients
Legume, fish, brown sugar, and coconut
Ash from kitchen fires
Animal bone ash with vinegar
Spinach, whole grains, nuts (especially almonds)
Can be found near hot springs and volcanic areas
Animal bones, shells

Table 2. Sources of nutrients

Step 2

Ask the participants to divide into smaller work groups (see the appendix) and have each workgroup come up with a list of various natural materials that are sources for nutrient listed on the table.

Step 3

After each workgroup has created their lists, ask them to write the lists on the board (table 2) while presenting the results to the entire group for feedback and other suggestions. A list of natural nutrient sources is provided in the "Natural nutrient sources" section in the PC Book MOD 4 – Healthy Soil.

Note: There may be many other local techniques for adding nutrients, which can be shared amongst participants.

Presentation : Mulching for soil improvement

Method : **Facilitator presentation**

Tools : **Diagrams of mulch and non-mulch**

References : **PC Book MOD 4 - Healthy Soil**

Objective : **Participants understand what mulch is and the benefits of using it**

In natural forests, leaves, rotting trees, materials, animal manure, and even dead animals all make a cover of "mulch" on the ground, like a skin.

This skin is continually being added to and continuously decomposing.

Mulch (skin) provides:

- Nutrients and organic matter for the soil which is used by plants and trees.
- Continuous food supply for plants and soil biota in your garden.
- Greatly reduced amount of weed growth.
- Moderated soil temperature, which creates a healthier environment for plants.
- Balanced pH in the soil.
- Improved soil structure which makes the soil easier to dig.
- Water retention in the soil.
- Natural protection from the soil drying in the sun.
- Natural protection from erosion caused by the rain.
- Natural protection from drying and erosion caused by wind.

By mirroring nature, we can make and use mulch to dramatically improve soil health.

Various methods and tips for mulching

Before mulching:

- Use rocks, thick branches, or other materials to make garden borders. This will help to hold the mulch, give room for soil to build up, and prevent erosion.
- If you put compost under mulch it will maximize the benefit of the compost.

When/where to use mulch:

- For seeds and seedlings, mulch the land before planting.
- For trees, mulch underneath the outside leaves - continuous mulching will improve tree health and productivity.
- For vegetables, plants, and trees, DO NOT let mulch touch the stem or trunk - this is very important in the wet season to prevent rot and mould.
- Mulching paths will help save water.

What kind of mulch to use:

- Use finer (smaller size) mulch for vegetable beds and coarser (larger size) mulch for large crops and trees.
- When you use weeds to make mulch, remove weed seeds to use as animal fodder or liquid compost material – this will reduce weed growth
- Legumes, grasses, and other plants can be grown to produce mulch.
- Rice and coffee husks need to be composted or dried before being used as mulch - put in a big pile for 1 month or more before use.

How much mulch you should use:

- Ensure there is always a good layer of mulch throughout the plot.
- About a 5-10cm layer and a 20cm layer for fruit trees.

For more information about mulching, see PC Book MOD 4 – Healthy Soil.

Creative thinking : Legumes and their uses

Method : **Group and workgroup brainstorms**

Tools : **Black/white board or large paper or Meta Plan, markers**

References : **PC Book MOD 4 - Healthy Soil**

Objective : **Participants create a list different legumes and their uses**

Step 1

Using something like the table below, the facilitator can ask the participants to identify local legume varieties (table 1).

Step 2

Ask the participants to split up into smaller work groups (see the Resource Book) and have each workgroup come up with ideas for table 2 (a) uses for that legume plants, and (b) where the legume could be planted.

The answers listed below are supplied for the facilitator only for prompting ideas and discussions if the participants need help.

Type of legume
Beans
Moringa
Merak flower
Turi tree
Gamal tree
Lamtoro tree
Pete tree
Jengkol tree

Table 1.

Various uses	Where to plant
For vegetables, provides nitrogen for the soil	Everywhere
For vegetables, provides nitrogen for the soil, pest control (ant)	Dry land
Decorative plant, provides nitrogen for the soil	Dry land
Provides nitrogen for the soil, shade plant	Rice field, along the streets
Animal feed, shade plant, provides nitrogen for the soil	Garden, rice field, farm
Animal feed, shade plant, provides nitrogen for the soil, for vegetable	Garden, rice field, farm
Shade plant, provides nitrogen for the soil, for vegetable	Garden, rice field, farm
Shade plant, provides nitrogen for the soil, for vegetable	Garden, rice field, farm

Table 2.

Step 3

After each workgroup has noted their ideas, ask them to present their ideas and integrate them onto the chart (table 2.)

Field activity : Mulching a garden bed

Method : **Identify, collect, and use mulch material**

Tools : **Mulch materials, mulch cutting tools**

References : **PC Book MOD 4 - Healthy Soil**

Objective : **Participants practice various mulching techniques**

Preparation

The facilitator should prepare the following:

- Rocks, thick branches, or other materials for making garden borders.
- Compost.
- Mulch materials.
- Tools for chopping mulch materials.

Locations with:

- Fruit trees.
- Vegetable beds.
- Paths.
- Seedlings.

Running this exercise

- Divide the participants into workgroups, and have each group choose a target area for their mulching exercise (i.e. trees, beds, paths, seedlings).
- Ask the participants to identify and collect various mulch materials.
- Prepare the mulch materials – bulkier materials should be chopped up.
- Have the groups apply the mulch at the various locations.
- Together with the entire group do a survey of each of the mulched sites and discuss together the various samples of mulching they have created. Congratulate good examples, and give tips and feedback on how some could be improved (if necessary).

Additional exercise

The facilitator can give the "Mulching test" exercise in the "Mulching" section of PC Book MOD 4 - Healthy Soil to the participants to try for themselves after the workshop.

Presentation : How to use legumes

Method : **Facilitator presentation and group brainstorm**

Tools : **Images that help explain how legumes work**

References : **PC Book MOD 4 - Healthy Soil**

Objective : **Participants know how legumes work and how to use them**

Nitrogen is an essential element for healthy plants. It also helps fruit production. Legumes are plants that put nitrogen into the soil. There are many different legumes in Indonesia, including annuals (complete life cycle in 1 year) and perennials (complete life cycle in 2 or more years).

How legume plants put nitrogen in the soil

Bacteria in the soil called Rhizobiu attaches itself to legume plant roots which "fixes" nitrogen from the air into the soil in small storage balls called "nodules". These nodules:

- Are attached to the plant roots.
- Are the size of match heads or smaller.
- Provide nitrogen for the legume plant.

When legumes die or shed their roots extra nitrogen nodules that the legume plant has not used goes back into the soil and are available for other plants to use.

The facilitator can encourage a discussion with the participants about:

- Other products legume plants can provide.
- Other functions local legume plants can provide.
- Techniques for using both annual and perennial legumes.

The answers listed below are only supplied as guidelines for the facilitator should the participants need help or prompting for ideas and discussions.

Besides nitrogen fixing, legumes provide many other products and functions:

- Products - Food, animal fodder, mulch/compost material, timber, firewood, medicine.
- Functions - Windbreaks, living fences, shade trees, trellising.

Annual legumes can be grown together with vegetables, annual crops and with trees.

Techniques for using annual legumes:

- Rotation of crops.
- Green manure crops.
- Annual crop integration.

Perennial legumes can be grown together with annual crops, fruit trees and other trees.

Techniques for using perennial legumes:

- Living fences.
- Legume tree terraces.
- Perennial crop integration.
- Pioneer trees.

See the "Legumes" section in **PC Book MOD 4 – Healthy Soil** for detailed explanations of the techniques and other tips about using legumes.

Field activity : Various methods of using legumes

Method : **Try three different ways of using legumes**

Tools : **See exercise preparation below**

References : **PC Book MOD 4 – Healthy Soil;**
PC Book MOD 5 – Seed Saving and Nurseries;
PC Book MOD 8 - Forests, Tree Crops, and Bamboo

Objective : **Participants try and learn three methods for using legumes**

The 3 methods for using legumes that are covered in this activity are:

- Planting annual legumes as a green manure crop.
- Planting seeds or cuttings of perennial legumes on terraces or swales.
- Pruning established legumes for animal fodder, compost material, or mulch.

Preparation

- Annual legume seeds to be planted as a green manure crop.
- A garden bed or area ready for a green manure crop.
- Seeds or cuttings of perennial legumes to plant.
- If possible, swales or terraces that are ready for planting.
- Established legume trees that can be pruned back.
- Appropriate tools for each activity.

Note: The perennial legumes planting part of this activity will achieve better results (and show integration techniques) if the legumes are planted in an area that has already been shaped into swales or terraces which are on contour. If the terraces/swales are close together, only plant every 2nd terrace/swale with the legumes. The terraces/swales not planted with legumes can be planted with pineapples, lemon grass, comfrey, or other plants. This with prevent problems arising from too much shade. If this is not possible, plant legumes as a living fence around a garden.

Running this exercise

- The facilitator can give a brief overview of each activity including a short demonstration of each technique.
- Divide the participants into 3 workgroups and have each group choose and then carry out a "using legumes" activity.
- Together with the entire group visit each site and discuss together what has been created. Give tips and feedback on how some could be improved (if necessary).

For more information about these three techniques see **PC Book MOD 4 – Healthy Soil, PC Book MOD 5 – Seed Saving and Nurseries, PC Book MOD 8 - Forests, Tree Crops, and Bamboo.**

Presentation : About natural fertilizers

Method : **Facilitator presentation and group brainstorm**

Tools : **Images that help explain how compost and liquid fertilizer works**

References : **PC Book MOD 4 - Healthy Soil**

Objective : **Participants learn about the benefits of natural fertilizers**

Compost is made up of organic matter which is broken down by soil biota into a concentrated, nutrient-rich source.

Compost is mainly made up of carbon and nitrogen. Plant material is mostly carbon with a small amount of nitrogen. Manure is mostly nitrogen with a small amount of carbon. Compost also contains many other nutrients, minerals, trace elements, and soil biota.

Compost can be added at the bases of fruit trees or amongst vegetable crops to provide extra nutrients and improve the soil quality, which is very important for future crops.

There are many different ways to make compost – From a simple mix of rice husks and cow manure to various combinations of many different types of materials. What you use depends on what materials are readily available.

The facilitator can encourage a discussion with the participants to identify:

- Different readily available compost ingredients.
- Different ways to make compost ingredients more readily available.
- The essential functions compost provides for plants and for the soil.

Liquid fertilizer is a very good nutrient rich natural fertilizer made from small amounts of manure and other ingredients. It is easy to prepare and very useful for nurseries, small gardens, large crops, rice paddies, fruit trees, and other tree crops. It can easily be spread over a large area. Liquid fertilizer can be made in any size container from a bucket to a steel drum - the more the better. It can be made and stored anywhere. It is a very strong concentration and needs to be diluted with water before use, which means it should be stored near a water supply.

The facilitator can encourage a discussion with the participants to identify:

- Different readily available liquid fertilizer ingredients.
- Different ways to make liquid fertilizer ingredients more readily available.
- The essential functions liquid fertilizer provides for plants and for the soil.

The facilitator can also encourage a discussion with the participants to identify the differences between natural fertilizers (compost and liquid fertilizers) and chemical fertilizers, as well as their impacts.

Presentation : Various natural fertilizing techniques

Method : **Facilitator presentation**

Tools : **Images of various compost and liquid fertilizers being made and used**

References : **PC Book MOD 4 - Healthy Soil**

Objective : **Participants learn about various compost and liquid fertilizer techniques**

There are 6 different methods of composting, plus explanations about liquid fertilizer, described in **PC Book MOD 4 – Healthy Soil.**

They are

1. **Quick compost heaps** - Made all at once with many different materials, turned after 2 weeks, ready to use in 1 month. Excellent for home gardens and intensive agriculture.
2. **Slow composts** - Continuously made over time, usually are made larger than quick compost heaps. Excellent for farms and larger crops.
3. **Compost baskets and trenches** - Part of the garden beds or next to fruit trees, partly in the ground and partly above the ground, provides a constant supply of nutrients to plants through the soil as well as compost to use on top of garden beds.
4. **Banana pit or pit composting** - A large pit for making slow compost. The compost will continuously feed bananas or any plants growing around the pit. When ready the compost can be removed to use in other places.
5. **Direct composting** - Quick compost made in a place where a garden bed will be made or a fruit tree will be planted. The soil and new plants will have a good supply of plant food and soil biota from the compost.
6. **Liquid fertilizer** - Plant food and good bacteria in a liquid form. Great for fast results and for covering large areas of land.

Creative thinking : List of natural fertilizers and uses

Method : **Group and workgroup brainstorms**

Tools : **Black/white board or large paper, markers**

References : **PC Book MOD 4 - Healthy Soil**

Objective : **Participants list types of natural fertilizers and how to use them**

Step 1

Using something like the table below, the facilitator can ask the participants to identify types of natural fertilizers (table 1.)

The answers listed below are only supplied as guidelines for the facilitator should the participants need help or prompting for ideas and discussions.

Natural fertilizer
IMO4 (Indigenous Micro-organism 4)
Organic fertilizer N
Organic fertilizer P/Ca
Organic fertilizer K
Pest control

Table 1. Natural fertilizers

What it is best for	When/how to use
Fix soil structure, grow soil worms, fix soil temperature, media compost	Apply at the base of trees
Control yellowing, paleness of all leaves and new growth, helps plants grow well and produce fruit or flower	1cc extract mixed with 1 liter water and used as a spray
Good fruit and bright color, fertilized leaf edges	1cc extract mixed with 1 liter water and used as a spray
Leaves grow well, green color, plant growth is normal	1cc extract mixed with 1 liter water and used as a spray
Insects	1cc extract mixed with 1 liter water and used as a spray (depends on how strong the pest)

Table 2. For what, how, and when to use the natural fertilizer

Step 2

Ask the participants to divide into smaller work groups (see the Resource Book) and have each workgroup come up with lists of what those natural fertilizers could be used for and when or how to use them.

Step 3

After each workgroup has noted their ideas ask them to present their ideas and integrate them onto the chart (table 2.)

Field activity : Make a quick compost heap

Method : **Participatory construction of a quick compost heap**

Tools : **Composting materials, tools, and containers as described below**

References : **PC Book MOD 4 – Healthy Soil; IDEP composting fact sheets**

Objective : **Participants learn how to make "Quick compost"**

In the "Compost" section of the **PC Book MOD 4 – Healthy Soil** there are several methods described for making compost.

During a Permaculture workshop it is recommended to use the "Quick composting" method so that participants can make compost in one lesson.

Preparation

Photocopy enough of the "Compost" section of the **PC Book MOD 4 – Healthy Soil** and **IDEP composting fact sheets** so that each participant can take one set of references home.

Collect the materials and tools needed for:

- Making the compost container.
- Creating the compost.

Create the "Quick Compost" heap with the participants.

See the "Compost" section of the **PC Book MOD 4 – Healthy Soil** for detailed instructions on:

Building a "Quick compost" heap including:

- Materials needed.
- How to construct it step by step.
- How to maintain the compost heap.
- How to use compost.

Field activity : Make liquid fertilizer

Method	**: Participatory making of liquid fertilizer**
Tools	**: Materials, tools, and containers as described below**
References	**: PC Book MOD 4 – Healthy Soil**
Objective	**: Participants learn how to make liquid fertilizer**

In the "Compost" section of the **PC Book MOD 4 – Healthy Soil** there are instructions on how to make liquid fertilizer.

It takes 2 weeks for liquid fertilizer to be ready to use so the facilitator should prepare a batch of liquid fertilizer at least 2 weeks before the course so that participants can experiment using it.

Preparation

Photocopy enough of the "Liquid fertilizer" sections of the **PC Book MOD 4 – Healthy Soil** so that each participant can take one set of references home.

Collect the materials and tools needed for:

- Preparing the liquid fertilizer container with a lid (drum, plastic container, etc).
- Creating the liquid fertilizer.

Create the liquid fertilizer with the participants.

See the "Compost" section of the **PC Book MOD 4 – Healthy Soil** for detailed instructions on making liquid fertilizer, including:

- Materials needed.
- How to make it step by step.
- How to maintain it.
- How to use it.

Field activity : Using liquid fertilizer

Method : **Participatory trial of using liquid fertilizer**

Tools : **Prepared sample of liquid fertilizer, other materials described below**

References : **PC Book MOD 4 – Healthy Soil**

Objective : **Participants practice using and making more liquid fertilizer**

In the composting section of the **PC Book MOD 4 – Healthy Soil** there are instructions for making liquid fertilizer.

It takes 2 weeks for liquid fertilizer to be ready to be used. The facilitator should prepare a batch of liquid fertilizer at least 2 weeks before running this lesson so participants can experiment using it.

Preparation

- To be able to run this exercise the facilitator will need to prepare a batch of liquid fertilizer at least 2 weeks before the lesson (see previous exercise).
- Prepare water, buckets or watering cans, and materials needed to make more liquid compost.
- Identify gardens or fruits trees to use for the demonstration.
- If you are demonstrating direct use on plants, the exercise should be run very early in the morning or late afternoon.

Note: If the liquid fertilizer is not properly diluted, plant leaves and roots could be burned from receiving too much nutrients all at once - young plants are more sensitive than older, more established plants.

Running this exercise

Step 1

With the participants, demonstrate mixing 1 part liquid fertilizer with 20 parts water.

Step 2

Have the participants create their own mixes and try the two different ways liquid fertilizer can be used:

- Using a watering can or a tin can with holes, apply the diluted liquid fertilizer directly onto plant leaves - use enough to wet all the leaves of the plants. Remind the participants that they should only apply liquid fertilizer directly to plants in the very early morning or late afternoon. If not, the sun could burn the plant leaves.
- Apply the diluted liquid fertilizer onto the ground around plants.

- A 10-liter bucket of diluted liquid fertilizer should be enough for approximately 10 seedlings or 3-5 established plants.
- For young trees up to 3 years old use 1 large (20 liter) bucket around each tree.
- For older trees use up to 3 large buckets around each tree.
- If there are watering pipes in the ground put half of the liquid fertilizer in the watering pipe and half directly onto the soil.

Step 3

With the participants, demonstrate making more liquid fertilizer by adding more ingredients to the existing liquid fertilizer, in the following portions:

- 1/3 manure.
- 1/3 plant materials or seaweed.
- 1/3 water.
- Don't forget to continuously stir.

Note: Remind the participants that they can continue to make more liquid fertilizer as demonstrated for up to 6 months.

After 6 months the liquid fertilizer should be emptied onto compost heaps and a new fertilizer started because all the nutrients from the old ingredients will be used up.

Step 4

Advise the participants about how often they should apply the liquid fertilizer:

- For vegetables and small plants use the fertilizer every 2 weeks.
- For fruit trees apply once every 2 months in the wet season and once in the middle of the dry season.

For more information see the "Liquid fertilizer" section of the **PC Book MOD 4 – Healthy Soil.**

Presentation : About worms for healthy soils

Method : **Discussion about worms**

Tools : **See the "Worm farms" section from PC Book MOD 4 – Healthy Soil**

References : **PC Book MOD 4 – Healthy Soil**

Objective : **Participants learn about the benefits of using worms**

The importance of worms in healthy soils

Many worms in the soil show that the soil is a healthy living environment.

How worms help create and maintain healthy soil:

- Worms eat and cast out soil. As the soil passes through their body, the humus in the soil is changed into nutrients and the quality of the soil improves.
- Worms continuously:
  - Turn humus into nutrients that plants can use.
  - Dig and add air to the soil.
  - Improve soil structure and water drainage.
  - Bring up nutrients from deep in the soil to supply plant roots with food.

Worms are extremely economic:

- 1 worm can eat and cast out many tons of soil each year.
- 1 worm can produce 150 baby worms each year.

The facilitator can encourage a discussion with the participants to identify:

- The importance of worms in soil and how they help create healthy soil.
- How worms turn natural fertilizers (mulch, compost, liquid fertilizer, etc) into nutrients available for plants.
- Why pesticides, herbicides, and some chemical fertilizers can kill worms in the soil.

Making a worm farm can quickly increase the number of worms in your soil. See the next page for details on how to make a worm farm.

Field activity : Make a worm farm

Method	**: Discussion about worms and participants make worm farms**
Tools	**: See the "Worm farms" section from PC Book MOD 4 – Healthy Soil**
References	**: PC Book MOD 4 – Healthy Soil**
Objective	**: Participants learn about worms and practice making a worm farm**

Preparations

Photocopy enough of the "How to make a worm farm" section of the **PC Book MOD – Healthy Soil**, and/or the **IDEP Worm Farm Fact Sheet**, so that each participant can take one set of references home.

Collect the materials and tools needed for preparing and creating a worm farm:

- Containers.
- Buckets with lids.
- Materials for making a worm farm (see below).

Running this exercise

Make the worm farms with the participants.

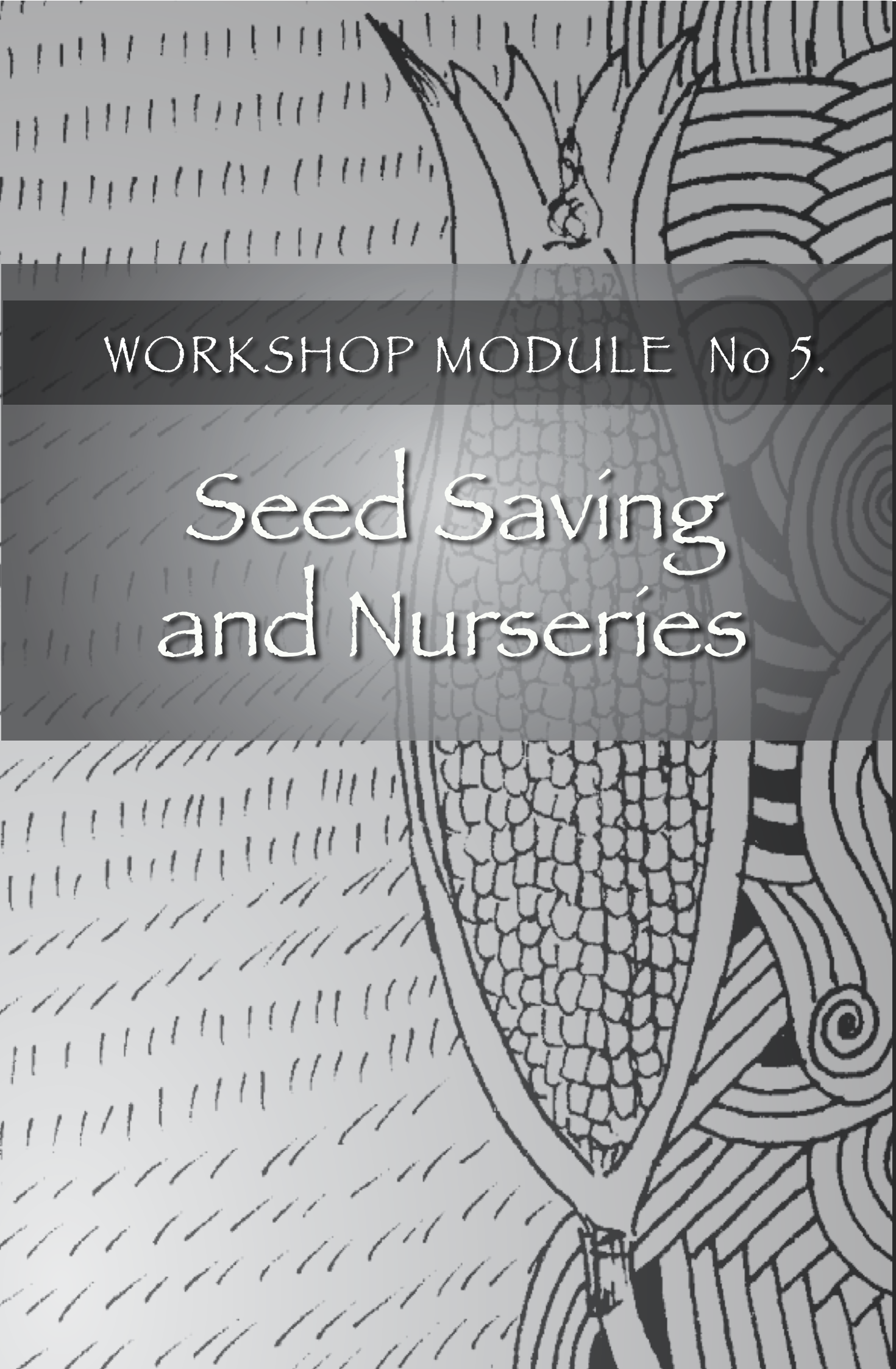
For detailed instructions on making worm farms, including:

- Materials needed.
- How to make it step by step.
- How to maintain them.
- Using the natural fertilizer.

See the "How to make a worm farm" section of the **PC Book MOD 4 – Healthy Soil.**

Notes...

Notes...



WORKSHOP MODULE No 5.

Seed Saving and Nurseries

Permaculture Facilitator's Handbook Module 5. Seed Saving and Nurseries

Notes...

Presentation : How seeds are reproduced

Method : **Facilitator presentation and group brainstorm**

Tools : **Images of pollination, black/white board, markers**

References : **PC Book MOD 5 – Seed Saving and Nurseries; IDEP Seed Saving Fact Sheet**

Objective : **Participants learn about how seeds are reproduced**

How plants reproduce

Pollination happens when pollen from the male parts of a flower (stamen) comes into contact with female parts of the flower (pistil). Once a flower is pollinated it begins to create seed. Depending on the type of plant, pollination can happen in several ways.

The facilitator should discuss the following important topics:

- Pollination.
- Cross pollination.
- Hand pollination.
- Introducing new species or varieties of plants to an area.

These topics can all be referenced at the start of **PC Book MOD 5 – Seed Saving and Nurseries** and in the **IDEP Seed Saving Fact Sheet.**

Ask the participants to discuss the following in a group brainstorm:

- What they know about pollination.
- Traditional practices that assist or affect pollination.
- Experiences they have had with species that have been introduced.

The answers can be written on the board or compiled using a meta plan brainstorm system.

Presentation : Genetically Modified Organisms (GMO)

Method : **Facilitator presentation**

Tools : **Images of seed related problems, IDEP GMO Fact Sheets**

References : **IDEP GMO Fact Sheets, PC Book MOD 5 – Seed Saving and Nurseries**

Objective : **Participants learn about GMO and hybrid seed related problems**

Most seeds used in agriculture today is produced in laboratories and factories by big corporations. There are three main types of factory-produced seeds:

- Single parent variety seeds.
- Hybrid seeds – Made by forced crossed pollination.
- Genetically Modified Organisms (GMO) seeds – Made by combining the genes of different species.

There are many GMO crops being field tested and researched in Indonesia. Most of the research and trials are being undertaken without the knowledge of the general public. These commercially produced seeds are creating many problems for farmers, consumers, and the environment in general.

Costs

- **High production costs for farmers –** Seeds and the chemicals needed to grow them.
- **Lower yields -** Studies show that GMO crops can actually produce lower yields over time.

Seed problems

- **Inability to save and self-produce seeds –** Seeds saved from factory produced seeds are generally not viable or consistent.
- **Loss of local seed varieties –** As less people save and use them.
- **Seeds are not locally adapted –** Factory seeds are coated with chemicals making them less resilient and requiring use of various chemicals to grow.

Environmental damage

- Water and soil pollution.
- Beneficial insects and animals may be affected.
- Competition with native plants for sunlight, nutrients, and water.

Farming problems

- **Loss of health and markets –** As people learn about the negative impacts of unnatural produce they prefer not to buy or eat these products.
- **Land damage –** Regular use of chemicals causes soil to die and farming becomes dependant on expensive chemicals.
- **Promotes unsustainable monoculture.**
- **Other crops can be contaminated with GMO genes, bacteria, or viruses.**
- **The development of herbicide resistant super weeds, insecticidal resistant super pests, and mutated plant viruses.**
- **Controlled farming –** GMO companies can make farmers sign contracts controlling their options.
- **Over time yields are less stable and less productive.**

The facilitator can hand out the IDEP GMO Fact Sheets to the participants to either discuss on site or take home to study.

Creative thinking : What are GMOs?

Method : **Participatory game**

Tools : **Game cards as described below**

References : **IDEP GMO Fact Sheet No. 1 – What do you know about GMO?**

Objective : **Participants learn how GMOs are made**

Preparation

Prepare and hand out the GMO Fact Sheet No. 1 to all the participants.

Take 12 pieces of paper or card and draw the following on the front of each of the cards:

- 2 cards – Chicken - on the back write 4, 5.
- 2 cards – Bacteria - on the back write 2, 3.
- 2 cards – Fish - on the back write 1, 4.
- 2 cards – Corn - on the back write 3, 5.
- 2 cards – Tomato - on the back write 1, 6.
- 2 cards – Soybeans - on the back write 2, 6.

Running this exercise

- Hand out the cards to the participants.
- Talk about reproduction in nature – what can reproduce with what? Plant with plant, animal with animal, etc.
- Then get more specific i.e. not all plants can breed with all other plants, not all animals can breed with all other animals – ask the participants to give some examples of this fact.
- Ask the participants with the same pictures to pair up - reiterate this is what generally happens in nature.
- Then ask the participants to pair up with someone who has the same number on the back of the card as them. Talk about the combinations that are now possible with GMO.
- Explain that numbers 1, 2, and 3 are real examples of GMOs today.
- Explain that numbers 4, 5, and 6 are NOT real examples but they could be in the future especially if there is an economic reason to do so.
- Collect the cards and hand out or discuss the **IDEP GMO Fact Sheet No. 1.**

Presentation : About seed saving

Method : **Facilitator presentation**

Tools : **Images of good seeds and pollination, IDEP Seed Saving Fact Sheet black/white board, markers**

References : **PC Book MOD 5 – Seed Saving and Nurseries**

Objective : **Participants learn about seed production and benefits of saving local seed varieties**

Saving, producing and using local seed is one of the most important methods of strengthening Indonesian agriculture because:

- **It is cheap and easy to do.**
- **Everyone can collect, save, and produce seeds.**
- **Increasing varieties of local seeds will increase the amount and range of food that can be grown.**
- **Seeds are valuable and can be exchanged for other seeds and/or sold.**
- **Local seeds are adapted to local conditions** - This means that they are used to the climate and the soils where they grow. Each year that seed is collected and planted, the plant will become more adapted and stronger. If someone from Sulawesi goes to live in England it will take them many years to adapt to the cold climate, people, language, and culture. It is the same for seeds and plants.
- **Plant quality will naturally improve each year when good techniques are used for selecting and saving seeds** - The plants that grow the healthiest and strongest are the plants that the seed should be saved from.

More information can be referenced at the start of **PC Book MOD 5 – Seed Saving and Nurseries.**

Ask the participants to discuss the following in a group brainstorm:

- Varieties of seeds they already save.
- Varieties of seeds they have had problems with.
- Foods they used to grow and eat, but do not anymore.

The answers can be written on the board or compiled using a meta plan brainstorm system.

Presentation : Different types of agricultural systems

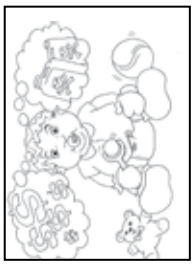
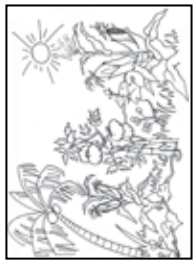
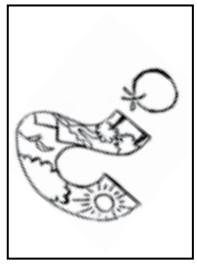
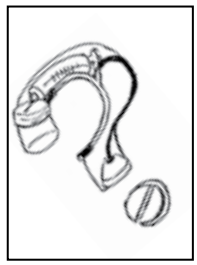
Method : **Facilitator presentation and group brainstorm**

Tools : **Black/white board, markers**

References : **IDEP GMO Fact Sheets, PC Book MOD 5 – Seed Saving and Nurseries**

Objective : **Participants learn about sustainable and unsustainable agriculture**

Let's compare agricultural systems

Agricultural systems	From an environmental perspective	From a farmer's perspective	From a health perspective	From the corporations' perspective
Traditional agricultural practices that would have been used in villages 50 years ago, based on many years of development with very little outside influence. All agricultural inputs would have been from the local area.				
Green revolution, conventional, high external input agriculture that arrived in Indonesia in the late 1960's and 1970's. This agriculture system uses hybrid seeds, chemical fertilizers, & chemical pesticides, which need to be purchased.				
Sustainable agricultural system that is based on a "back to nature" approach to farming. It involves less reliance on seed and chemical companies for agriculture production, traditional systems and other innovative ideas.				
Biotechnvological agricultural system that uses genetically engineered or modified seeds that have been developed and imported by large multinational corporations as part of their agricultural system.				

Which agricultural system will you choose for your farm and future?

Creative thinking : Compare agricultural systems

Method : **Creative thinking exercise**

Tools : **Black/white board, markers**

References : **IDEP GMO Fact Sheets, PC Book MOD 5 – Seed Saving and Nurseries**

Objective : **Participants learn about sustainable and unsustainable agriculture**

Ask yourself about GMO...
is it the best choice for your farm and future?

Info about doing this exercise: To do this activity, show your group the FS.GMO#009.eng.Let's Compare Agricultural System. In a group of any size work your way down the list comparing the systems of Agriculture. The group discussion is more important than the actual answers. This exercise can go quickly or slowly depending on the time available & how much time you want to allow for discussion.

	Aspects of agricultural systems *Including both monetary (things farmers pay or receive money for) and non-monetary items.*	**Traditional Practices**	**Green Revolution**	**Sustainable Agriculture**	**Biotechnology Systems**	**Choose 1 symbol for each box** ↑ positive for farmers ↓ negative for farmers — no change for farmers **Questions**
1	**Seed**					Cost? Available in your village? Can you grow it? More/ less labour?
2	**Fertilizer**					Cost? Available in your village? Can you make it? More/ less labour? Affects on your soil?
3	**Pesticides**					Cost? Available in your village? Can you make it? More/ less labour? Do people using it get sick?
4	**Planting**					Who does it? Cost? More/less labour? Best results from planting system?
5	**Weeding**					Who does it? Cost? More/less labour? Best results from weeding system?
6	**Harvesting**					Who does it? Cost? More/less labour? Best results from harvesting system?
7	**Yield**					Do you get more or less yield? Is product better or worse quality?
8	**Marketing**					Is the crop sold more easily? Do more or less people want to buy or use your crop?
9	**Selling price**					Is the price you sell your crop for higher?
10	**Food at home**					More or less food at home? Is it produced on your farm? How easy is it to store?
11	**Export**					What is the export potential? Are other contries interested in buying the crop?
12	**Cultural**					Has this system had an impact on the local Culture? Ceremonies, gifts, local food etc?
13	**Plant biodiversity**					Are there more or less species of crops? Are more or less varieties or each type of crop grown?
14	**Social**					How systems change social practices (labour, how people work together etc) in your village.
15	**Water quality**					Do the streams have more or less insects, fish, frogs etc? Is the water more clear/clean?
16	**Soil quality**					Does the soil have more or less living things in it? Is the land harder or difficult to dig?
17	**Beneficial insects**					Are there more or less beneficial species (spiders, ladybugs) in the system?
18	**Other insects + mammals**					Do you have more/less rat problems? Are there more/ less animals in and around your fields?
19	**Risk**					What happens if price of the crop decreases? What happens if pests destroy your crop?
20	**Legal issues**					Are there more/less legal documents in this system? Land contacts, seed contracts etc.

Do you want a genetically modified future?

Creative thinking : How to save and store seed

Method : **Group and workgroup brainstorms**

Tools : **Black/white board or large paper, markers**

References : **PC Book MOD 5 – Seed Saving and Nurseries**

Objective : **Participants understand the reasons, methods, and techniques for saving seeds**

Step 1

Using something like the table below, the facilitator should list the following six stages of seed saving. The answers listed below are only supplied as guidelines for the facilitator should the participants need help or prompting for ideas and discussions.

Seed saving stages	Why it is needed	Methods and techniques
Stage 1: Grow healthy plants	For our health and the environment	Use organic plants and seeds
Stage 2: Choose the best seeds	To grow the best plants	Choose whole seeds, not deformed ones
Stage 3: Choose the ideal time and method for collecting the seeds from each plant	To get better seeds	Choose healthy plants that are ready to harvest and have no insect damage
Stage 4: Clean the seeds	To avoid fungus	Soak the seeds for 1 day 1 night and then clean
Stage 5: Dry the seeds	To decrease content of water to keep it a long time	Cover the seed with cloth and dry in the sun or use seed dryer
Stage 6: Store the seeds	To keep the quality and stay longer	Keep in a cool, dry place

Table 1. Why use these steps **Table 2. Local methods**

Step 2

As a group, ask the participants to identify the reasons each of the seed saving stages are important (table 1).

STAGE 1: Grow healthy plants

- Healthy soil, compost, and mulch are the best way to produce healthy plants.
- For more information, see the **PC Book MOD 4 – Healthy Soil.**

STAGE 2: Choose the best seeds

Collect seeds from the BEST plants. These plants will:

- Produce healthy and tasty fruit or leaves.
- Be disease free and naturally resistant to pests.
- Be able to withstand extreme conditions – For example the ability to cope with very dry or very hot conditions, or still grow well in rocky soil.
- Be slow to go to seed - For green leaf and other similar vegetables (lettuce, cabbage, spinach, etc) collect seeds from the plants that are the LAST to produce flowers and seeds, NOT the first because the ones that go to seed first are weaker and produce less.

STAGE 3: Choose the ideal time and method for collecting the seeds from each plant

- It is important to choose the right time to collect seeds, according to seed or fruit maturity and weather conditions.
- See the table in **PC Book MOD 5 – Seed Saving and Nurseries** for more details.

STAGE 4: Clean the seeds

- If seeds are properly cleaned to remove all plant material and foreign matter the chance of insect damage and rot will be greatly reduced.

STAGE 5: Dry the seeds

- This is a very important part of the seed saving process. If seeds are not properly dried they will rot when it is stored.

STAGE 6: Store the seeds

After the seeds are dry they need to be stored properly. While in storage, seeds need to be protected from:

- **Air** – Will reduce the lifetime of the seeds.
- **Moisture** – Will make seeds rot.
- **Heat** – Will reduce the number of seeds that germinate when planted.
- **Animals** – Can eat or damage seed.
- **Insects** – Can eat or damage seed. For example if insect eggs are laid inside seed storage containers, they can hatch and the young insects will eat the seeds.
- **Light** – Will damage seed and reduce the number of seeds that germinate when planted.

Step 3

Ask the participants to divide into smaller work groups and have each work group come up with lists of what specific methods and techniques are used locally. Information from **PC Book MOD 5 – Seed Saving and Nurseries** can act as a guide for the facilitator if the work groups need help prompting ideas and discussions.

Step 4

After each workgroup has created their lists ask them to write them on the board (table 2) while presenting the results to the entire group for feedback and other suggestions.

Field activity : Seed collection and storage

Method	**: Field visit to collect seed, then prepare and store dried seeds**
Tools	**: See preparations listed below**
References	**: PC Book MOD 5 – Seed Saving and Nurseries**
Objective	**: Participants practice and learn about collecting, preparing and storing seeds**

Preparation

The facilitator will need to have available and/or identify the following:

- **Vegetables that are ready to pick seeds from -** as different seeds require different methods, it is best of you have at least 2 or 3 different types. E.g. lettuce, tomatoes, and beans.
- **A drying area for the collected seed.**
- **Old newspaper or other material to put the seeds on -** Old wire mesh works well for large seeds.
- **Some seeds that are already dry but still require cleaning -** Collect enough for 3 or 4 groups to work with.
- **Air tight storage containers.**
- **Natural insect repellents for the storage containers.**
- **Natural moisture absorbents for the storage containers.**
- **Permanent markers** for writing the contents of the various storage containers.

See **PC Book MOD 5 – Seed Saving and Nurseries** for more detailed information and some specific examples of materials that can be used.

Running this exercise

Step 1

Collecting seeds

Visit the plants as a whole group and collect seeds. As the seeds are being collected, discuss with the participants the different methods that are being used and the reasons for using those methods.

Step 2

Preparing the seeds for storage

Take the seeds to the place where they will be dried and use the appropriate techniques to prepare and dry the seeds. See **PC Book MOD 5 – Seed Saving and Nurseries** for more detailed information.

Step 3

Storing dried seeds

Have the participants divide into groups. Each group can choose the seeds to work with for completing the following process:

- Final cleaning of the seeds to remove all foreign matter.
- Placing the clean dry seeds in storage containers.
- Adding natural insect repellents and natural moisture absorbers to the containers.
- Closing and labelling the containers, making sure to note the seed variety and date of storage.

Step 4

Discussion each groups' activities

Have the class come back together and present or describe to the rest of the group the processes that their group used for storing the dried seeds so that the group can learn from each other's experiences and give feedback and suggestions.

Creative thinking : Design a community seed saving group

Method : **Group and workgroup brainstorms**

Tools : **Black/white board or large paper, markers**

References : **PC Book MOD 5 – Seed Saving and Nurseries**

Objective : **Participants learn about and design community seed saving groups**

The facilitator should explain why each function of a community seed saving group is important and how a group approach is much more economic and effective than individual seed saving. Detailed descriptions about this is available in the "Community seed saving groups" section of the **PC Book MOD 5 – Seed Saving and Nurseries.**

Step 1

Using something like the table on the next page the facilitator can list, with the help of the participants, the functions of a community seed saving group (table 1). **The answers listed here are only supplied as guidelines for the facilitator should the participants need help or prompting to develop ideas and discussions.**

Step 2

Ask the participants to divide into smaller workgroups (see the Resource Book) and have each workgroup design a community seed saving group using their own community as an example (table 2). Ask the participants to consider the following factors:

- **Functions needed** - Which functions are most important for them when starting up.
- **How many people and how often** - How many people are needed for each function and how often are they needed. This could include the time needed per week to implement each function.
- **Compensation for people's work** - How are people compensated (this doesn't have to be financial).
- **Tools and space needed** - Infrastructure including rooms, containers, garden/ nursery land, etc.
- **Compensation for tools and space** - How are tools and space paid for or if they are contributed how are people compensated (this doesn't have to be financial).
- **Name for the group.**
- **How could income be generated** - Income doesn't need to be money. List various ways and estimated values.
- **How many different types of exchanges could be made** – Both within and beyond the groups' communities (seeds, plants, knowledge, etc).

Step 3

After each workgroup has completed the exercise ask them to present their community seed saving group to the entire group for feedback and other suggestions.

Various functions
Seed exchange
Seed and plant selection
Collecting and cleaning seed
Seed drying
Seed storage
Seed supply
Seed garden
Seed and planting materials list
Seed testing
Exchanging and selling seed
Community nursery

Table 1. Functions

Why is this function needed	How many people and how often	Compensation for work	Tools and space needed	Compensation for tools/space
To get more varieties of seed	10 people 6-12 months	Seed barter	Seeds, information, farmer, garden	-
To identify seed and plants	2-5 people per month	Seeds or vegetables	Gloves, scissors, garden	Clean the tools and space
To get enough seeds	2-5 people 6-12 months	Seeds	Scissors, water, bowl, garden	Clean the tools and space
To get good quality seed	2-5 people 6-12 months	Dried seeds	Seed dryer, cloth, garden	Clean the tools
To keep seed supply	1-3 people 6-12 months	Seeds ready for planting	Vacuum containers, neem powder/ leaves	Keep storage clean and dry
To get more seed	1-3 people 6-12 months	Seeds	Vacuum container, storage	Keep storage clean and dry
To plant to get seeds	5-10 people per month	Seeds or vegetables	Mattock, shovel, claw, compost, seeds, bamboo, land, mulch, water	Clean the tools and garden
To know varieties of plants	2-5 people every time new seeds are ready for storage	Share information	Seed saving form, pen, pencil, garden	Keep the form updated
To know germination percentage of seed	2-5 people every time new seeds are ready for storage	Good quality seeds	Compost, pot, marker, garden, water	Watering the seeds
To get profit	5-10 people every day	Payment	Seed, information, envelopes, marketing tools	To renew the tools
To get enough seedlings	10-15 people every day	Seedlings	Seedling bag (natural bag), compost, seed, bamboo, shovel, claw, water, net	Keep the tools and nursery area clean

Table 2. Design aspects of the community seed saving group

Field activity : Test and document seed viability

Method : **Groups practical exercise**

Tools : **See preparation below**

References : **PC Book MOD 5 – Seed Saving and Nurseries**

Objective : **Participants practice creating a seed list and testing seed viability**

Preparation

The facilitator will need to collect or prepare:

- 3 different varieties of seed with at least 50 seeds for each variety.
- A planting tray for each variety of seed with good quality planting soil.
- Identification cards or signs for each variety of seed.
- Photocopies of the 'Community seed saving group' section from PC Book MOD 5 – Seed Saving and Nurseries for each participant.
- Pens and paper.

Running this exercise

Divide the participants into 3 groups.

Step 1

Create the seed and planting material list - Follow Step 8 in the "Community seed saving group" section of **PC Book MOD 5 – Seed Saving and Nurseries**. Each group can create a table as shown in the PC Book and complete it using examples of the seeds that the facilitator has provided. Extra examples of local varieties of vegetable or fruit can be added if time permits.

Step 2

Start a seed viability rate test - Supply each group with 1 variety of seed, a planting tray, potting soil, identification card, pens, and paper. Follow step 9 in the "Community seed saving group" section of **PC Book MOD 5 – Seed Saving and Nurseries**. Use Method 2 – Seed testing for selling and trading seed. The participants will be able to start this experiment and the seeds will probably start germinating at the end of the workshop. Through group consensus, 3 participants, or representatives from the participants' communities, could take the seed trays home to complete the rest of the seed test after the workshop ends. Results can be sent back to the facilitator for review and the participants will be able to plant the seedlings afterward.

Step 3

Feedback - The groups can join together to discuss the lists and preliminary results of the seed test.

Presentation : Well-designed integrated nurseries

Method : **Facilitator presentation**

Tools : **Images, black/white board, markers**

References : **PC Book MOD 5 – Seed Saving and Nurseries**

Objective : **Participants learn how to design an integrated nursery**

The facilitator can use the information from **PC Book MOD 5 – Seed Saving and Nurseries** and images – photos, illustrations, etc – to help explain the important functions that a well-designed nursery provides.

Some important points to remember:

- Planting, watering, and maintaining seedlings is easier because everything you need is in one place.
- Provides protection from the hot sun, heavy rains, and strong winds.
- Provides a controlled environment for young plants. Animals can be kept out, pests can be minimized and controlled, and water and fertilizer can be easily checked and applied.
- Uses soil that allows for fast and strong root growth, good drainage and supplies enough nutrients.

The following aspects of nursery construction and management can be discussed with the participants, asking for their input as much as possible:

- Nursery design and construction.
- Seedling boxes and containers.
- Soil mixtures.
- Planting seeds
- Collecting young seedlings
- Propagation techniques
- Nursery maintenance:
    - Watering.
    - Fertilizing.
    - Transplanting.
    - Weed control.
    - Pest and disease control.
- Hardening plants before planting.

Creative thinking : Ideal trees for a nursery

Method : **Group brainstorm**

Tools : **Black/white board, large paper, markers**

References : **PC Book MOD 5 – Seed Saving and Nurseries**

Objective : **Participants create local tree lists for future nurseries**

With the help of participants, the facilitator can write a list of tree categories similar to the list below.

Divide the participants into workgroups. Each group can brainstorm a list of trees that they would like to grow in a local village nursery, including at least 2 or 3 trees from each of the categories in the following list.

Tree categories:

- Fruit trees.
- Animal fodder trees.
- Bamboo.
- Handicraft trees.
- Rare and endangered trees.
- Wind break trees.
- Spice trees.
- Timber trees.
- Medicinal trees.
- Firewood trees.
- Oil trees.
- Shade trees.
- Fire resistant trees.
- Other useful trees.

When each group has completed their list they can apply the following questions to each tree:

- Which tree species are locally available?
- Apart from its main function, are there other functions that each tree species may be able to provide?
- Where can the trees be found for propagation?
- How is each tree best reproduced – seed, cutting, root stock, etc - and what is the best time of year to collect it?
- What costs may be involved and how can these costs be covered?

The workgroups can present the results of their considerations to the whole group.

Field activity : 3-D model of a well-designed nursery

Method : **Model building of nursery**

Tools : **Model building materials**

References : **PC Book MOD 5 – Seed Saving and Nurseries**

Objective : **Participants learn how to design an integrated nursery**

Divide the participants into smaller groups. Use the following list as a reference for the participants. Provide materials to the work groups and ask them to design a model of a nursery design. The participants can create the model on paper and/or develop a simple 3-dimensional model showing the various elements to be included in the nursery design.

Important functions that a well-designed nursery provides include:

- Planting, watering, and maintaining seedlings is easier because everything you need is in one place.
- Provides protection from the hot sun, heavy rains, and strong winds.
- Provides a controlled environment for young plants. Animals can be kept out, pests can be minimized and controlled, and water and fertilizer can be easily checked and applied.
- Uses soil that allows for fast and strong root growth, good drainage and supplies enough nutrients.

Nurseries should have areas with different amounts of sunlight. It is good to have 3 different areas:

- Small seedlings and delicate plants need good protection from the hot sun and from heavy rains.
- Larger seedlings need less protection and benefit from more sunlight.
- An area that allows full sun for seedlings to "harden" before they are planted in the ground. To "harden" a plant prepares it for the conditions in which it will grow.

Nurseries integration ideas include:

- Vines like passion fruit, loofah, cucumber, beans, and gourds can be grown on the structure and the fences.
- The nursery area can also be the compost making area for the garden.
- It can be used for seed drying in the dry season.
- Excess water can be directed into vegetable gardens, small fruit trees, or vines.
- Fences for the nursery can also be fences for animal houses or vegetable gardens (use 1 fence for 2 systems).

Have the work groups present the results of their construction models and explain the nursery's features to the whole group.

Document the results of the design exercise either using images or by drawing the conclusions onto large sheets of paper. This documentation will be useful for ongoing brainstorms and use in future trainings.

Field activity : Start a nursery

Method	**: Participatory field activity**
Tools	**: Nursery construction materials and appropriate tools**
References	**: PC Book MOD 5 – Seed Saving and Nurseries, 3-D models and designs**
Objective	**: To construct a community nursery**

Note: This exercise will be specifically for workshops with a focus on nurseries as it will require a relatively long amount of time to run.

Part 1: Choose a location

The nursery could be located at a local primary school to increase awareness and education; children have an intimate knowledge of plant resources in the community and usually have free access to seeds and seedlings. See "Nursery location" in **PC Book MOD 5 – Seed Saving and Nurseries** for a guide to choosing a good location.

Part 2: Design the nursery

If the participants have made 3-D model nurseries then these could be used as the designs. If not, the facilitator can use the information provided for that exercise to help the participants make their designs.

Part 3: Commence construction

There will probably only be enough time to construct part of the nursery. The design and construction could allow for future extensions. Rather than just focusing on construction of the entire nursery structure it will be more beneficial for the participants to practice all the aspects of a nursery.

Outcomes for this exercise could include:

- A section of the nursery built using local, sustainable building materials.
- Compost bays, soil mixing bays, and soil ingredients bays.
- A table for seedlings.
- Water supply.
- Weed control on the floor.
- Some containers with potting mix and seeds/seedlings.
- Water run-off is re-used.

For more information and many different ideas and techniques, see **PC Book MOD 5 – Seed Saving and Nurseries.**

Field activity : Make good quality potting soil

Method : **Making good quality potting soil**

Tools : **Soil ingredients, tools, and containers as described below**

References : **PC Book MOD 5 – Seed Saving and Nurseries**

Objective : **Participants learn how to make good quality potting soil**

In the "Soil mixtures" section of the P**C Book MOD 5 – Seed Saving and Nurseries** there are several different soil mixture compositions described. Use ingredients that are available locally and make 1 soil mixture for vegetable seedlings and 1 for tree seedlings to show the differences. If possible make several different mixtures so the results can be compared. **Note**: The facilitator should take the time to explain why good soil mixtures for nurseries are different to ground soil and how it will benefit the plants.

The most important part of making a good soil for seedlings is to make sure that the plant roots can grow easily and that water can drain easily. Usually soil from the ground is too dense and needs to be mixed with other ingredients to provide drainage and root growth space. It is also important to provide a small but steady supply of nutrients for seedlings. All plant seeds contain the food needed by the plant for the first few weeks of growth.

Preparation

Photocopy enough of the "Soil mixtures" section from **PC Book MOD 5 – Seed Saving and Nurseries** so that each participant can take one set of references home.

Collect the materials and tools needed for:

- Making the soil mixtures.
- Putting it into containers.

Create the soil mixtures with the participants. Put it into plant containers.

For detailed instructions on making soil mixtures including:

- Ingredients needed.
- Ratios of ingredients for different needs.

See the "Soil mixtures" section of the **PC Book MOD 5 – Seed Saving and Nurseries. Note**: This exercise could be combined with the following exercise on making banana leaf and banana trunk plant containers.

Field activity : Making natural plant containers

Method : **Participatory field activity**

Tools : **See preparation below**

References : **PC Book MOD 5 – Seed Saving and Nurseries**

Objective : **Participants learn how to make plant containers from a local resource**

Banana leaves make excellent containers. They are easy to make and free. Grow 1 vegetable seedling in each banana leaf container and 1 tree seedling in each banana trunk container. When it is time to plant the seedlings simply place the whole container in the ground and the roots will grow through the banana leaves.

Preparation

For every participant photocopy the page from **PC Book MOD 5 – Seed Saving and Nurseries** that demonstrates through step-by-step diagrams how to make the seedling containers.

Prepare enough of the following for all the participants - There should be enough materials for every participant to make a container, and enough potting mix to plant some seeds and a few seedlings.

- Banana leaves.
- Banana trunks.
- Bamboo pins to hold the containers together.
- Machete.
- Potting mix.
- Vegetable seeds and tree seedlings.

Running the exercise

- **Step 1**: Follow the step-by-step diagrams to make the different containers.
- **Step 2**: Fill some of the containers with the potting soil.
- **Step 3**: Plant the seeds and tree seedlings.

Note: This activity can also be a seed planting and seedling transplanting exercise. Refer to those sections in **PC Book MOD 5 – Seed Saving and Nurseries** for more information.

Field activity : Plant propagation techniques

Method : **Participatory field activity**

Tools : **See preparation below**

References : **PC Book MOD 5 – Seed Saving and Nurseries**

Objective : **Participants practice propagation techniques**

In the plant propagation section of the **PC Book MOD 5 – Seed Saving and Nurseries** several different techniques for plant propagation are described. **Note**: Grafting should only be included if the facilitator has had some practical experience with this and has good equipment to work with.

Preparation

- Photocopy enough of the "Plant propagation" section of the PC Book MOD 5 – Seed Saving and Nurseries so that each participant can take one set of references home.
- Identify plants that can be used for the various propagation techniques.
- Collect the materials and tools needed for:
  - Preparing and/or collecting the propagation plant stock.
  - Transporting the propagation plant stock.
  - Replanting the propagation plant stock.

See the "Plant propagation" section of the **PC Book MOD 5 – Seed Saving and Nurseries** for detail on each type of propagation.

Running the exercise

Divide the participants into 3 groups using a creative group creation technique. The groups can choose between cutting propagates, root propagates, and marcotting propagates. Each group can take part in collecting, transporting, and replanting the plant propagates. For detailed instructions on cutting propagates, root propagates, and marcotting propagates including:

- Techniques used.
- Materials needed.
- Maintenance.

See the "Plant propagation" section from **PC Book MOD 5 – Seed Saving and Nurseries.**

Once completed, the entire group can observe the different results, discuss the various techniques used, and give tips and feedback on how some could be improved.

Notes...

WORKSHOP MODULE No 6.

Home and Community Gardens

Permaculture Facilitator's Handbook Module 6. Home and Community Gardens

Notes...

Presentation : Home gardens

Method : **Presentation and discussion**

Tools : **Garden images, black/white board, markers**

References : **PC Book MOD 6 – Home and Community Gardens**

Objective : **Participants learn and discuss ideas for sustainable and productive gardens**

The home garden plots and community garden plots are the basis for good health and self-sufficiency. Gardens can provide vegetables, fruit, spices, and medicines for very small cost. By using simple organic methods the garden can be highly productive and the soil fertility will improve every year.

It is good to start small and make a garden that works well and is protected from animals. Then expand your garden as you need. A lot of food can be grown in a very small garden.

Note: The facilitator can use the images to show good design ideas, integrated techniques, and sustainable methods for productive home gardens.

The facilitator can use some of the Permaculture principles and home garden examples of principles in action to help explain sustainable home garden concepts. Discuss with the participants and see how many examples they can think of.

The following are a few examples to get started, the facilitator can encourage the participants to think about and contribute other ideas.

Diversity	Grow flowers, small medicinal plants, and herbs among the vegetables
Energy planning	Make swales or terraced gardens on sloped land to catch, store, and direct water to where it is needed
Energy cycling	Compost all garden waste
Scale	Start with a few small garden beds and make more over time
Biological resources	Use duck or chicken tractors for pest control and fertilizing
Multiple functions	Plant living legume fences that provide nitrogen, mulch, animal fodder, and structure for vines
See solutions, not problems	Run excess and stagnant water into ponds that provide food, pest predator habitats, and compost materials
Observation	Watch for pests and for predators that eat those pests

Presentation : Good nutrition

Method : **Facilitator presentation**

Tools : **Copies of the 'Food nutrition circle' from PC Book MOD 6**

References : **PC Book MOD 6 – Home and Community Gardens**

Objective : **Participants understand good nutrition and home gardens**

Growing a wide range of vegetables, grains, fruit, and nuts provides important nutritional needs for families, especially for children. The most important time period for good nutrition is when mothers are pregnant and for babies. Other family members need to help to make sure that they are eating as well as possible during this time. This will reduce the chances of babies becoming sick and dying and will lead to a much healthier life later on.

Note: The facilitator can explain what good nutrition is and the connections between home gardens, good soil, good nutrition, and good health. They can encourage a discussion on the topics by first asking the participants' opinions. For more information, see the "Good nutrition" section at the start of **PC Book MOD 6 – Home and Community Gardens**.

Good nutrition leads to:

- Fewer health problems.
- Faster recovery after sickness.
- Children grow up stronger and healthier and they have fewer health problems later in life.
- Longer lives.
- More energy for work and for play. Therefore more can be achieved in a day.
- The ability to learn and concentrate increases. This is very important for children at school. Better food leads to smarter people.

What is good nutrition?

People need to eat a wide variety of foods to be healthy. This means eating vegetables, fruit, eggs, and meat as well as beans and grains every day. A wide range of healthy organic vegetables grown at home will provide many vitamins, minerals, proteins, energy, and oils.

Healthy soils are needed so that vegetables, fruit, grains, and animals can provide food that is full of vitamins, minerals and protein needed for healthy bodies. If the soils are poor then the produce will also be low quality.

Note: The facilitator can hand out photocopies of the food nutrition circle and encourage a discussion about what it means and how it can be achieved with local produce.

Creative Thinking : Good Nutrition from a Garden

Method : **Group and workgroup brainstorms**

Tools : **Black/white board or large paper, markers**

References : **PC Book MOD 6 – Home and Community Gardens**

Objective : **Participants create a nutritional sources from garden produce table**

Step 1

Using something like the table below, the facilitator can ask the participants to identify different nutritional needs and why each nutritional need is important (table 1).

Step 2

Ask the participants to split up into smaller workgroups and have each workgroup come up with sources of nutritional needs, first from home gardens and then from other local sources.

The answers listed below are only supplied as guidelines for the facilitator should the participants need help or prompting to develop ideas and discussions.

- **Vitamin A:** Good for eyes, examples are taro leaves, sweet potato leaves, cassava leaves, pumpkin leaves, cabbage, green vegetables, carrot, mango, banana, and papaya.
- **Vitamin C:** Good for body health, examples are papaya, citrus, tomato, pineapple, guava, and tamarind.
- **Protein:** Strong bones and muscles, examples are peanuts, beans, peas, yam, watermelon seeds, banana tuber, moringa seeds, and candle nut.
- **Carbohydrates:** For energy, examples are rice, corn, sweet potato, cassava, taro, potato, avocado, coconut (old), jack fruit, bread fruit, and sugarcane.
- **Fats and oils:** Good for skin and hair, examples are avocado, milk, chocolate, peanut, candle nut, cashew nut, and soybean.
- **Iron:** Good for growth, strength, and stamina, examples are mustard, spinach, green vegetables, banana tuber, cassava, sweet potato leaves, and dried beans.
- **Vitamins and minerals:** Good for healthy, bodily functions, and vitality. The foods listed for vitamin A and C provide other vitamins and minerals, and other examples include eggplant, choko, spinach, okra, pumpkins, cucumbers, watercress, bitter gourd, onions, and radishes and fruit such as watermelon, custard apple, and passion fruit.
- **Some trees, like Sesbania and Moringa, also provide very nutritional leaves and pods.** Their leaves can be dried, ground and added to rice, soup, rice porridge, and more. If they are mixed with small amounts of coconut oil, sea salt and sugar they can provide good basic nutrition.

- **Meat, fish, and eggs provide lots of protein, iron, and some oils** and they are important part of a daily diet.
- **Dry beans, tempe, and tofu also provide protein.**
- **Bamboo shoots provide many different vitamins and minerals.**
- **Mushrooms provide protein and many vitamins and minerals.**
- **Traditional medicines, especially small medicine plants like aloe vera and mint** can be grown close to the house with flowers and vegetables.
- **Spices and herbs like chilli, ginger, garlic, pepper, coriander, and basil are also important to eat for healthy bodies** and are good to use to help fight some sicknesses.

Step 3

After each workgroup has created their lists ask them to write the lists on the board (table 2) while presenting the results to the entire group for feedback and other suggestions. The facilitator can use the information provided above to add to the tables if necessary.

Nutritional need	Why it is needed
Vitamin A	Good for eyes
Vitamin C	Needed every day for a healthy body
Other vitamins and minerals	Good health, good bodily functions, and vitality
Iron	Strength and stamina
Protein	Strong bones and muscles
Fats and oils	Keep your insides healthy
Energy (carbohydrates)	Fuel for people
Medicines	Heals our body

Table 1. Nutritional needs and why it is needed

Home garden sources	Other local sources
Taro leaves, sweet potato leaves, cassava leaves, pumpkin leaves, cabbage, green leaf vegetables, carrot, mango, banana, papaya, moringa, sesbania	Juicy tubers, radishes
Green papaya, lemons, oranges, mandarins, pomegranate, sweet peppers, tomato, pineapple, guava, mango, cashew fruit, tamarind	Tangerines, Bali oranges, snake skin fruit, mangosteen, star fruit, *mahkota dewa*
Eggplant, *chokos*, spinach (*kangkung*), okra, pumpkins, cucumbers, watercress, bitter gourd, onions and radishes, custard apple, passion fruit	Watermelon, melon
Mustard, amaranth, green leaf vegetables, banana heart, cassava leaves, sweet potato leaves, dried beans	Spinach (*kangkung*), sago
Peanuts, beans, peas, yam beans, pigeon peas, watermelon seeds, banana tubers, cashew nuts, candle nuts, moringa seed pods, sesbania seed pods	Avocado, coconut
Avocado, coconut, peanuts, candle nuts, cashew nuts, soybeans	
Corn, sweet potato, cassava, taro, yam, potato, rice, pumpkin, avocado, ripe coconut, jackfruit, breadfruit, bananas, sugarcane	
Chilli, ginger, garlic, pepper, coriander and basil	*Sambiroto, sirih* leaf, *sembung* leaf, *katu* leaf, turmeric, *kencur* (greater galinger)

Table 2. Sources

Creative thinking : Design a food calendar

Method : **Presentation and workgroup brainstorms**

Tools : **Black/white board, markers, large paper**

References : **PC Book MOD 6 – Home and Community Gardens**

Objective : **Participants create their own food calendars**

The goal of this exercise is to link good nutrition and food availability with what is locally grown and develop a food calendar, which shows how good nutrition and food availability can be better achieved all year round.

Note: In the "Succession planting" section of the **PC Book MOD 6 – Home and Community Gardens** there is a detailed description of how to make local food calendars, with examples.

Step 1

The facilitator can explain the process of making a food calendar including:

- How it works.
- The connection with good nutrition.
- The connection with food availability all year.
- How it can be used for garden planning.

Use visual examples to help explain this.

Step 2

Ask the participants to divide into smaller workgroups (see the Resource Book) and have each workgroup make their own food calendars - one for when to plant and one to when to harvest.

Hints:

- It may be easier for the participants to develop a harvest calendar first to create year round harvests for a range of foods, and then create the planting calendar from the harvest calendar.
- This exercise may create planting times and harvest times that conflict with traditional events. This will result in some interesting discussion. It is important to preserve local traditions but also important to make positive change when it improves health and nutrition.

Step 3

After each workgroup has created their calendars, they can present them to the entire group for feedback and other suggestions. The facilitator can also make the link on how good food storage will improve year-round food availability.

Presentation : Food storage and preservation

Method : **Facilitator presentation**

Tools : **Images, markers, black/white board**

References : **PC Book MOD 6 – Home and Community Gardens; PC Book MOD 12 – Appropriate Technology**

Objective : **Participants learn food storage and preservation techniques**

This presentation introduces techniques and simple technologies for improving food storage and preserving excess food for later use.

The technologies are sustainable and able to be used in rural areas. The facilitator can focus on the most appropriate ideas for the participants, but it is also good to introduce new ideas for future use. See **PC Book MOD 12 – Appropriate Technology** for detailed description and illustrations.

Storing and using vegetables properly is very important. Good storage means that vegetables last much longer and keep more vitamins. Fewer vegetables will go rotten and there is a better chance of selling them. For most root vegetables the best option is to store them in the ground until needed. But for other vegetables a good storage method is essential.

After harvest, clean and remove any rotten leaves. Store the vegetables in a cool place that is out of the sun and protected from insects and animals.

Three good types of storage containers are:

- **Clay pots are excellent for small vegetables and green leaf vegetables.** Cover the top with a damp cloth and use string or rubber bands to tie it on. Keep out of the sun. The vegetables will stay fresh for many days longer.
- **In Africa some people use two clay pots, a smaller pot inside a larger pot.** A 2cm layer of wet sand is placed between the 2 pots. Cover and keep out of the sun. This technique works even better than 1 clay pot.
- **A Coolgardie safe.** The Coolgardie safe is a simple way to keep food colder as well as stopping animals from eating it and insects from touching it. The Coolgardie safe can be hung from a roof or placed on a legs or a stand. It is important to put it outside in a place that gets wind.

If many vegetables are picked at once or can't be sold or eaten there are methods to use and store the vegetables for later. A solar drier can be used to dry vegetables. There are many different types. The type that is made and used depends on the materials, time, and money available. They can also be used for drying fish, meat, and fruit.

Solar driers are good because:

- They provide protection against insects.
- Food dries much faster. Fish that takes 1 week to dry only takes 2 days to dry in a solar drier. Much more produce can be dried in the same amount of time.
- Less food goes rotten. Any food that can't be sold or eaten can be dried and saved for later use.
- The nutrients in the food stay in the food.

Vegetables and fruit can be preserved as sauces, pastes, pickles, and jams. Some examples:

- Sauces: tomato, chilli, tamarind.
- Paste: peanut, candlenut, cashew.
- Pickles: cucumber, onions, capsicum, cabbage, mango, limes, bamboo.
- Jams: All fruit except watermelon.

Some vegetables can be dried and stored in oil for later use: for example eggplant, capsicum, chilli, and tomato.

Creative thinking : Food storage and preservation ideas

Method : **Participatory brainstorm, group discussion**

Tools : **Paper, markers, black/white board**

References : **PC Book MOD 6 – Home and Community Gardens**

Objective : **Participants create a list of storage and preservation techniques**

Step 1

Conduct a brainstorm with the entire group to create a list of the food that is grown in home gardens (table 1). **Note**: Write the participant's answers on large pieces of paper or white/black board so that everyone can see and comment.

Step 2

Once the list of home grown foods is done, ask the participants to divide into smaller workgroups. The groups can then work out:

- How fresh food is normally stored.
- If the storage could be improved.
- How fresh food is or could be preserved – dried, pickled, sauce, paste, etc.
- What simple technologies could be used to achieve better storage or preservation – solar drier, Coolgardie safe, pedal powered grinder (table 2).

The answers listed below are only supplied as guidelines for the facilitator should the participants need help or prompting to develop ideas and discussions. The facilitator may need to help with some of the simple technologies.

Type of food	How is it stored?	Can it be improved?	How is or could the food be preserved?	Simple technologies for storage or preservation
Snake beans	Kept in a cold place	Yes	Drying the seed	Every morning put outside to remove dew
Corn	Kept in a cold place	Yes	Drying	Put above the stove
Tomatoes	Kept in a cold place	Yes	Drying	Food dryer
Cucumbers	Kept in a cold place	Yes	Drying	Food dryer
Capsicums	Kept in a cold place	Yes	Drying, make a powder	Food dryer and grinder
Ginger	Kept in a dry place	Yes	Drying, make a powder	Food dryer and grinder
Coriander	Kept in a dry place	Yes	Drying, make a powder	Food dryer and grinder
Soybeans	Kept in a dry place	Yes	Drying, milk powder, tofu, tempe	Food dryer and grinder

Table 1. **Table 2.**

Step 3

After each workgroup has created their lists, they can present the results to the entire group for feedback and other suggestions.

Creative thinking : Garden location and design

Method : **Participatory brainstorm, group discussion**

Tools : **Paper, markers, black/white board**

References : **PC Book MOD 6 – Home and Community Gardens**

Objective : **Participants create a checklist and response list for location factors**

Note: The purpose of this exercise is for participants to consider different factors that affect the location and design of garden beds and find techniques for positive responses to these factors.

Step 1

Conduct a brainstorm with the entire group to create a checklist of location and design considerations (table 1). Write the participant's answers on large pieces of paper or the white/black board so that everyone can see and comment.

Step 2

Once the list is done, ask the participants to split up into smaller workgroups. The groups can then come up with solutions and good design ideas to deal with the different considerations (table 2).

The answers listed below are only supplied as guidelines for the facilitator should the participants need help or prompting to develop ideas and discussions. The facilitator may need to help with some of the simple technologies.

Considerations
Sunlight
Water source
Soil
Wind
Slope
Tree root competition
Proximity to house
Animals
Insect problems
Stagnant water
Protection for seedlings

Table 1.

Location and design solutions
Choose or create an area with full sun and partial shade
Close to water supply or bring water to garden
Test soil type, apply appropriate improvement techniques, use natural fertilizers and mulch
Living fences, windbreaks, rows of legumes
Swales, terraces
Choose treeless site or remove big trees if necessary. Only plant small productive trees close to garden
As close as possible
Strong fence, living fence, make chicken coop to prevent chickens entering the garden area
Create pest predator habitats – flowers, perennial plants ponds, rotting logs, rocks
Raised garden beds, run water into trenches, ponds, or pits and grow water loving plants
Small nursery

Table 2.

Presentation : Garden maintenance

Method : **Facilitator presentation**

Tools : **Images, photocopies of weed control and water saving techniques from PC Book MOD 6 – Home and Community Gardens**

References : **PC Book MOD 6 – Home and Community Gardens;**
PC Book MOD 4 – Healthy Soil;
PC Book MOD 9 – Integrated Pest Management

Objective : **Participants learn sustainable, organic garden maintenance methods**

Preparation

Photocopy enough of the plant food, pest control, and weed control sections from **PC Book MOD 6 – Home and Community Gardens** so that each participant can take one set of references home.

Plant food is explained in more detail in **PC Book MOD 4 – Healthy Soil**, and pest control is explained in more detail in **PC Book MOD 9 – Integrated Pest Management.**

Notes:

- The facilitator can use images such as photos or illustrations to help explain the following topics. Local examples for each topic will also help to explain these techniques. Allow as much discussion time as is needed.
- If making plant food and integrated pest management are also part of the workshop, then only discuss these in relation to home gardens and leave the specific details for the other parts of the workshop.
- Hand out the photocopies at the end of the exercise.

Adding plant food

- Compost.
- Liquid compost.
- Mulch.
- EM – Effective Microorganisms.
- Integrating composts with garden design.

Water saving techniques

- Always water very early in the morning or late afternoon.
- Garden borders.
- Mulching.
- Windbreaks.
- Bamboo or plastic water bottle watering pipes.
- Bamboo irrigation.

Weed control

- Mulching.
- Plant ground covering vegetables.
- Create weed barriers around the outside of the vegetable plots.
- If you turn over the soil less, then fewer weeds will grow.
- Animal tractors.
- Any weeds that do grow should be removed before they produce seeds.
- Grow productive weeds.

Pest control

- Pest control in the garden is not just about removing pests.
- To control pests in a sustainable manner use many different techniques which will improve soil quality, encourage pest predators, and prevent pests.
- If pesticides are needed, natural pesticides should be used, not chemical pesticides.

Note: If the garden is changing from using chemical sprays to organic methods, then pesticides will need to be used as often as chemical pesticides until other pest control methods such as improving soil quality, encouraging pest predators, and preventing pests restore a better balance. Then even natural pesticides only need to be used rarely.

Field activity : Creative gardens using natural patterns

Method	**: Design and make natural shaped garden beds**
Tools	**: Photos or illustrations of different shaped garden beds, pens, paper, tools for making garden beds, garden border materials, mulch**
References	**: PC Book MOD 6 – Home and Community Gardens**
Objective	**: Participants use their creativity and natural patterns in design**

Garden beds don't have to be made in straight lines. The garden beds can be made in any shape. The shape and slope of the land always varies and if the designer works with it then the land will help to show the shape of the garden beds. Working with natural patterns and edges will increase the potential productivity of the land. It will also help to increase diversity and reduce pest problems.

- On sloped land swales and terraces are shaped with the land to catch and store water and mulch.
- On gently sloped land different patterns can make use of wet season rains.
- Edges occur naturally on the land but may also occur due to human development. All edges can be used and all usage of edges will increase production and diversity. All paths have edges on both sides that are not often used for production - planting path edges with fruit and flowers is beneficial.

Preparation

The facilitator will need to identify a site to make the garden beds. Garden borders such as rock, bamboo, wood, etc will be needed and it is good to have mulch and compost ready before running the exercise so it can be applied straight away.

Running this exercise

Step 1

Ask the participants to draw some different shapes of garden beds. The shape can be anything they want but the width of the bed should be around 1-1.5m at any point. This is wide enough to hold the water and soil but thin enough to prevent stepping on the beds. When complete, put the designs into a hat and have a participant randomly choose 1 design to make per 5 students.

Step 2

Create the garden beds. Each bed should be raised to allow drainage and bordered with the materials provided. Apply the compost and mulch at the end to complete the process.

Step 3

Review the process with the participants and discuss how they think natural patterns can be used on a larger scale. Write the participant's answers on large pieces of paper or white/black board so that everyone can see.

Presentation : Making use of space and time

Method : **Presentation, visual examples, field walk**

Tools : **Visual displays, black/white board, markers**

References : **PC Book MOD 6 – Home and Community Gardens**

Objective : **Participants learn concepts that can improve garden productivity**

By making more efficient use of space and time gardens will become more intensive, meaning that they will be able to produce more in a smaller space.

Preparation

- Read the 'planting methods' and 'planting times' sections from **PC Book MOD 6 – Home and Community Gardens** in order to be familiar with the concepts. Some practical experience is also important.
- The facilitator can walk around the community and identify different examples to demonstrate the topics in the exercise.

Running the exercise

The facilitator can use visual displays such as photos, illustrations, or local examples to help explain the following topics.

The facilitator can introduce each of the following concepts and then ask the participants to give local examples. Allow as much discussion time as is needed.

Making use of space

- Use different plant heights.
- Changing garden plot heights.
- Integrating crops together.
- Vegetable combinations.
- Vegetable plot and rice paddy integration.

Making use of time

- Succession planting.
- Use different plant growth lengths.
- Crop rotation.
- Integration with animals.

After the discussion, take the participants on a field walk to show them different examples in action. Ask the participants to find more for themselves and explain them to the other participants.

Presentation : Designing and building a garden system

Method : **Facilitator presentation and group discussion**

Tools : **Images of fully developed integrated garden systems**

References : **PC Book MOD 6 – Home and Community Gardens**

Objective : **Participants learn the components of a sustainable home garden**

Ideally, if time during the workshop allows, the 16 remaining activities in this module can all be carried out during the workshop as an integrated exercise. If there is not enough time, then the facilitator can choose the most relevant lessons to deliver. Note: It is important for the participants to be involved in creating integrated systems, not just individual garden beds. The Garden Exercises include:

- Ex. 1 : Design a garden system
- Ex. 2 : Make raised garden beds
- Ex. 3 : Mulch the garden beds
- Ex. 4 : Plant a living fence
- Ex. 5 : Plant Seedlings
- Ex. 6 : Create a small nursery
- Ex. 7 : Create a compost and mulch area
- Ex. 8 : Using compost, mulch, and liquid compost
- Ex. 9 : Use water saving devices
- Ex. 10 : Make trellising
- Ex. 11 : Construct ponds
- Ex. 12 : Make swales/terraces
- Ex. 13 : Construct banana pits
- Ex. 14 : Make and use a chicken tractor
- Ex. 15 : Weed control for the garden
- Ex. 16 : Pest control for the garden

Develop a different aspect of the garden project on different days so that over the duration of the course the garden will be added to step-by-step and the participants will gain a full understanding of how to design, implement and maintain a healthy garden.

Preparation

- **Identify land to use** – The components developed during these activities should be able to be maintained as an ongoing demonstration site, not just for the time of the workshop, therefore the land that is used needs to be available long-term. It will take around 2 years to show the real results of soil improvement and clearly demonstrate improved productivity.
- **Identify the water source for the gardens and other components** – The garden will need regular and easy to access water source.
- **Prepare other materials and tools needed** – There should be enough materials and tools for all of the workshop participants to be actively involved in all of the hands-on activities chosen for this series of exercises. If needed, participants can be asked to bring their own tools to use for various exercises.
- **The importance of the design step** – The following exercise 'Designing the garden' is essential no matter how many of the other exercises are used.

Running this exercise

Introduce to the participants each of the activities that will be part of the 'Garden design and building' process over the duration of the workshop. Answer any questions they may have about the process. Encourage them to participate by preparing seeds, cuttings, and composting and mulching materials that can be used later as the process unfolds.

Field activity : Design a garden system (Garden Ex. 1)

Method : **Participatory field activity**

Tools : **Pens, paper, clip board, and/or 3-D modeling materials**

References : **PC Book MOD 6 – Home and Community Gardens**

Objective : **Participants develop the garden system to be implemented**

Note: This exercise is essential, no matter how many other exercises in this series are undertaken.

Participatory site survey

Take the participants to the site that has been chosen for the demonstration gardens to survey the land and other resources that can be used such as water source, mulch materials, etc.

Groups design the garden project

Divide the participants into groups and ask each group to create their garden designs. Note: These designs should include all the elements of a sustainable and productive garden (as follows), even if only some of those aspects are put into practice at the demonstration.

Components include:

- Garden beds and pathways.
- Small nursery.
- Trellising
- Swales/terraces.
- Living fences.
- Banana pits.
- Ponds.
- Compost and mulch storage.

Considerations include:

- Access to water.
- Sunlight.
- Access to the house.
- Access to mulching materials.
- Wind.
- Distance from tree roots.

The designs can be on paper or a simple 3-D model. The designs do not need to be too detailed as the details of the designs will become clear as they are implemented in the development of the garden and related components. **Note:** The designs will need to last the duration of the workshop so 3-D models will need to be protected from the rain.

Choose the design to implement

- Each group presents their design to the whole group and explains their ideas.
- Then the whole group can choose the final design. Each participant can vote for their favorite design other than their own group's design.
- The chosen design is used as the template for the garden practical exercises.

See **PC Book MOD 6 – Home and Community Gardens** and other exercises in this book for reference and ideas.

Field activity : Make raised garden beds (Garden Ex. 2)

Method : **Participatory field activity**

Tools : **See description below and PC Reference Manual**

References : **PC Book MOD 6 – Home and Community Gardens**

Objective : **Participants practice making creative raised garden beds**

Running this exercise

- From the chosen design, copy and mark out the garden beds to make. Make sure that the garden beds are 1-1.5m wide at any point. This is wide enough to hold the water and soil but thin enough to prevent stepping on the garden beds. Paths are also important and should be wide enough for easy access.
- Create the garden beds. Each bed should be raised to allow drainage and bordered with the materials provided.
- If necessary, dig some soil from the paths to raise the height of the garden beds. But make sure that the paths will drain easily after heavy rains.

See **PC Book MOD 6 – Home and Community Gardens** for reference and ideas.

Field activity : Mulch the garden beds (Garden Ex. 3)

Method : **Participatory field activity**

Tools : **See description below and PC Reference Manual**

References : **PC Book MOD 6 – Home and Community Gardens;**
PC Book MOD 4 - Healthy Soil

Objective : **Participants practice mulching garden beds**

Running this exercise

- Divide the participants into workgroups, and have each group choose a target area for their mulching exercise (i.e. trees, beds, paths, seedlings).
- Ask the participants to identify and collect various local mulching materials.
- Prepare the mulching materials.
- Have the groups apply the mulch at the various locations.

See **PC Book MOD 6 – Home and Community Gardens**, **PC Book MOD 4 - Healthy Soil,** and other exercises in this book for reference and ideas.

Field activity : Plant a living fence (Garden Ex. 4)

Method : **Participatory field activity**

Tools : **See description below and PC Reference Manual**

References : **PC Book MOD 6 – Home and Community Gardens; PC Book MOD 10 – Animal Systems**

Objective : **Participants learn about and practice making a living fence**

Preparation

- Prior to running this exercise the facilitator should prepare materials that can be used for creating a living fence.
- **Appropriate plants for living fences include:**
  - Moringa.
  - Cactus.
  - Tall grass.
  - *Flamboyan.*
  - *Lamtoro.*
- **Other materials that can be used for creating the fences include:**
  - Stones.
  - Bamboo.
  - Old roofing materials.
  - Wood.
  - Old fishing nets.

Running this exercise

- Ask the participants to identify, gather, and use local materials to build a strong fence around the garden.
- On the inside of the fence (approximately 10cm from the fence line) the participants can plant legume tree cuttings or seeds - very close together, 5-10cm apart so that they will become a strong living fence within 1-2 years.
- The fence can also be used to grow vines on.
- Thought should also be given to stopping chickens that may fly over the fence. A chicken house and yard is a good solution, clipping chicken wings is another.

Note: This should be one of the first exercises as it provides protection for future work.

See **PC Book MOD 6 – Home and Community Gardens, PC Book MOD 5 - Seed Saving and Nurseries, PC Book MOD 10 - Animal Systems,** and other exercises in this book for reference and ideas.

Field activity : Plant seedlings (Garden Ex. 5)

Method : **Participatory field activity**

Tools : **See description below and PC Reference Manual**

References : **PC Book MOD 5 – Seed Saving and Nurseries**

Objective : **Participants learn about and practice planting seedlings**

Most or all of the participants will have planted seedlings before, but following the instruction in the PC Reference Book and conducting this exercise as a participatory activity is still important because:

- There may be a step that they hadn't thought of before.
- There may be something that they could improve.
- From the participants sharing their own knowledge everyone, including the facilitators, will learn more.

Preparation

- Prior to running this exercise the facilitator should prepare the seedlings that will be used in the demonstration gardens.
- Vegetables that grow better when the seeds are planted in a nursery are cabbage, tomatoes, green-leaf vegetables, spinach, eggplants, capsicum, onions, chilli, cucumbers, peas, okra, lettuce, and mustard.
- Vegetables that grow better if the seeds are planted straight into the ground are pumpkins, corn, beans, peanuts, radish, sunflowers, loofah, squash, gourds, and melons.

Running this exercise

- Review the planting plan for the garden with all the participants.
- Then divide the participants into smaller workgroups that can focus on planting different parts of the garden.
    - Small seeds should be planted about 1 finger knuckle deep in the soil.
    - Large seeds should be planted about 2 finger knuckles deep in the soil.
- When they are done, the whole group can work together to water the seedlings in the new nursery and plant some more seedlings in the demonstration garden.

See **PC Book MOD 5 – Seed Saving and Nurseries** and other exercises in this book for reference and ideas.

Field activity : Create a small nursery (Garden Ex. 6)

Method : **Participatory field activity**

Tools : **See description below and PC Reference Manual**

References : **PC Book MOD 5 – Seed Saving and Nurseries; PC Book MOD 6 – Home and Community Gardens**

Objective : **Participants learn about and practice making a small nursery**

If there is a large nursery near the garden site then it can be used for growing the vegetable seedlings for the garden. If not then a small nursery can be made.

- It needs to be inside the garden fence and have easy access to water.
- It can be located close to the compost and liquid compost areas.

Preparation

- Collect construction materials and shade materials for the nursery roof (e.g. bamboo, wood poles, coconut leaves, etc).
- Collect the tools needed for construction.
- Collect the materials needed for the potting soil mixture.
- Prepare plant containers.
- Prepare seeds and propagates for planting.

See the "Small nurseries" section in PC Book MOD 6 – Home and Community Gardens for detailed information.

Running this exercise

With all the participants decide on the location, size, and design of the nursery.

Then, divide the participants into 2 groups.

- **Group 1**: Focuses on the nursery construction.
- **Group 2**: Prepares soil mixtures, containers, seeds, and seedlings.

Ask each group to plan and implement their tasks. When they are done, the whole group can work together to water the seedlings in the new nursery and plant some more seedlings in the demonstration garden.

See **PC Book MOD 5 – Seed Saving and Nurseries, PC Book MOD 6 – Home and Community Gardens** and other exercises in this book for reference and ideas.

Field activity : Create a compost and mulch area (Garden Ex. 7)

Method	**: Participatory field activity**
Tools	**: See description below and PC Reference Manual**
References	**: PC Book MOD 6 – Home and Community Gardens; PC Book MOD 4 - Healthy Soil**
Objective	**: Participants learn about and create a storage area close to the garden**

The size of the storage area needed for the ongoing compost, liquid compost, and mulching materials will depend on the size of the garden.

Preparation

- Prepare all the materials and storage bins as described below.

Running this exercise

The storage area should include the following:

- **3 compost bays, 1m x 1m for each bay.**
  - Construct 3 sides – use a fence as the back side for all the bays and leave the front open.
  - A removable front will help but is not essential.
  - Use whatever local materials are available for construction – bamboo, wood, stone, large planting cuttings like cassava or gamal.
- **3 mulch and compost material collection bays.**
  - The size will vary depending on the space available, but they should be a minimum of 1m x 1m.
  - Construct in the same method as the compost bays.
- **1 liquid fertilizer drum.**
  - 200 liters or the equivalent amount using other containers.
  - A liquid compost container can easily be made out of ferro cement if drums or large containers are not available.

If there is time in the workshop the next step is to collect the materials and use them to make the compost and liquid compost.

See **PC Book MOD 4 - Healthy Soil** and other exercises in this book for detailed instructions on how to do this.

Field activity : Using compost, mulch and liquid compost (Garden Ex. 8)

Method : **Participatory field activity**

Tools : **See description below and PC Reference Manual**

References : **PC Book MOD 6 – Home and Community Gardens; PC Book MOD 4 - Healthy Soil**

Objective : **Participants practice composting, mulching, and using liquid compost**

Preparation

- Depending on the objectives and other components of the lesson plan for the workshop, the facilitator should review the relevant sections of this book and the PC Reference Manual to decide which of the composting, mulching, and liquid compost exercises are most applicable.
- The lists of materials and tools to be prepared are provided in the individual exercise descriptions.
- Follow the instructions in any of these exercises from Module 4. Healthy Soil:
    - Mulching a garden bed.
    - Make a quick compost heap.
    - Make liquid fertilizer.
    - Use liquid fertilizer.

Running this exercise

- With all the participants as a group discuss the plan for using the compost, liquid compost, and mulching materials in the demonstration garden.
- Then divide the participants into 2 groups:
    - **Group 1**: Focuses on applying the compost.
    - **Group 2**: Focuses on gathering and applying the mulch materials.
- Ask each group to plan and implement their tasks.
- When they are done, the whole group can work together to apply the liquid compost throughout the demonstration garden.

See **PC Book MOD 4 - Healthy Soil, PC Book MOD 6 – Home and Community Gardens,** and other exercises in this book for reference and ideas.

Field activity : Use water saving devices (Garden Ex. 9)

Method : **Participatory field activity**

Tools : **See description below and PC Reference Manual**

References : **PC Book MOD 6 – Home and Community Gardens**

Objective : **Participants learn about and create water saving devices**

Preparation

Prepare the following materials:

- Bamboo poles at least 10cm wide.
- Plastic 1.5 liter water bottles.
- Hammer, nails, knife, and machete.
- Tool for poking small holes through the nodes of the bamboo.

Running this exercise

With all the participants as a group discuss the benefits and techniques for using water saving devises in the demonstration garden. The pictures in the "Water saving techniques" section of **PC Book MOD 6 – Home and Community Garden** provide simple explanations for how to make the watering pipes.

Divide the participants into 2 groups

- **Group 1**: Focuses on creating a bamboo water saving device system.
- **Group 2**: Focuses on creating a plastic bottle water saving device system.

Ask each group to plan and implement their tasks. **Remind them to install the systems 40-50cm apart and at least 15cm deep in the soil.**

When they are done, each of the work groups can explain to the others the techniques that they used to implement their water saving device systems.

The facilitator should take this opportunity to also explain to the participants that some watering on the soil will still be required, especially for seedlings before their roots are established and deep - however over time a lot of water will be saved through use of these techniques.

See **PC Book MOD 6 – Home and Community Garden** and other exercises in this book for reference and ideas.

Field activity : Make trellising (Garden Ex. 10)

Method : **Participatory field activity**

Tools : **See description below and PC Reference Manual**

References : **PC Book MOD 6 – Home and Community Gardens**

Objective : **Participants learn about and create shade trellises**

Preparation

Identify and prepare or ask the participants to identify and prepare the tools and materials to build the trellises and cuttings that can be used for planting on the trellises.

- **Appropriate plants for trellises include:**
  - Moringa.
  - Cactus.
  - Tall grass.
  - *Flamboyan.*
  - *Lamtoro.*

- **Materials that can be used for creating the trellises include:**
  - Wood.
  - Old fishing nets.
  - Bamboo.
  - Old roofing materials.

Running this exercise

With all the participants as a group discuss the benefits and techniques for using trellising in the demonstration garden.

- The design and shape of the trellises will depend on the garden size and shape and the creativity and needs of the people making them.
- Trellises can be permanent, temporary, or moveable.
- Fences can be adapted to make trellises.

Ask the participants to plan the trellises for the garden system. Remind them to beware of creating too much shade in the garden - some shade is good for plants like lettuce and green leaf vegetables but not total shade. Pictures in the PC Book MOD 6 – Home and Community Garden provide examples of various trellis techniques if needed.

Then divide the participants into 2 groups:

- **Group 1**: Focuses on applying building the trellises.
- **Group 2**: Focuses on preparing the plants to be planted on the trellises.

Ask each group to plan and implement their tasks.

When they are done, the whole group can work together to plant the various plants that have been prepared for the trellises.

See **PC Book MOD 6 – Home and Community Gardens** for reference and ideas.

Field activity : Construct ponds (Garden Ex. 11)

Method : **Participatory field activity**

Tools : **See description below and PC Reference Manual**

References : **PC Book MOD 6 – Home and Community Gardens; PC Book MOD 11 - Aquaculture**

Objective : **Participants learn how to create ponds in a garden system**

Preparation

- The facilitator should test the soil in the planned location for the pond to see if it will hold water or not. If not, clay or cement materials can be prepared.
- A water source for filling the pond will be needed. The pond can be filled using a hose, buckets, or from digging a trench from another water source to the pond.

Tools and materials to prepare include:

- Tools for making the pond.
- Water loving plants to plant in and around the edge of the pond.
- Mosquito eating fish.
- Rocks to control the water inflow and outflow.

Running this exercise

With all the participants as a group :

- Choose the location and design the shape and size of the pond.
- More than 1 pond could be made if space and time permits.

Then divide the participants into 2 groups:

- **Group 1**: Focuses on digging and lining the pond, and later as Group 2 plants the plants, Group 1 can collect and apply mulch around the plants on the edge of the pond.
- **Group 2**: Focuses on preparing the water, inflow and outflow controls, plants, and fish.

Ask each group to plan and implement their tasks.

When they are done, review the process with all the participants and discuss the functions and benefits of the pond. Write the participant's answers on large pieces of paper or a white/black board so that everyone can see and comment.

See **PC Book MOD 6 – Home and Community Garden, PC Book MOD 11 - Aquaculture** and other exercises in this book for reference and ideas.

Field activity : Make swales/terraces (Garden Ex. 12)

Method : **Participatory field activity**

Tools : **See description below and PC Reference Manual**

References : **PC Book MOD 6 – Home and Community Gardens; PC Book MOD 8 - Forests, Tree Crops, and Bamboo; PC Book MOD 7 - Farming**

Objective : **Participants learn about and create swales and terraces**

Preparation

- Materials for making and using A-frames.
- Tools for digging the swales and/or terraces.
- Rocks, clay, or wood for holding the terraces and/or swales in place.
- Seeds, seedlings, or propagates to plant in the finished terraces and/or swales.
- Mulch materials.

Running this exercise

This exercise is divided up into the following steps:

1. Making the A-Frame and using it to mark out the swales and/or terraces.
2. Digging the swales and/or terraces.
3. Using the rocks, clay, or wood to support the swales and/or terraces.
4. Planting the seeds, seedlings, or propagates:
    - Create legume tree rows, if space provides, use legume propagates on the edge of every 2nd swale or terrace.
5. Mulching the swales and/or terraces.

Notes:

- It is beneficial for all the participants to practice each of the steps in this exercise.
- For successful implementation of this exercise you can use the information and pictures in the reference chapters for advice, but some direct field experience with designing and making swales and terraces is important.

See **PC Book MOD 6 – Home and Community Gardens, PC Book MOD 8 - Forests, Tree Crops, and Bamboo, PC Book MOD 7 - Farming,** and other exercises in this book for reference and other ideas.

Field activity : Construct banana pits (Garden Ex. 13)

Method : **Participatory field activity**

Tools : **See description below and PC Reference Manual**

References : **PC Book MOD 6 – Home and Community Gardens; PC Book MOD 4 – Healthy Soil**

Objective : **Participants learn how to make banana pits**

Preparation

- Tools for digging the banana pits and planting the plants around the pit.
- Banana planting stock and other seeds, seedlings, and propagates ready to plant. Note: It is not essential to use bananas. If the participants prefer, vegetables can be planted around the outside of the pit.
- Rocks to support the edge around the pits.
- Mulch materials.
- Water for the plants.

Running this exercise

With the whole group, identify good locations for the banana pits. The locations should:

- Allow for space for the bananas to grow and multiply without shading or crowding any vegetable beds.
- Make use of the banana pits' ability to collect and absorb stagnant water.

Divide the participants into groups using a creative group creation technique (see appendix). The number of groups will be determined by (a) the space available for the banana pits and (b) the time available for the exercise - at least 2 hours is needed to complete 1 pit.

- **Each group will be responsible for developing 1 banana pit:**
  - Creating the pit.
  - Planting the pit and borders.
  - Mulching after planting.
  - Watering.
- Have each group present their pit to the rest of the participants.
- Review the results and the processes used with all the participants.

See **PC Book MOD 6 – Home and Community Gardens, PC Book MOD 4 - Healthy Soil** and other exercises in this book for reference and ideas.

Field activity : Make and use a chicken tractor (Garden Ex. 14)

Method : **Participatory field activity**

Tools : **See description below & PC Reference Manual**

References : **PC Book MOD 6 – Home and Community Gardens; PC Book MOD 10 – Animal Systems**

Objective : **Participants learn about and practice making and using a chicken tractor**

Making a chicken tractor can be a fairly long a process, especially as more than 1 tractor will have to be made if there is a large group of participants and every participant is to be included in the process.

If time and materials are available, this is an excellent activity that demonstrates an integrated approach.

Preparation

- Prepare enough materials for making 1 chicken tractor per 10 students.
- For a chicken tractor of 3m x 4m collect 4 large bamboo poles.
- Other materials needed will include**:**
    - Grasses, rattan, hammer, nails, string, wire, etc - for binding the bamboo together.
    - Grass, coconut leaves, and/or plastic sheeting to attach as a roof for shade and protection from rain.
    - Old fishing nets to cover the tractor to prevent escapes or intrusions.
- Chicken to put in the tractors.

Running this exercise

- With the whole group, discuss the basic principles and techniques of chicken tractor design including best size and shape.
- Decide where the chicken tractors will be used.
- Then ask the participants to divide into smaller workgroups - each group can then construct their own chicken tractor.
- Once the tractors are completed, the groups can put chickens into the tractors to test the results.
- Suggest that the participants monitor and even document the effects of using the tractors during the remainder of the workshop.

See **PC Book MOD 6 – Home and Community Gardens**, **PC Book MOD 10 - Animal Systems,** and other exercises in this book for reference and ideas.

Field activity : Weed control for the garden (Garden Ex. 15)

Method : **Participatory field activity**

Tools : **See description below & PC Reference Manual**

References : **PC Book MOD 6 – Home and Community Gardens;**
PC Book MOD 7 – Farming;
PC Book MOD 9 - Integrated Pest Management

Objective : **Participants learn about and practice ways to control weeds in the garden**

Following are some of the key systems for weed control in the garden:

- **Remove weeds -** Most weeds can be used as a compost or mulch material. However, weeds like running grasses or weeds that have already seeded need to be separated and should not be used for compost or mulch. Put these weeds in banana pits, into liquid compost, or use as chicken feed.
- **Plant ground covering vegetables** like pumpkin, beans, loofah, sweet potato, and yam under cassava, corn, and other large crops to reduce weed growth.
- **Mulch the garden** to prevent weed growth.
- **Make a weed barrier** around the outside of the vegetable plots to stop running grasses from growing into the garden plots. **The weed barrier can be:**
    - A path around the edge that is kept free of weeds.
    - A small but thick living barrier that will prevent running grasses from entering the garden. Lemon grass, vetiver grass, comfrey, etc. Plant them close together so that the roots create the barrier.
- **Use animal tractors -** This is a good way to remove weeds and weed seeds while fertilizing the ground at the same time.
- **Grow productive weeds -** Spread seeds and cuttings of useful plants that grow easily. This will create a new weed problem. The difference is that it is useful plants that become weeds!

Preparation

- Discuss with the participants the weed control methods outlined above, if images and or hand outs have been prepared they can be used as well.
- Choose the weed control techniques to be implemented that are most suitable for the workshop and area.
- If some of the recommended techniques are not chosen for implementation, they should still be explained to the participants for future reference.

Running this exercise

- Divide the participants into groups
- Write down the different techniques chosen to be implemented - each technique on a different piece of paper. Fold up the papers and let a representative from each group choose a technique or techniques.

- The weed control technique chosen by the each group is implemented in the demonstration garden.
- After each group has finished, they can present the results to the entire group for feedback and other suggestions.

See **PC Book MOD 6 – Home and Community Gardens, PC Book MOD 7 - Farming, PC Book MOD 9 - Integrated Pest Management,** and other exercises in this book for reference and ideas.

Field activity : Pest control for the garden (Garden Ex. 16)

Method : **Participatory field activity**

Tools : **See description below and PC Reference Manual**

References : **PC Book MOD 6 – Home and Community Gardens; PC Book MOD 9 - Integrated Pest Management**

Objective : **Participants learn about and practice different types of pest control**

In Module 9 - Integrated Pest Management includes several practical exercises which can be used for pest prevention and control. Some of the practical exercises from the module that are important for a sustainable home garden include:

- Observation and hand control.
- Integrating flowers.
- Making a pond.
- Crop rotation.
- Vegetables and herbs.
- Making and using natural pesticides.
- Setting baits and trap.

Preparation

- Use the same method for exercise preparation as outlined in the previous exercise "Weed control for the garden".

Running this exercise

- Use the same method for running this exercise as outlined in the previous exercise "Weed control for the garden".

See **PC Book MOD 6 – Home and Community Gardens, PC Book MOD 9 - Integrated Pest Management,** and other exercises in this book for reference and ideas.

Notes...

WORKSHOP MODULE No 7.

Farming

Notes...

Presentation : About sustainable farming

Method : **Facilitator presentation**

Tools : **Images of good farming practice, black/white board, markers**

References : **PC Book MOD 7 – Farming**

Objective : **Participants are introduced to sustainable farming concepts**

Improvement of the sustainability and long-term productivity of farmland is essential for the future prosperity of Indonesia. Protection of the natural environment and its resources is also a key to sustainability. These two goals can be achieved together if good plans and techniques are used.

Good plans and techniques follow Permaculture ethics and principles and include concepts such as integration, diversity, following natural patterns, recycling and reusing energy, and waste management.

The key issues to prioritize are:

- Maximizing production on agricultural land already in use in a sustainable and affordable way.
- Forming community cooperatives and farmers' groups that share resources, costs, techniques, and knowledge.
- Improving storage, marketing, and transportation systems for produce.

Many current farming practices use chemical pesticides and fertilizers, monoculture crops, and hybrid seeds. Farmland where these techniques are practiced often experience serious problems with poor soil conditions and serious pest and plant disease problems.

As well as experiencing these problems, many farmers are now very poor because they have to purchase a great deal of their inputs for farming from commercial outlets. The chemical fertilizers, chemical pesticides, chemical herbicides, tractors, hybrid seeds, and plastic mulch that is used can cost most of a farmers hard-earned profits.

Farming techniques which promote **independence instead of dependence** are much better for farmers and their families, and are much more sustainable for the environment.

Techniques which promote independence include:

- Using local resources as much as possible.
- Using organic methods of farm management, including compost, liquid compost and mulch, and recycling of all farm wastes.
- Catching and storing rainfall and preventing erosion and soil loss by using terracing and swales.

- Using legume trees grown in rows along terraces and swales to divide the land for crop rotation and allow for integration with animal systems.
- Improving productivity by integrating several varieties of crops and integrating different systems.
- Using organic weed control methods.
- Using efficient systems of irrigation and water use.
- Using living fences to protect crops from animals and grow mulch and animal fodder.
- Using crop rotation, companion planting, and other integrated pest management techniques to reduce pest attacks, and natural pesticides to control any problems.
- Using animals to plough the soil.
- Using organic fertilizer to reduce pest problems.
- Using non-hybrid, open-pollinated seeds that can be self-propagated.

The facilitator can discuss these techniques for sustainable, more economically viable farming with the participants, and ask them to speak about local examples that they know of or use already.

If handouts and/or images that explain these issues have been prepared, hand them out to the participants while discussing the related components.

Then discuss the following:

Other important planning and long-term ideas to discuss include:

- **Step-by-step short-term, mid-term, and long-term strategies** - Sometimes to try new techniques and implement major changes, a long-term approach and plan is needed. This long-term plan can be divided up into mid-term and short-term plans to practice and develop new techniques and make gradual and long lasting improvements. A long-term approach is also more affordable, less risky, and allows for adaptations and new ideas.
- **Food calendars** - See **PC Book MOD 6 - Home and Community Gardens** and Module 6 in this handbook for food calendar explanations and exercises.
- **Organic certification** – Means that the land and water must be chemical free and all farming practices must be organic. If land is organically certified then any crop growing on it can use an organic label. This will increase the selling value of the harvest and open up new markets. To gain organic certification is usually a 3 year process.

See **PC Book MOD 7 – Farming, MOD 4 – Healthy Soil, PC Book MOD 5 - Seed Saving and Nurseries, PC Book MOD 6 - Home and Community Gardens, PC Book MOD 9 - Integrated Pest Management, PC Book MOD 10 - Animal Systems,** and other exercises in this book for reference and ideas.

Creative thinking : Farming chemicals pollution and costs

Method : **Presentation, discussion, and group brainstorm**

Tools : **IDEP GMO Fact Sheets, black/white board, markers**

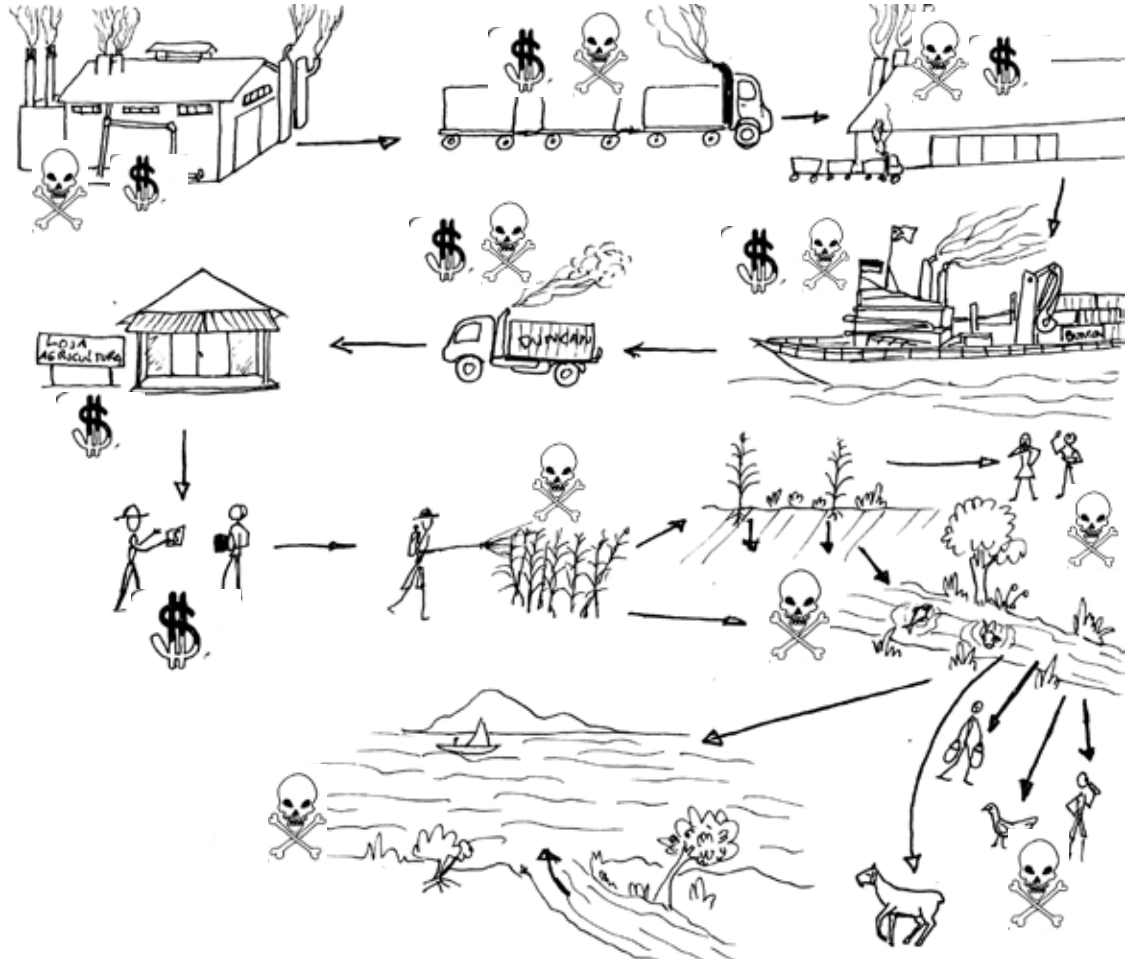
References : **PC Book MOD 7 – Farming;**
PC Book MOD 9 - Integrated Pest Management

Objective : **Participants understand the impacts of chemicals and external inputs**

CREATIVE THINKING EXERCISE

Step 1

The facilitator can draw on the white/black board something like the following diagram:



Discuss with the participants the short-term and long-term impacts of using chemical pesticides, herbicides, and fertilizers, including:

- Cost to the farmers.
- Pollution from transporting the chemicals.
- Pollution from using the chemicals.
- Impacts on soil fertility.
- Impacts of the surrounding environment and farmers' health.
- Impacts on water sources.
- Impacts on the heath of people who eat produce grown with chemicals.

Use locally relevant examples to show how this chain of farming chemicals affects the participants and how farmers are a part of the chain when they use chemical products.

Step 2

- Conduct a group brainstorm with the participants.
- On the board create a table something like the following - leave the answers to the questions blank so that the participants come up with their own ideas.
- List the external inputs - these are products that are generally factory made and bought for farming.
- Allocate the estimated costs per external input for one crop harvest on one average farm.
- Then fill in the column with suggestions for local resources that farmers can make or use instead.
- Allocate estimated costs of the local resources for one harvest on one average farm.
- Finally total the values at the bottom of both of the cost columns and compare the results.

The answers listed below are only supplied as guidelines for the facilitator should the participants need help or prompting to develop ideas and discussions.

External inputs	Average cost per harvest	Local resources that can be used instead	Estimated cost per harvest
Chemical fertilizer	Rp. 150,000 / are	Compost	No cost
Chemical pesticide	Rp. 300,000 / are	Local natural pesticide	No cost
Hybrid or GMO seeds	Rp. 3,000 / kilo / are (for hybrid rice 64)	Local traditional seed variety	No cost
Chemical herbicide	Rp. 100,000 / are	Mulch and cover crop	No cost
Machine Tractor	Rp. 500,000 / are	Orange rinds, bamboo leaves, and lime	No cost
TOTAL COST:	**Rp. 1,053.000 / are**	**TOTAL COST:**	No cost

Presentation : Windbreaks for farming

Method : **Facilitator presentation**

Tools : **Images of windbreaks and how they work, black/white board, markers**

References : **PC Book MOD 7 – Farming**

Objective : **Participants understand what windbreaks are and how they work**

A windbreak is 3 or 4 rows of trees planted together that slow and redirect strong winds while still allowing light winds to flow through. Even a small windbreak can improve production for a large area of land. They benefit tree crops, community and home gardens, animal production, aquaculture, and house and living areas.

The direct benefits of windbreaks for agriculture include:

- Reduce stress on plants therefore increasing growth rate.
- Reduce wind damage to plants.
- Erosion is greatly reduced.
- Water evaporation from plants and the soil is reduced and plants use the water more efficiently.
- Soil temperature won't change as much (the soil won't get as hot or cold) - this creates a better temperature for healthy plant roots and soil biota.

Other benefits:

- Pollination rates will increase because the number of birds and insects increase - this will increase the number of grains, vegetables, or fruit on each plant.
- If you use a lot of legume trees then nitrogen in the soil will increase around and below the windbreaks.
- Windbreak trees also can provide animal fodder, nuts, oils, firewood, timber, mulch, fibre, medicines, etc.
- Water evaporation from rice paddies, ponds, and aquaculture will decrease.
- Animals will be healthier and less stressed - this will increase the amount and the quality of meat and other by-products while reducing animal sickness.
- House areas will be much better and more comfortable to live in.

The windbreak shape depends on (a) the size of the windbreak, (b) the shape of the land, (c) the wind characteristics, and (d) what it is needed for.

See PC Book MOD 7 – Farming for detailed information and illustrations about:

- Windbreak location.
- Windbreak shape.
- Windbreak construction.
- Windbreak maintenance.

Creative thinking : Productive windbreak plants

Method : **Participatory group brainstorm**

Tools : **Large paper, markers**

References : **PC Book MOD 7 – Farming**

Objective : **Participants identify trees to use for windbreaks**

Step 1

- Ask the participants to divide up into smaller groups.
- Have each group come up with lists of local trees that can be used for windbreaks (table 1).
- The groups can also briefly describe the size and shape of each species and its productive uses (table 2).

The answers listed below are only supplied as guidelines for the facilitator should the participants need help or prompting to develop ideas and discussions.

Windbreak trees
Moringa
Bamboo
Mango
Durian
Turi tree
Ligundi

Table 1.
Windbreak trees

Size and shape of tree	What are its productive uses?
Tall, pyramid shape	Pod and leaf used as vegetables and legumes
Tall, spreading	Building material and bamboo shoots for vegetables
Big, tall	Produces fruit
Straight and tall	Produces fruit and timber
Thin and strong	Pod for vegetable and legume
Bush	Natural pest control

Table 2.
Size and shape of tree and its productive uses

Step 3

After each workgroup has created their lists ask them to present them to the entire group for feedback and other suggestions.

Field activity : Identify windbreak locations

Method : **Site visit and mapping**

Tools : **Clipboards, notebooks, pens**

References : **PC Book MOD 7 – Farming;**
PC Book MOD 2 - Natural Patterns and Permaculture Design

Objective : **Participants practice locating windbreaks**

PARTICIPATORY FIELD ACTIVITY

Preparation

The facilitator can locate an appropriate site for the participants to practice the following exercise. This could be the site of the workshop or farmland close by.

Running this exercise

Take the participants to the site and give the following questions and ideas to help them identify good locations for windbreaks,

Factors for windbreak location:

- Where do strong winds come from?
- Where do these winds come from most often?
- What needs protection from strong winds? E.g. house, animals, crops, fruit trees, etc.
- The area of land that is improved by windbreaks depends on how high the windbreak is, for example:
    - A 5m high windbreak will slow the wind for more than 100m of land behind the windbreak.
    - A 10m high windbreak will slow the wind for more than 200m of land.
- Roots of windbreak trees will reduce productivity of crops grown next to the trees.
- Shade from large trees when they are fully grown can affect crops (note: very tall trees are not usually needed for windbreaks).

Each participant can draw simple maps to show their ideas for the best windbreak location at the site.

When they have finished they can present their ideas and discuss the results with the whole group.

Presentation : Natural fertilizers for farms

Method	**: Presentation and discussion**
Tools	**: Images of quality results using natural fertilizing techniques black/white board, markers**
References	**: PC Book MOD 7 – Farming; PC Book MOD 4 - Healthy Soil**
Objective	**: Participants learn about natural fertilizing techniques for farms**

Sustainable agriculture practice focuses on building up and improving the soil quality year after year. Natural fertilizers provide the nutrients that the plants need as well as improving soil quality and structure.

By incorporating several different sustainable agriculture techniques at the same time the soil quality and structure will be greatly improved.

Preparation

The facilitator can prepare relevant handouts for the participants which explain the benefits, and methods for making and using the natural fertilizers listed below.

Running this exercise

The following methods of natural fertilizing are all described in detail in the "Natural fertilizers and mulch" section of PC Book MOD 7 – Farming and in PC Book MOD 4 - Healthy Soil.

The facilitator can introduce each of the methods while giving the participants hand outs and/or showing images of the results of using the following:

- Liquid fertilizer.
- Compost.
- EM – Effective Microorganisms.
- Cover crops.
- Legumes.
- Green manure crops.
- Mulch.

The facilitator can encourage a discussion with the participants about:

- The current condition and quality of farming/gardening soil in the area.
- Any positive experiences that participants have had using natural fertilizers.
- What types of natural fertilizer the participants think would be good for different types of farming – Rice paddies, grain crops, vegetables, etc.
- Their ideas for developing a natural fertilizing system for local farms which incorporate many different techniques.

Presentation : Mulching for farms

Method : **Facilitator presentation**

Tools : **Images of mulch production and use on farms, black/white board, markers**

References : **PC Book MOD 7 – Farming; PC Book MOD 4 - Healthy Soil**

Objective : **Participants learn about using mulch on farms**

A lot of mulch material is needed to keep a farm continuously mulched. The facilitator should emphasize the importance of growing mulch, not just collecting it, to ensure a continuous supply.

Preparation

The facilitator can prepare relevant handouts for the participants which explain the benefits, and methods for growing and using mulches.

Running this exercise

The following methods of mulching are all described in detail in the "Natural fertilizers and mulch" section of PC Book MOD 7 – Farming and in PC Book MOD 4 - Healthy Soil.

The facilitator can introduce the following while giving the participants hand outs and/or showing images of the techniques, including:

- How to mulch.
- How to grow mulching materials, including:
    - Living fences and living terraces using legume trees.
    - Using stems, leaves, husks, etc from crops as mulch instead of burning.
    - Green manure crops.

The facilitator can encourage a discussion with the participants about:

- Any positive experiences that participants have had using mulches.
- What types of mulches the participants think would be good for different types of farming – Rice paddies, grain crops, vegetables, etc.
- Their ideas for developing a mulch production system for local farms.

Presentation : Intercropping and integration on farms

Method	**: Presentation and discussion**
Tools	**: Images showing inter cropping and integration techniques, IDEP Companion Planting Chart, black/white board, markers**
References	**: PC Book MOD 7 – Farming; PC Book MOD 8 – Forests, Tree Crops, and Bamboo; PC Book MOD 6 – Home and Community Gardens**
Objective	**: Participants learn about combining different systems to increase productivity**

The facilitator can explain the Permaculture principle of diversity, as intercropping and integration both encourage and strengthen diversity.

In natural environments a greater diversity of plants and animals leads to a healthier, more balanced environment - It is the same for farmland.

A diverse system:

- Is more resilient to extreme weather and more flexible with sudden change.
- Produces food and income more often during the year.
- Means that if one crop fails or some animals die then other crops or animals still produce or may even produce more.
- Will suffer less from large-scale pest or disease problems.

Intercropping means growing different types of grains, vegetables, and small trees together. There are many intercropping systems and benefits to using them.

Examples of intercropping

- Cassava can be grown with small trees - As well as growing more crops the cassava will benefit from the shade and from the nitrogen from the legumes.
- Papaya, sesbania, moringa, pineapples, and bananas can all be grown together.
- Mound rows with trenches dug in between them are good for holding wet season rains and for irrigation. The mounds can be used for grains, vegetables, and even some legumes and small fruit trees. In the trenches you can grow water spinach, watercress, and taro.

The facilitator can hand out and/or show around the room the sample of the IDEP companion planting chart and related components of the relevant sections from the Permaculture Reference Book.

Integration means combining different agriculture systems together. Maintenance of integrated systems can be cheaper and easier as the waste from one part of the system can be used as a resource in another part of the system. **Overall production from the land can be increased.**

Examples of integration:

- **Small fruit trees and legume trees grown with grains and vegetables** - The trees can be harvested as well and can help to increase production of the grains and vegetables. They can be grown in rows, around the cropland, or in groups.
- **Animals grazed on the cropland after harvest** will fertilize the soil. However, be careful not to leave buffalo and cows in one spot too long or the soil will become compacted.
- **Legume trees used as living fences for crop rotation and animal grazing** - Legumes can be grown in rows or planted to divide cropland into sections.
- **Water from aquaculture ponds is rich in nutrients** - Swales, terraces, and paddies can be used to catch and store the run-off water and use it to grow vegetables and trees.

The facilitator can hand out related components of the relevant sections of the Permaculture Reference Book.

See **PC Book MOD 7 – Farming, PC Book MOD 8 – Forests, Tree Crops, and Bamboo, PC Book MOD 6 – Home and Community Gardens,** and other exercises in this book for reference and ideas.

Creative thinking : Integrating productive farm systems

Method : **Group participatory brainstorm**

Tools : **Large paper, markers**

References : **PC Book MOD 7 – Farming;**
PC Book MOD 2 - Natural Patterns and Permaculture Design

Objective : **Participants create integrated farm designs**

The aim of this exercise is for the participants to practice creating integrated systems.

All of the groups should start with the same basic farm model and then they will be given 2 other productive systems (1 animal and 1 plant) to integrate into their farm models.

The suggested basic farm model is as follows (note: the facilitator can create other models using the same ideas):

- Rice paddies, irrigated vegetable, and corn fields.
- Approximately 2 hectares in total with a gentle slope.

Preparation

The facilitator should

- Prepare a sample drawing of the basic farm model described above and/or list the farm model components on the black/white board or a large piece of paper so that everyone can easily see it.
- Write or draw up 1 card to represent each of the following systems:

Productive systems to integrate

Animal systems

1. Small animals (chickens, ducks, or pigs).
2. Large animals (goats, cows, or buffaloes).
3. Aquaculture.

Plant systems

4. Fruit trees.
5. Bamboo.
6. Commercial medicinal herbs.

Step 1

Ask the participants to split up into 3 workgroups (see the appendix for ideas about using a creative group creation techniques).

Step 2

- Each group chooses 2 cards at random, 1 animal card and 1 plant card.
- These cards represent the 2 productive systems that the groups will integrate into their basic farm models.
- The groups can integrate the 2 new systems any way they choose, but the facilitator should list the following guidelines for the groups to refer to when they are working on creating their designs:
    - Can the waste products from each system, like manure or plant materials, be reused by other parts of the new farm system?
    - How many times can energy and resources, like water or fences, be reused or shared in the farm design?
    - How many ways can the different systems work together for the benefit of the whole system? E.g. trees providing shade for animals, animals providing pest control for vegetables, aquaculture run-off providing nutrient rich water for other crops, etc.
    - Other elements or techniques such as legume trees, nursery, drying and storage facility, etc can be added if the groups decide it is necessary or beneficial.

Step 3

- Each group is asked to create a simple map to help explain their plan.
- If time provides, they can also include a list of ideas of all the things they want to produce in their integrated systems.
- Each group should be able to explain how the different systems work together.

Step 4

After each workgroup has completed their designs, they can present them to the entire group for feedback and other suggestions.

Creative thinking : Design a crop rotation plan

Method : **Discussion and group brainstorm**

Tools : **Black/white board, large paper, markers**

References : **PC Book MOD 7 – Farming;**
PC Book MOD 6 – Home and Community Gardens;
PC Book MOD 9 – Integrated Pest Management

Objective : **Participants learn about and create a crop rotation system**

Step 1

The facilitator should talk through the following key aspects of crop rotation and answer any questions the participants may have.

Crop rotation is an important part of farm management because:

- Different plants use different amounts and types of nutrients from the soil.
- If the same type of plant is grown in the same place each year, some nutrients will be depleted while there will be too much of other nutrients.
- The soil will be out of balance and production will decrease.

Crop rotation helps because:

- It balances the amount of nutrients taken from the soil.
- It reduces pest and disease problems – Some pests and diseases live in the soil and will cause a lot of damage if the same type of crop is grown on the same land over and over again.
- Changing crops will allow diseases and pests to die out before the plant that they attack is replanted in that soil.

Good methods include:

- Never growing the same type of vegetable in the same garden bed twice in a row.
    - All beans can be considered as 1 type of vegetable.
    - Tomato, eggplant, capsicum, potato, and chilli can all be considered as 1 type of vegetable because they are all from the same family (solanaceae).
- It is also good to give the land a rest for a few months every 2 years to help it regain its stock of nutrients.
- During this first period add lots of compost and mulch.

Step 2

Discuss with the participants any traditional or modern crop rotation techniques they know or use already.

Step 3

On the board create 3 simple crop rotation plans:

1. Vegetable beds.
2. Large crop areas – Corn, grains, soybean, etc.
3. Rice paddies.

Do a group brainstorm with the participants about the above, focus on the ideas contributed by the participants, if needed some ideas for these rotation plans could include:

For vegetable crops

- 1st – Bean crop.
- 2nd – Fruiting vegetables (tomato, eggplant, cucumber, etc) or leaf vegetable crop (Chinese vegetables, broccoli, spinach, etc).
- 3rd – Root crop (carrot, beetroot, parsnip, etc).
- 4th – Rest period.

For grain crops

- 1st – Grain #1 (corn, wheat, barley, rye, oats, etc).
- 2nd – Grain #2 (corn, wheat, barley, rye, oats, etc, but different type than the 1st grain crop).
- 3rd – Legume crop (beans, green manure crop, etc).
- 4th – Rest period.

For rice paddy

- Rice paddies can also be rotated, with every 2nd crop being a bean crop such as soybean, sweet potato, corn, or other grains.
- Rice paddies should receive a rest period as well.
- The different crops will improve soil structure and will create more balance of the nutrients that are removed.

For example:

- **1st – Rice crop (organic local variety takes 6 months).**
- **2nd – Bean crop.**
- **3rd – Rice crop.**
- **4th – Rest period.**
- **5th – Rice crop.**
- **6th – Sweet potato crop.**
- **7th – Rice crop.**
- **8th – Rest period.**

Field activity : Create productive terraces and swales

Method : **Participatory field activity**

Tools : **See preparation below**

References : **PC Book MOD 7 – Farming;**
PC Book MOD 8 – Forests, Tree Crops, and Bamboo;
PC Book MOD 2 – Natural Patterns and Permaculture Design

Objective : **Participants practice creating terraces and/or swales**

Preparation

- Identify land that can be used for making terraces or swales.
- Prepare:
  - A-frames.
  - Tools for digging and planting the swales.
  - Legume tree seeds or cuttings, rootstock of pineapple, vetiver grass, lemon grass, comfrey, etc.
  - Mulch material.

Running the exercise

Mark out contour lines using an A-frame (See PC Book Module 2), approximately:

- 5m apart on gentle slopes.
- Or, 2-3m apart on steep slopes.

Dig the terraces and/or swales, using the contour lines as a guide. Note: See PC Book MOD 8 – Forests, Tree Crops, and Bamboo and PC Book MOD 7 – Farming for detailed information about making swales and terraces.

- Plant the legume tree seeds or cuttings. If water is available they can be planted any time, if not this should be done at the beginning or during the wet season.
- Plant the legume tree seeds or cuttings on top of every 2nd swale or on the bottom edge of every 2nd terrace, and plant them about 5cm apart – Gliricidia or Lueceana are best.
- Vetiver grass, pineapples, comfrey, or lemon grass can be planted instead of legume trees on the other swales or terraces.

The legume trees will grow into a thick fence which will prevent erosion and help build up the soil, as well as provide nitrogen, mulch, and compost materials. Legumes can be cut back every 1-2 months in the wet season and 1-2 times in the dry season.

The vetiver grass, pineapples, comfrey, and lemon grass will hold the soil and produce mulch and other products and are especially good for steep slopes.

Vegetable and grain crops can be grown on the terraces or between the swales.

See **PC Book MOD 7 – Farming, PC Book MOD 8 - Forests, Tree Crops, and Bamboo,** and other exercises in this book for reference and ideas.

Presentation : Weed control

Method : **Presentation and group brainstorm**

Tools : **Images of different weed control methods, large paper, markers**

References : **PC Book MOD 7 – Farming;**
PC Book MOD 6 – Home and Community Gardens

Objective : **Participants learn weed control techniques and create a list of weeds**

Weeds can reduce crop production because they use nutrients and water and compete with the main crops. However, if they are used as mulch then some nutrients and water are returned to the soil. More weed removal equals better production, more plants, and larger crop size. If possible, remove weeds once a month.

Burning is a quick method for removing weeds but it causes many problems and reduces soil quality each year.

Discuss with the participants about the types of weeds that are growing and what weed control techniques they know of or use already.

The following are some techniques for natural weed control:

- Mulch - greatly reduces weed growth.
- Cover crops.
- Animal labour.
- Plough the ground before planting.
- Annual weeds can be slashed but perennial weeds should be pulled out before they become too old and too hard to remove.
- Remove the weeds before the weeds form seeds.
- For irrigated vegetables crops in dry season, especially tomatoes, beans, eggplants, etc – More directed irrigation means less weed problems.

After the presentation and discussion hold a group brainstorm about the types of weeds that are growing in the area. On the board create a table something like the following; leave the answers to the questions blank so that the participants come up with their own ideas.

The answers listed below are only supplied as guidelines for the facilitator should the participants need help or prompting to develop their own ideas and discussions.

Type of weed	Growth habit	Control methods	Potential uses
Grass	By seed, root, cutting	Mulch and pull out	Compost, liquid compost, fodder
Stinging nettle	Seed	Mulch and pull out	Compost
Fern	Roots spread	Mulch and pull out	Compost
Wild spinach	Seed	Mulch and pull out	Compost, vegetable, and fodder
Wild eggplant	Seed	Mulch and pull out	Vegetable and compost
Shy plant	Roots spread	Mulch and pull out	Compost

See "Weed control" section of **PC Book MOD 7 – Farming** and other exercises in this book for reference and ideas.

Field activity : Weed control

Method : **Group practical activity**

Tools : **See preparation below**

References : **PC Book MOD 7 – Farming;**
PC Book MOD 6 – Home and Community Gardens

Objective : **Participants practice weed control techniques**

Preparation

- Identify farm land suitable for practicing weed control techniques.
- Collect the tools and materials needed for the techniques that will be practiced:
  - Weeding and mulch collecting tools.
  - Digging tools and bean seeds.
  - Tools and materials for animal tractors.
  - Tools and materials for rotation systems.

Running this exercise

The whole group should observe and note the weed types and weed growth on the site. **Then, one or more of the following techniques can be put into practice:**

Weed control - Method 1. Remove the weeds and mulch

- Use different, appropriate techniques for each different type of weed.
- See the "Weed control" sections of PC Book MOD 7 – Farming and PC Book MOD 6 - Home and Community Gardens for detailed instructions.

Weed control - Method 2. Cover crops

- Plant bean seeds as a cover crop at approximately 50cm apart in rows 1m apart. For example, beans planted in the middle of the corn growing cycle will cover the ground in between the corn.
- The beans don't compete with the corn because of when they are planted and they provide good weed control and food for the soil.
- The beans are also cut back for mulch, as are the corn stalks.
- Sword bean, velvet bean (macona bean), and jack bean are good to use, other beans that cover the ground may also work well.

Weed control - Method 3. Animal labour

- Chickens, ducks, pigs, goats, cows, and buffaloes can all be used as animal tractors or integrated through animal rotation systems.
- See PC Book MOD 6 – Home and Community Gardens, PC Book MOD 10 – Animal Systems, PC Book MOD 7 – Farming and other lessons in this book for detailed information.

Creative thinking : Make a 3-D model of a small farm

Method : **Model building of a farm**

Tools : **Materials for building farm model, paper, pens, markers**

References : **PC Book MOD 7 – Farming;**
PC Book MOD 2 – Natural Patterns and Permaculture Design

Objective : **Participants create designs for an integrated small farm**

Preparation

- Identify a farm, preferably one that can be used for practical exercises or the farm owned by a participant of the workshop.
- Prepare handouts and/or large sheets of paper with the following lists so that all the participants can refer to them during the exercise.

Running this exercise

Step 1 - Ask the participants to divide into smaller workgroups.

Step 2 - At the farm have each group survey and make a simple map of the land.

Ask the participants to make suggestions on their models on how the farm can use the following components - The designs should suit a local budget and use local materials.

Some key components to consider for sustainable, intensive farming:

- Protect crops from strong winds.
- Store, use, and direct rain water.
- Grow mulch and compost materials on site.
- Have minimal erosion.
- Protection from animal damage.
- Have irrigation system (if water is available).
- Follow the land's natural patterns.
- Have healthy living soil.
- Integrated with animal systems and possibly aquaculture systems.
- Integrated with tree crops.
- Use weed maintenance techniques.

Step 3 - Provide the model building materials to the workgroups and ask them to make a model of their farm design.

The participants can create on paper and/or 3-D models of the redesigned farm including the various elements listed below. The designs can include any or all of the following, depending on time available:

- **A list of plant systems for each part of the farm design:**
  - Crops (fruits, vegetables, grains, etc).
  - Legumes.
  - Windbreak trees.
  - Water loving plants.
  - Animal fodder trees.
  - Bamboo.
  - Commercial medicinal herbs.
- **A food calendar of what is produced at different times of the year.**
- **A list of animal systems for each part of the farm design:**
  - Small animals (chickens, ducks, or pigs).
  - Large animals (goats, cows, or buffaloes).
  - Aquaculture.
- I**deas for community integration**:
  - Shared water use.
  - Shared animal housing or management.
  - Natural forest and river protection.
  - Cooperatives and enterprises for selling.
  - Transporting and value adding of produce.
  - Post-harvest crop preservation and storage ideas.

Step 4 - Have the workgroups present the results of their farm models and explain the different techniques used to whole group.

Document the results of the design exercise either by taking photos or drawing the conclusions onto large sheets of paper. This documentation will be useful for ongoing brainstorms and use in future trainings.

Notes...

Notes...

WORKSHOP MODULE No 8.

Forests, Tree Crops, and Bamboo

Permaculture Facilitator's Handbook Module 8. Forests, Tree Crops, and Bamboo

Notes...

Presentation : Community forests

Method : **Facilitator presentation**

Tools : **Images, black/white board, markers**

References : **PC Book MOD 8 - Forests, Tree Crops, and Bamboo**

Objective : **Participants learn about sustainable, productive community forest management**

The community forest zone is located on the lands surrounding the village farms. Many community resources can be grown in this zone. Plants in the community forest zone can vary from controlled orchards to semi-wild forests. Developing productive community forest management systems will help to replace illegal logging practices.

The conservation zone is located on the lands surrounding the community forest. A healthy community forest and conservation zone are the source of a healthy environment, and these 2 zones have a cooperative, mutually beneficial relationship. This means that if community forests and conservation zones are mistreated and damaged, the health of the environment and the health of the people will also be damaged.

Community forests can supply many products, including:

- Firewood.
- Medicines.
- Oil.
- Animal habitats.
- Timber.
- Animal fodder.
- Bamboo.
- Fruit.
- Nuts.
- Craft material.

Practical steps to a healthy and sustainable community forest system:

- **Store water in the ground** – This will protect water sources, improve tree growth and production, and reduce the risk of erosion and landslides.
- **Protect soils and stop erosion** – With good land management techniques and continual tree coverage, the soil can be protected and improved and the risk of erosion and landslides will be greatly reduced.
- **Control animals** – With community cooperation and participation, techniques like fencing, tree guards, and animal control can be managed as part of the system. Animal traps can be built to catch wild animals.
- **Stop burning** – This will improve diversity, water retention, soil quality, protect mulch and organic matter, reduce erosion, and encourage high productivity systems.
- **Integrate community nurseries** – These can be developed to supply the trees and plants needed for maintaining the community forests.
- **Good management of forests and resources.**

Note: The facilitator can do the exercise "Creative thinking: Community management plan" which is presented later in this module to help the participants understand and create a plan for good management of forests and resources.

Some key points for successful community forest management are:

Strengthening community ownership, connection, and responsibility.

- **Short, medium, and long-term strategies are planned by community.**
- **Multifunctional and diverse design** that imitates a natural forest.
- **Awareness and education about connection between environmental sustainability/diversity and long-term income security** – Including diversity of income sources and diversity of product ranges.
- **Sustainable local businesses that use forest resources wisely** – Seeds, medicines, furniture, oils, bamboo products, nuts, honey, and many other natural products which are highly saleable and sustainable if the source of the raw materials is well managed.

Land use policies are developed and implemented by the whole community.

A community can create an agreement about which people or groups will be responsible for managing the community land, which includes a plan for dividing the produce generated. For example 1/3 of the produce can be given to the people responsible for managing the community land and 2/3 is given to the other community members.

Note: If the management system is based solely on income based decisions the systems may not be sustainable, especially in the long-term. Therefore, the appointed community land managers would need to also be in charge of protecting and supervising the land and its resources.

This will include identifying land needs and proposing actions needed to increase the sustainability of the systems. In the same way that the benefits of the community land are shared benefits, any inputs needed to maintain the community systems can be a shared responsibility.

The community may also wish to consider traditional payment systems for the community land managers such as not having to pay for ceremonies or other exchanges.

It is very important that these productive community forests and their management systems are developed and/or agreed upon by all members of the community to avoid disputes.

There are many more ideas presented later in this module in the exercises:

- Presentation - "Tree protection for crops and community forests".
- Creative thinking - "Forest management plan".

Presentation : Natural forests – The conservation zone

Method : **Facilitator presentation**

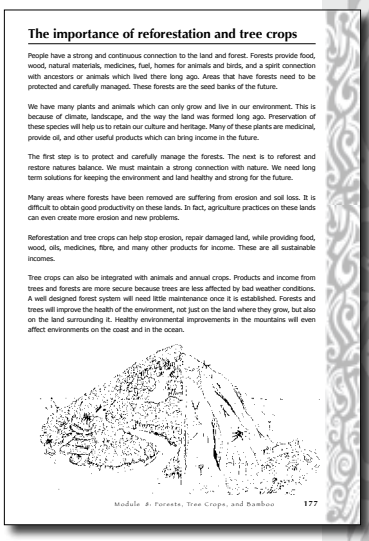
Tools : **Images, black/white board, markers**

References : **PC Book MOD 8 - Forests, Tree Crops, and Bamboo**

Objective : **Participants understand the importance of the conservation zone**

Preparation

Organize enough copies of this page from **PC Book MOD 8 - Forests, Tree Crops, and Bamboo** so that each participant can have one, including the image and text.



The importance of reforestation and tree crops

People have a strong and continuous connection to the land and forest. Forests provide food, wood, natural materials, medicines, fuel, homes for animals and birds, and a spirit connection with ancestors or animals which lived there long ago. Areas that have forests need to be protected and carefully managed. These forests are the seed banks of the future.

We have many plants and animals which can only grow and live in our environment. This is because of climate, landscape, and the way the land was formed long ago. Preservation of these species will help us to retain our culture and heritage. Many of these plants are medicinal, provide oil, and other useful products which can bring income in the future.

The first step is to protect and carefully manage the forests. The next is to reforest and restore natures balance. We must maintain a strong connection with nature. We need long term solutions for keeping the environment and land healthy and strong for the future.

Many areas where forests have been removed are suffering from erosion and soil loss. It is difficult to obtain good productivity on these lands. In fact, agriculture practices on these lands can even create more erosion and new problems.

Reforestation and tree crops can help stop erosion, repair damaged land, while providing food, wood, oils, medicines, fibre, and many other products for income. These are all sustainable incomes.

Tree crops can also be integrated with animals and annual crops. Products and income from trees and forests are more secure because trees are less affected by bad weather conditions. A well designed forest system will need little maintenance once it is established. Forests and trees will improve the health of the environment, not just on the land where they grow, but also on the land surrounding it. Healthy environmental improvements in the mountains will even affect environments on the coast and in the ocean.

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Running this exercise

- Distribute the copies of the forested/un-forested page.
- Give the participants time to read the text, then discuss what the picture and text means to them.
- The facilitator can also use the following text for more ideas about stimulating a discussion about conservation zones.

The conservation zone is situated on the land surrounding the community forest. A healthy community forest and conservation zone are the source of a healthy environment, and these 2 zones have a cooperative, mutually beneficial relationship. This means that if community forests and conservation zones are mistreated and damaged the health of the environment and the health of the people will also be damaged.

The conservation zone is an extremely important community asset.

To preserve and increase the value of this important asset, communities should create local policies and implementation plans to protect and regenerate their natural forests and conservation zones.

Community awareness and education is the key. This should include practical awareness and education programs (especially for children) about the impacts of deforestation to:

- Community water sources.
- Community land.
- Community safety – Erosion, landslides, etc.
- Balancing conservation and income needs.

Note: Forest conservation laws should be written and accepted by everyone in the community.

The community should work together and with the local government to:

- Voice ideas.
- Help create guidelines for conservation and sustainable resource management.
- Lobby for the protection of the conservation zone.
- Reduce corruption and resource depletion.
- Advocate for laws which can restrict companies using resources.
- Create guidelines for protecting sensitive areas.
- Protect the area against landslides.
- Encourage appropriate and sustainable tourism activities.
- Re-forest and/or protect forests on land and mountains above villages – This will help to prevent erosion, landslides, and water loss.

About the money made from community forests

National and international companies make a lot of money from Indonesia's forests and other natural resources. This money is made by harvesting the forest, cutting it down to grow plantations, or both.

Community members are told that they will get jobs and income for endorsing and participating in these activities. However, short-term jobs and a small amount of money will never replace the wealth and value contained in these forests, especially for our children and their children. The profits made from the sale of wood is huge, while the income generated for the local communities is quite small.

This happens in countries all over the world and is causing huge problems, including natural disasters and destruction worldwide.

It is very important that any existing or planned plantations should be separated from community forests and community forest or conservation zone management systems. Plantations should never be allowed to replace forests.

Another consideration is that Indonesia's forests and its beautiful environment attracts many tourists each year. Ecotourism can provide more jobs and local income for community members than logging and plantations can. And it is sustainable for the future.

Creative thinking : Consequences of forests destruction

Method : **Group brainstorm, group reading activity**

Tools : **Large paper, markers**
IDEP CBDM "Landslide" and "Flood" comic books

References : **PC Book MOD 8 - Forests, Tree Crops, and Bamboo,**

Objective : **Participants understand the consequences of forest destruction**

Logging natural forests gives only short-term benefit for a few people, while it can cause long-term disasters for everyone.

Step 1

Do a group brainstorm with the participants. On the black/white board or a large piece of paper create a table something like the following. Leave the answers to the questions blank so that the participants come up with their own ideas.

The answers listed below are only supplied as guidelines for the facilitator should the participants need help or prompting to develop ideas and discussions.

Disaster	Damage caused	Specific prevention techniques
Erosion	Loss of fertile soil, bare forests, water crisis, global warming effects, flooding	Reforestation, planting hardwood trees, stop illegal logging, develop productive community forests
Landslides	Landslide disasters	Plant bamboo and hardwood trees, terracing
Flooding	Loss of houses, health problems, harvest failure	Stop illegal logging, reforestation, remove garbage from rivers
Loss of water resources	Water crisis, no clean water, no life	Protect the water source area, save the green belt in mountains, use water as needed, stop illegal logging
Dry forest burn	Smoke everywhere, health problems, danger for airplanes, bare forest, biodiversity problem	Stop illegal logging, reforestation, productive community forest

Note: Put this list in the training area so that it can be referenced during the rest of the workshop.

Step 2

After the brainstorm, hand out the IDEP CBDM "Landslide" and "Flood" comic books.

Ask the participants to choose characters from the books so that all the characters are represented. Then ask them to read out the comics with the participants playing the roles of the characters. Encourage them to act out the roles as much as possible.

Discuss the issues presented in the comics with the participants, including the disaster fact sheets in the back of the comic books.

Presentation : Tree protection for crops and community forests

Method : **Facilitator presentation**

Tools : **Images of tree protection techniques, black/white board, markers**

References : **PC Book MOD 8 - Forests, Tree Crops, and Bamboo**

Objective : **Participants learn general and specific tree protection techniques**

All tree crops and community forests need to be protected from:

- **Illegal logging.**
- **Fire –** Which can quickly destroy many trees and waste a lot of hard work.
- **Uncontrolled animals.**
- **Strong winds –** Which can damage young trees, slow tree growth, and the trees will need a lot more water.
- **Erosion –** Will wash away young trees and the soil that they need to grow.

If the trees are protected they will grow and produce well.

The following ideas and techniques are important steps to successfully protecting, and therefore growing trees:

- Community participation.
- Community ownership.
- Protection from fire.
- Protection from animals.
- Protection from wind.
- Protection from erosion.

All of the above points are explained in detail in the "Protection from animals, fire, wind, and erosion" section in **PC Book MOD 8 - Forests, Tree Crops, and Bamboo.**

When presenting these ideas, discuss them with participants, especially community participation and ownership.

Ask them about techniques they know of or use already in the area.

Creative thinking : Forest management plan

Method : **Group participatory brainstorm**

Tools : **Large paper, markers**

References : **PC Book MOD 8 - Forests, Tree Crops, and Bamboo**

Objective : **Participants create community forest management plans**

Step 1

Have the participants brainstorm an imaginary community forest, including:

- The size of the forest.
- The topography of the land.
- The main types of trees and plants (5-10 types, more can be added later).
- The location of rivers or springs.
- Animals on the land.
- How much of the land is (a) thick forest, (b) thin forest, or (c) cleared.

While the brainstorm is happening, the facilitator or one of the participants can list the results on the black/white board or a large piece of paper that everyone can see.

Step 2

Then ask the participants to divide into smaller workgroups and brainstorm a community management plan for the community forest. Following are some key points that should be covered by the participants' plans. The facilitator can use it as a checklist to prompt the participants if needed.

- Plan for the future.
- Plant productive native trees.
- Define what can be harvested, from where, when, and who can harvest it.
- Who can generate income and what income is used for forest management.
- If animals can graze, and if so, what types of animals and where.
- Do not allow any major clearing of land.
- Do not give ownership or rights to companies.
- Sustainable local businesses that can use resources wisely. E.g. seeds, medicines, furniture, oils, bamboo products, nuts, honey, etc.
- Traditional ceremonies for protection of sacred land and forests.
- Using traditional governance systems to manage the resources.
- Schools, local groups, religious leaders, government agriculture workers, and community radio involved in educations activities.
- Protection from animals, fire, wind, and erosion (especially for rivers and springs).
- Involvement of local government and other groups.

Step 3

Once each workgroup has completed their community management plan, they can present the plan to the entire group for feedback and other suggestions.

Presentation : Tree maintenance

Method : **Facilitator presentation**

Tools : **Images explaining the techniques, black/white board, markers**

References : **PC Book MOD 8 - Forests, Tree Crops, and Bamboo**

Objective : **Participants learn techniques for tree maintenance**

Most or all of the participants will have planted and looked after trees before, but this is still an important exercise because:

- There may be a step that they hadn't thought of before.
- There may be something that they could improve.
- From the participants sharing their own knowledge everyone, including the facilitator, will learn more.
- Good techniques will make tree growth faster, production better, and reduce the chances of disease or pest attack.

The facilitator, using the detailed information in PC Book MOD 8 - Forests, Tree Crops, and Bamboo, and their own experience, can explain and discuss the following concepts with the participants:

- **Tree planting:**
  - Small trees grown together - Citrus, bananas, cacao, guava, custard apple, papayas, sesbania, pigeon pea, moringa, coffee, taro, etc.
  - Large fruit trees grown together – Mango, avocado, jack fruit, coconut, etc.
  - Timber trees, oil trees, bamboo, fibre trees, medicine, firewood trees, etc.
- **When to plant.**
- **Watering.**
- **Natural tree fertilizers.**
- **Tree mulching.**
- **Tree pruning.**

Note: Different techniques are used depending on whether the tree is an annual production higher maintenance tree or a lower maintenance forest tree.

For each of the components above ask the participants to share their own techniques and experiences.

List their answers on the board for everyone to see, compare, and discuss.

Field activity : Tree planting and maintenance

Method : **Participatory tree planting and maintenance**

Tools : **See preparation below**

References : **PC Book MOD 8 - Forests, Tree Crops, and Bamboo**

Objective : **Participants practice tree planting and maintenance techniques**

Preparation

In the 'Tree maintenance' section of the PC Book MOD 8 - Forests, Tree Crops, and Bamboo, there are many different explanations and exercises for tree planting and maintenance. Any or all of these can all be covered in this practical exercise.

- The facilitator should choose the exercises that are most suitable to the area, people's needs, and the workshop goals, including:
  - How to plant, water, fertilize and mulch the trees step by step.
  - Ideas for pruning fruit trees, forest trees, and legume trees.
- The facilitator, with representatives from the community, should identify appropriate sites for planting fruit and forest trees.
- The identification of appropriate established trees will be needed for the pruning exercise.

Collect the materials and tools needed for:

- **Planting, watering, fertilizing, and mulching fruit and forest trees** - The number of trees that will be used in this exercise will depend on the number of trees in the area, the number of participants, and the time available.
- **Pruning established trees.** Note: Pruning of fruit trees, beyond removing dead wood, should only be conducted if the facilitator has pruning experience.

Note: Bamboo watering pipes should be added when planting, especially for fruit trees.

Running this exercise

- The facilitator should conduct an orientation to talk about the relevant techniques that will be practiced by the participants.
- Small groups can practice the following techniques on 1 or more fruit trees and 1 or more forest tree:
  - Planting.
  - Watering.
  - Fertilizing.
  - Mulching.
- Then practice pruning some established trees with the participants.

Presentation : Swales with tree crops and forests

Method : **Facilitator presentation and discussion**

Tools : **Images, black/white board, markers**

References : **PC Book MOD 8 - Forests, Tree Crops, and Bamboo**

Objective : **Participants learn about swales and their benefits**

Swales are trenches that are dug on a contour – equal level (above sea level) along a slope. Soil and rocks dug from the trenches can be placed below the trenches to form long mounds. Swales are similar to terraces but are more efficient in catching and storing water, soil, and mulch.

The facilitator can discuss these ideas with the participants, especially about how the swales can help improve community forests. During this discussion, use images and examples to help explain specific types of swales and techniques for using them with tree crops and natural forests.

There are several types of swales, including:

- Trench swales.
- Ploughed contour lines.
- Rock swales.
- A small wall that is built from rocks, branches, or other materials.

All types of swales:

- Create a level line from one end to the other.
- Are usually dug on a hillside, one below the next.

Swales can improve community forests and land in many ways because they:

- Improve tree growth and increase production.
- Hold and store the water in the ground.
- Hold and store soil and mulch.
- Reduce risks of erosion and landslides.

How swales can work with tree crops:

- Planting legumes.
- Alley crops.
- Integration with animals.
- Reforestation (used for natural forests).

See **PC Book MOD 8 - Forests, Tree Crops, and Bamboo** for detailed information about designing, making, and using swales.

Presentation : Designing and making productive swales

Method : **Facilitator presentation and discussion**

Tools : **Images, black/white board, markers**

References : **PC Book MOD 8 - Forests, Tree Crops, and Bamboo**

Objective : **Participants plan swale development activities**

If time during the workshop allows, the 3 following activities in this module which relate to swales can all be conducted during the workshop as an integrated exercise. If time does not allow for this, then the facilitator should choose the most relevant components.

The Swale Exercises include:

- Design productive swales (Swale Ex. 1)
- Prepare swales for planting (Swale Ex. 2)
- Plant productive swales (Swale Ex. 3)

Develop a different aspect of the swales project on different days so that over the duration of the course the swale system will be added to step-by-step and the participants will gain a full understanding of the process of how to design, implement, and maintain a healthy swale system.

Preparation

- **Identify land to use** – The components developed should be able to be maintained as an ongoing demonstration site, not just for the time of the workshop, therefore the land that is used needs to be available long-term. It will take around 2 years to show the real results of soil improvement and clearly demonstrate improved productivity.
- **Check if there are rocks on site,** as these can be used to make the swales. Using rocks is much easier than digging, although for training purposes a combination of both is ideal.
- **Identify the water source for the swales** – The amount of water and season when the planting is done will affect the types of plants that can be used in the field activities.
- **Prepare other materials and tools needed** – There should be enough materials and tools for all of the workshop participants to be actively involved in all of the hands-on activities. If needed, participants can be asked to bring their own tools to use for various exercises.
- **The importance of the design step** – The following exercise 'Designing productive swale systems' is essential no matter how many of the other exercises are used.

Running this exercise

Introduce to the participants to each of the activities that will be part of the 'Productive swale design and building' process over the duration of the workshop. Answer any questions they may have about the process that will be undertaken. Encourage them to participate by preparing seeds, cuttings, trees, compost, and mulch materials that can be used later as the process unfolds.

Field activity : Design productive swales (Swale Ex. 1)

Method : **Participatory field activity**

Tools : **Pens, paper, clip board, and/or 3-D modeling materials**

References : **PC Book MOD 8 – Forests, Tree Crops, and Bamboo**

Objective : **Participants design the swale system to be implemented**

Participatory site survey

Take the participants to the site for the demonstration swales to survey the land and other resources that can be used such as rocks, water source, mulch materials, etc.

Ideally there will be two different sites used:

- One with unplanted land.
- One with established trees.

Groups design the swales systems

List on the board and/or give the students handouts which clarify the following. See PC Book MOD 8 – Forests, Tree Crops, and Bamboo for more information. Divide the participants into groups and ask each group to create 2 swale designs (1 for unplanted land and 1 for the land with established trees) based on the following considerations.

Types of swales to choose from:

- Trench swales.
- Ploughed contour lines.
- Rock swales.
- A small wall that is built from rocks, branches, or other materials.

Considerations include:

- The size of the swales.
- Availability of water.
- Plant heights.
- Plant productivity.
- Community needs.
- Access to mulching materials.
- Planting patterns.
- Plant shapes.

Some planting ideas included in the PC Reference book are:

- Small swale planting systems.
- Large swale planting systems.
- Agriculture/tree crop swale systems.
- Legumes and alley crops.

Choose the design to implement

- Each group presents their design to the whole group and explains their ideas.
- Then the whole group can choose the final designs. Each participant can vote for their favorite design other than their own group's design.
- The chosen design will be used as the template for the swale practical exercises.

Field activity : Prepare swales for planting (Swale Ex. 2)

Method : **Participatory field activity**

Tools : **See description below**

References : **PC Book MOD 8 – Forests, Tree Crops, and Bamboo**

Objective : **Participants practice starting to make a swale system**

Preparation

- **Materials and tools to prepare:**
  - A-frames (see Module 2 for detailed instructions).
  - Tools for digging.
  - Rocks and rotting tree branches to make the swales.
  - Optional Bamboo watering pipes (see PC Book MOD 6 – Home and Community Gardens for detailed instructions).
  - Water source.

Running the exercise

- Take the participants back to the swale demonstration sites.
- Split the participants into smaller workgroups.
- Each group can focus on developing a different part of the swale system that was chosen in the earlier swale design exercise.
- Together with the participants, mark out contour lines using the A-frame:
  - **On gentle slopes:** Approximately 10-15m apart.
  - **On steep slopes:** Approximately 3-5m apart.
- Dig the swales using the contour lines as a guide.
- Line the bottom side of the swales with rocks or rotting tree branches to help stabilize the swales.
- If using a bamboo watering pipe system, prepare and install it.
- Mark out the planting locations for the trees between the swales.

Note: While working in the area with existing established trees, be careful not to damage too many tree roots when making the swales.

See **PC Book MOD 8 – Forests, Tree Crops, and Bamboo** and other exercises in this book for reference and ideas.

Field activity : Plant productive swales (Swale Ex. 3)

Method : **Participatory field activity**

Tools : **See description below**

References : **PC Book MOD 8 – Forests, Tree Crops, and Bamboo**

Objective : **Participants practice planting a swale system**

Note: Depending on the plants that will be used, this activity may need to be done at the beginning or during the wet season for the legume tree seeds or cuttings to grow. However, if water is available it can be done anytime.

Preparation

Materials and tools to prepare: Reference the model developed and chosen by the group in the exercise Design productive swales (Swale Ex. 1).

- Legume tree seeds or cuttings (with tree guards, if needed).
- Tree seedlings to plant (with tree guards, if needed).
- Legume tree seeds or cuttings.
- Rootstock of pineapple, vetiver grass, lemon grass, comfrey, etc.
- Tools for planting the swales.
- Mulch material.
- Water.

Running the exercise

- Take the participants back to the swale site that they have prepared during the exercise Prepare swales for planting (Swale Ex. 2).
- Plant the legume seeds and/or cuttings on top of the swales, very close together (5cm apart). The legume trees will grow into a thick fence which will prevent erosion and help build up the soil. They will also provide nitrogen, mulch, and compost materials. Mention to the participants that legumes can be cut back every 1-2 months in the wet season and 1-2 times in the dry season.
- Using the marked out planting locations for the trees, plant the tree seedlings in between the swales. See the "Tree maintenance" section of PC Book MOD 8 - Forests, Tree Crops, and Bamboo for tree planting techniques.
- In between the rows of legumes now are large rows or "alleys" that can be used for many different crops and eventually animals. See PC Book MOD 8 - Forests, Tree Crops, and Bamboo for more ideas.
- When the exercise is completed, discuss the results and the different processes with the participants.

Field activity : Visit forest and tree crop examples

Method : **Field visit, observation exercise**

Tools : **See preparation below**

References : **PC Book MOD 8 - Forests, Tree Crops, and Bamboo**

Objective : **Participants learn about community forestry options**

Field visits are excellent for bringing what the participants have learned into a practical framework.

Preparation

- Identify sites that provide good examples of sustainable tree crop management and sustainable community forest management.
- Identify people involved in the development, management, or ownership of the sites. These people could be:
  - Land owners.
  - Site workers.
  - Community leaders.
  - Project managers, etc.
- Speak to these people about the hope to conduct a field visit to their area/ project and the objectives of the field visit. Ask them if they would be willing to share their knowledge and participate in the workshop by being available to explain the forest management systems and answer participants' questions.
- Make an agreement about the date and time for the site visit, ideally just following the presentations and practical exercises on this topic.
- Organise vehicles for transportation and water, snacks, or meals for the participants if the field visit is longer than 2 hours.
- Organise clipboard, paper, and pens for the participants so that they can write notes, draw sketches, maps, etc during the field visit.

Running this exercise

- At the arranged time, go to the site and let the guides walk the participants around the site, explaining the plants, plans, and techniques used.
- Encourage the participants to write notes, draw sketches, maps, etc, and to ask as many as questions as possible. Encourage them to critically analyze the site as well (every site and project can be improved).
- After (or during) the field visit, the facilitator can conduct a group discussion where the participants can share what they learned and the facilitator can answer any further questions and add ideas if needed.

Creative thinking : Create a model of a community forest

Method : **Make a 3-D model hillside**

Tools : **See preparations below**

References : **PC Book MOD 8 - Forests, Tree Crops, and Bamboo**

Objective : **Participants practice creating a well managed community forest**

Preparation

- Enough soil so that groups of 8-10 participants can each work together to create models of 3-D hillsides.
- A good supply of water and at least 1 watering can per group (if regular watering cans are not available, use large tin cans with small nail holes in the bottoms).
- Shovels, spades, hoes, and rakes for shaping the model hillsides.
- Hand trowels and smaller tools for the finer detail of the models.
- Other items that can be useful for making creative models (twine, cardboard, pens, small stones to represent rock swales, etc).

Running this exercise

Step 1 - Exercise orientation

The facilitator should briefly revisit the key principles of creating a productive community forest together with the participants.

The following components can be listed on a board or a large piece of paper so all the participants can see. **Encourage the participants to include as many of the following principles as possible in their models:**

- Different sections which match the land topography – Fruit trees, tree plantations, forest areas, protected rivers, etc.
- Swales and terraces in appropriate areas, ideally several different types of swale systems (for example off contour swales could be used to redirect water to where it is needed).
- Include animals where suitable.
- Windbreaks.
- Pathways.
- Integrate different systems together as much as possible.
- Compost, liquid compost, and mulch making resources and facilities.
- Signs for the community forest area.

Step 2 - Form workgroups and give detailed instructions

- Ask the participants to split up into workgroups with 8-10 people per group.
- Ask each group to build a 3-dimensional model of a diverse, sustainable hillside community forest system.
- Suggest that each model can be approximately 1m x 1m to 2m x 2m, depending on time and clay soil available.
- Each model should resemble a mountain side, with valleys, rivers/water courses, etc up to 50cm high with steep and gentle slopes.
- Each model should include working water flows which could be demonstrated by simulating rain through watering cans.
- Remind the participants that every community forest that is created will be different because of different needs, land, and materials available. Each design should be developed to be self-sustaining and continuously improving.
- Small stones can be used to represent rock swales.
- Participants will need to collect materials for representative models of various elements to be added to the hillside (tree cuttings can be used to represent each tree type, for example legume leaves for legume trees, bamboo leaves for bamboo clumps, and so on) including, but not limited to:
    - Fruit trees.
    - Hardwood trees.
    - Legumes.
    - Bamboo.
    - Native forest trees.
    - Firewood trees.
    - Medicinal trees/plants.
    - Fences.
    - Various animals.
- Add the elements to the hillside to create the community forest.

Step 3 - Design presentations and feedback

- Have the workgroups present the results of their 3-dimensional community forest models and explain their designs for feedback and suggestions.
- Have members of a different group test the water flows by simulating rain through the watering cans.

Note: Document the results of the exercise either using images or by drawing the conclusions onto large sheets of paper. This documentation will be useful for ongoing brainstorms and use in future trainings.

Presentation : Bamboo propagation and uses

Method : **Facilitator presentation, group brainstorm**

Tools : **Images of bamboo both growing and in use, large paper, markers**

References : **PC Book MOD 8 - Forests, Tree Crops, and Bamboo**

Objective : **Participants list bamboo uses and learn about growing bamboo**

Bamboo is a plant that has many uses and functions. The facilitator can ask the participants to help list all the uses for bamboo they can think of. Write their ideas on a large piece of paper for reference. **The following is a list of uses of bamboo that the facilitator can use for stimulating the brainstorm if needed.**

Bamboo can provide:

- An alternative to logging.
- Income.
- Fencing materials and living fences.
- Musical instruments.
- Windbreaks.
- Irrigation pipes.
- Bamboo charcoal for cooking.
- Plant containers.
- And much more.
- Furniture building materials.
- Food for people and animals.
- Building materials, which are:
  - Fast growing.
  - Resilient to earthquakes.
  - In continuous supply.
- Cooking containers.
- Storage containers.

Bamboo can be easily propagated, grown, and harvested at very low cost and using mostly local resources. The method used depends on the type of bamboo and what the bamboo will be used for. There are two main techniques for propagation of bamboo:

1. **Rhizome propagation.**
2. **Culm cutting propagation.**

With good management and harvesting techniques the quality of bamboo poles and bamboo products can be improved.

Clump management involves:

1. Clump thinning.
2. Branch pruning.
3. Marking and cutting new shoots.
4. Creating bamboo plantations.

Pole harvesting includes:

1. Choosing the right species.
2. Cutting poles at the right age.
3. Good times to harvest.
4. Pole curing and storage.
5. Preservation of poles.

See **PC Book MOD 8 – Forests, Tree Crops, and Bamboo** and other exercises in this book for reference and ideas. There are several presentation and practical exercises later in this module that cover these topics in detail.

Presentation : Bamboo propagation

Method : **Facilitator presentation**

Tools : **Images explaining bamboo propagation techniques**
Handouts from PC Book MOD 8 - Forests, Tree Crops, and Bamboo

References : **PC Book MOD 8 - Forests, Tree Crops, and Bamboo**

Objective : **Participants learn how to propagate bamboo**

If available, the facilitator can hand out copies of the "Bamboo propagation" section of PC Book MOD 8 - Forests, Tree Crops, and Bamboo to all the participants.

There are two main techniques for propagation of bamboo. The method you use will depend on the type of bamboo and what the bamboo will be used for.

The two methods are:

1. **Rhizome propagation.**
2. **Culm cutting propagation.**

The best time of year to propagate bamboo:

- September to November is the best time of year to propagate bamboo, but with careful management and if water is available, it can be done at any time.
- If no water is available, propagate when the wet season has started.

Rhizome propagation

- Rhizome propagation is good for small-scale planting because it has a high success rate. Rhizome propagation is more complicated than culm cutting propagation, but its success rate is higher.
- Rhizome propagation will work with almost all types of bamboo, but rhizomes of large species are difficult to dig up. Therefore rhizome propagation is best for species of small bamboo with many rhizomes and culms.

Culm (pole) cutting propagation

- Culm cutting propagation is good for plantations and windbreaks because it is a simple process. The best time to propagate is at the beginning of the wet season.
- Culm cutting propagation works best with large bamboos that are difficult to propagate from rhizomes.
- Culm cutting propagation can be used for growing bamboo in containers.

See in the "Bamboo propagation" section from **PC Book MOD 8 - Forests, Tree Crops, and Bamboo** for detailed descriptions and illustrations that explain these methods of propagation.

Field activity : Propagate bamboo

Method : **Group practical activity**

Tools : **See preparation below**

References : **PC Book MOD 8 - Forests, Tree Crops, and Bamboo**

Objective : **Participants practice bamboo propagating techniques**

Preparation

- Identify clumps of bamboo from which propagates can be taken. If possible the participants should be directly involved in collecting the propagating the bamboo, as well as dividing and planting it, but this depends on how close the bamboo clumps are from the workshop area. If it is far away, collect the propagating material before the workshop and keep it moist until it is needed.
- Identify appropriate places for the propagates to be planted.
- Prepare water for planting.

Other materials needed:

- Digging bars, spades, hand saw, and machetes/knives for rhizome propagation.
- Machetes/knives and hand saw for culm propagation.
- Large planting containers to plant culm propagates.
- Rice sacks/containers for transporting propagates.
- Compost, mulch, and watering pipes.

Running this exercise

Explain the process and steps involved to the whole group. See the "Bamboo propagation" section from PC Book MOD 8 - Forests, Tree Crops, and Bamboo for detailed explanations of each type of propagation technique, including:

1. **How to collect the propagates.**
2. **How to prepare the propagates for planting.**
3. **How to plant them.**

Step 1: Ask the participants to split up into 3 workgroups:

- **Group 1** - Collect and plant rhizome propagates.
- **Group 2** - Collect and plant culm propagates in the ground.
- **Group 3** - Collect and plant culm propagates in the nursery.

Step 2: Collect, prepare, and plant the bamboo propagates. The facilitators should observe each group's techniques and offer advice as is necessary.

Step 3: Review the process with the participants. Each group can present their results and discuss the techniques used with the whole group.

Creative thinking : Types of bamboo and their uses

Method : **Group brainstorm**

Tools : **Large paper, markers**

References : **PC Book MOD 8 - Forests, Tree Crops, and Bamboo**

Objective : **Participants list local bamboo varieties and uses**

Step 1

Ask the participants to split up into smaller workgroups. Each group can create a list of local bamboo varieties and their ideas about their characteristics and uses. This list should include:

- Name of each variety – In the local language, Indonesian, or the botanical name.
- How resistant each variety is to pests and diseases – High, average, poor, including specific problems.
- General characteristics of each type – Height, width of each culm, strength, etc.
- Uses for each variety – Food, building material, furniture, musical instruments, etc.

Use the table below (without the answers) as an example to follow.

Bamboo variety	Pest and disease resistant?	General characteristics	Uses
Bamboo *petung*	Yes	Tall, big, straight	• Building material. • Furniture and craft making.
Bamboo *ampel*	Yes	Thick, easy to transplant, straight	• Building material. • Duck sticks. • Fishing rods. • Furniture and craft making.
Yellow bamboo	Yes	Yellow color, thin, straight	• Ceremonial. • Landscaping. • Furniture and craft making.
Bamboo *santong*	Yes	Medium size, fast growth, strong	• Building material. • Baskets and woven walls. • Furniture and craft making.
Bamboo *tali*	Yes	Thin, flexible, easy growth, most common variety found locally	• Bamboo rope. • Baskets and woven walls. • Building material. • Furniture and craft making.
Bamboo *tutul*	Yes	Rare, yellow with brown spot, grows on high grounds	• Percussion instruments. • Building material. • Furniture and craft making.

Step 2

- After each workgroup has created their lists, ask them to present the results to the entire group.
- Ask the participants to discuss the results together.

Presentation : Bamboo management

Method : **Facilitator presentation**

Tools : **Images describing the steps of good bamboo plant management**

References : **PC Book MOD 8 - Forests, Tree Crops, and Bamboo**

Objective : **Participants learn about good bamboo management**

Good management of bamboo clumps will improve the quality and durability of the bamboo poles, and will make access, maintenance, and harvesting poles and shoots much easier.

Bamboo plant management involves:

- Fertilizing.
- Watering.
- Mulching.

Clump management involves:

- Removal of dead or old culms.
- Thinning the number of culms to the desired amount.
- Branch pruning.
- Marking and cutting new shoots.

Bamboo plantations involve:

- Intensive plantations.
- Mixed plantations with other trees and animal grazing.
- Integration with aquaculture (See **PC Book MOD 11 – Aquaculture**).

For detailed information on bamboo management, see the "How to grow high quality bamboo" section from **PC Book MOD 8 - Forests, Tree Crops, and Bamboo.**

Field activity : Bamboo clump management

Method : **Group practical activity**

Tools : **See preparation below**

References : **PC Book MOD 8 - Forests, Tree Crops, and Bamboo**

Objective : **Participants practice bamboo clump management**

Preparation

- Identify 3 clumps of unmanaged bamboo clumps that the participants can work on.
- Collect the management tools – Machetes, knives (for cutting and marking), secateurs, wheelbarrow or buckets, shovels.
- Collect mulch, compost, manure, and cement.

Running this exercise

Explain the process and steps involved to the whole group. See in the "How to grow high quality bamboo" section from PC Book MOD 8 - Forests, Tree Crops, and Bamboo for detailed explanations on clump management techniques, **including:**

- Fertilizing.
- Watering.
- Bamboo clump management:
    - Removal of dead or old culms.
    - Thinning the number of culms to the desired amount.
    - Branch pruning.
    - Marking and cutting new shoots.

Step 1 - Form workgroups

- Ask the participants to split up into 3 workgroups.

Step 2

- Each group is assigned 1 unmanaged bamboo clump to improve using any or all of the techniques outlined above.
- The facilitator should observe each groups techniques and offer advice as needed.

Step 3

- Each group presents the results they have achieved and the techniques they used.
- Discuss the techniques that were used by the groups with the whole group.
- The facilitator can review the processes used and give inputs if needed.

For more detailed information on bamboo management, see the "How to grow high quality bamboo" section from **PC Book MOD 8 - Forests, Tree Crops, and Bamboo.**

Presentation : Producing high quality bamboo poles

Method : **Facilitator presentation**

Tools : **Images, black/white board, markers**

References : **PC Book MOD 8 - Forests, Tree Crops, and Bamboo**

Objective : **Participants learn about producing high quality bamboo poles**

What makes high quality bamboo poles?

- **The right species grown in the right conditions.**
- **Poles harvested at the right time.**
- **Poles harvested at the right age.**
- **Poles cured and stored well.**
- **Poles preserved against borer and insect attack through:**
  - Clump curing.
  - Water treatment.
  - Seawater treatment.
  - Borax treatment.
  - Oil and varnish treatment.

See the "What makes high quality bamboo poles?" section from PC Book MOD 8 - Forests, Tree Crops, and Bamboo for detailed descriptions and illustrations to support this exercise.

Encourage a discussion with the participants about what traditional curing and preservation techniques and preservation materials they know of.

Creative thinking : "From bamboo shoot to shop"

Method : **Group participatory brainstorm**

Tools : **Large paper, markers**

References : **PC Book MOD 8 - Forests, Tree Crops, and Bamboo**

Objective : **Participants design a small enterprise encompassing all stages of bamboo production**

Preparation

The facilitator can explain the following steps of the exercise to the participants.

Each group will create their own small enterprise involving bamboo to help strengthen their knowledge of bamboo production, harvest, treatment, and products as well as thinking about value adding and small enterprise creation.

Each group will create their enterprise plan covering the following points:

- **What type of enterprise group?** Cooperative, family, community group, small business partnership, etc.
- **The types of bamboo used** (local variety).
- **The products and/or services sold -** Materials other than bamboo, which support bamboo production can also be included – if so then include material sources, costs, amounts needed, etc if time permits.
- **How they will grow the bamboo –** Where, how much, who will plant and manage the bamboo, etc.
- **Approximately how many poles they will need each year to start their business?** - Which could change over time.
- **Harvest and post harvest drying, curing, and treatment plan.**
- **Storage plan.**
- **Product plan, including:**
    - How many of the products are made?
    - Where are the products sold?
    - How are the products transported to the place they are sold?
    - How are the products marketed?
    - What costs are involved in these processes?
    - How much are the products sold for?

The detail that the groups can give for each of these questions will depend on the amount of time provided for this exercise.

Running this exercise

Step 1 - Form the workgroups

- Have the participants to split up into smaller workgroups using one of the exercises in the appendix.
- Give each of the workgroups large pieces of paper and markers.

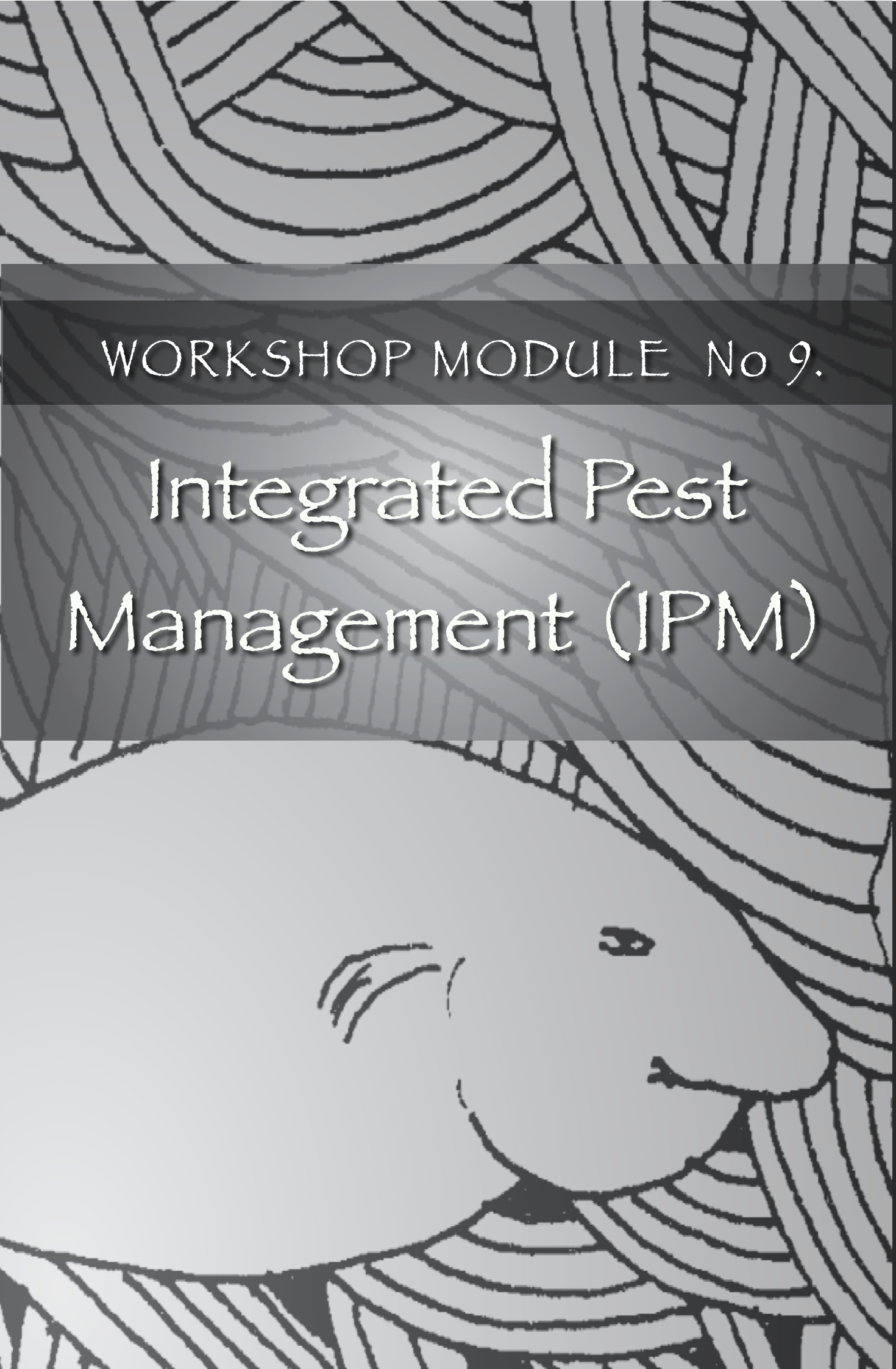
Step 2 - Workgroups create their plans

- Each group brainstorms and creates a 'Bamboo small enterprise plan' by answering the questions listed above.
- Have each of the work groups write up, or even draw pictures of their 'Bamboo small enterprise plan' on the large pieces of paper big enough so that everyone can see them later.

Step 3 - Presentation and feedback

- After each workgroup has created their plan, they can present them to the entire group for feedback and other suggestions.

Notes...



WORKSHOP MODULE No 9.

Integrated Pest Management (IPM)

Permaculture Facilitator's Handbook Module 9. Integrated Pest Management (IPM)

Notes...

Presentation : Integrated Pest Management (IPM)

Method : **Facilitator presentation**

Tools : **Images, black/white board, markers**

References : **PC Book MOD 9 – Integrated Pest Management**

Objective : **Participants understand the concept and benefits of IPM**

Pest problems occur because a system is not in balance.

Some different reasons for pest problems include:

- Fires, floods, and land clearing.
- Using large areas of land for only one crop (monoculture).
- The introduction of a pest to an area.
- Destruction of pest predators because of using pesticides or removing pest predator habitats.

Long–term pest management solutions need to **bring back a natural balance between croplands, gardens, and the natural environment**. This can sometimes take many years, so IPM also includes short-term solutions such as natural pesticides.

IPM combines different natural pest management techniques to:

- Reduce the chances of pest problems happening.
- Reduce the size of the pest problems that do occur.
- Use natural treatments for any problems that do occur.

Every part of the environment is connected to every other part, including people. **What happens to one part of a system or environment WILL affect every other part of the system or environment.** This is an important philosophy behind IPM and future sustainability. For IPM to be successful we need to understand how different parts of a system work and how they can work together (e.g. soil, insects, plants and trees, birds, animals, water, people, technology).

IPM systems will help to:

- Use fewer resources and expensive products because the farm will maintain itself more and more. Also, the resources that are needed are mostly local resources.
- Improve the soil, plants, and environment.
- Increase overall productivity of the land.
- Increased diversity and resilience to pests, diseases, and extreme weather.
- Improve the health of people in the area.

IPM works well for small home gardens, market gardens, large crops, rice production, fruit trees, and all systems.

To be healthy and resilient, plants need good growing conditions, including:

- Fertile soil.
- Sufficient water.
- The right amount of sunlight.

Different plants require different conditions. Some like very dry soil, some like moist soil, some like shade, some like full sun, etc. There are many different 'micro-climates' on each piece of land and if plants are matched with their preferred conditions they will grow better and be much more disease resistant.

For example:

- **Wet soil** – Water spinach.
- **Shady forest** – Vanilla.
- **Dry sandy soil** – cactus.

There are many aspects of IPM to help reduce pest problems naturally:

- **Healthy, living soil** – Strengthens plant resilience.
- **Natural pest predators** – Control pest numbers.
- **Healthy environment** – Keeps pests in balance and encourages pest predators.
- **Open-pollinated, non-hybrid seeds** – Stronger resilience to pests.
- **Good crop management, including:**
    - **Crop rotation** – Replenishes soil nutrients.
    - **Natural patterns for garden shapes** – Reduces pest attacks.
    - **Crop diversity, not monoculture** – Reduces pest numbers.
    - **Pest barrier crops** – Slows down any pest attacks.
    - **Companion planting** – Helps plants to help each other.
- **Making and using baits and traps** – Keeps pest numbers low.
- **Use of animals in pest contro**l – Effective and efficient pest control method.
- **Making and using natural pesticides** – Supports healthier environments.
- **Biological control** – Large-scale natural pest control mechanisms.

Note: When practicing any of these principles remember to learn and use traditional methods of pest control – Learn from local experiences.

See **PC Book MOD 9 – Integrated Pest Management** and other exercises in this book for reference and ideas. More explanation about these various techniques as well as practical exercises for doing them are presented on the following pages.

Presentation : Healthy soils reduce pests

Method : **Facilitator presentation, participatory brainstorm**

Tools : **Images, black/white board, markers**

References : **PC Book MOD 9 – Integrated Pest Management; PC Book MOD 4 – Healthy Soil**

Objective : **Participants understand how healthy soil and a healthy environment helps to reduce pest problems**

Healthy, living soil that contains all the different nutrients that plants need is **the most important IPM technique**.

- If a plant is fed and protected by healthy soil it will be more healthy and it will grow strong and will be less likely to be attacked by pests and disease.
- If it is attacked, it will suffer damage more slowly and recover more quickly.

If the land (environment) surrounding the agricultural land is healthy and diverse then the chances of large pest problems will be greatly reduced.

The facilitator can compare plants to humans to help participants understand the importance of healthy soils and healthy environment. Discuss with the participants about the benefits of being healthy.

If a person (or plant) is healthy it will:

- Usually live longer.
- Get better faster when sick.
- Be able to work more.
- Not get sick very often.
- Be stronger.
- Produce healthier children.

Draw a 2 simple separate pictures on the board – A plant and a person.

- Conduct a group brainstorm with the participants about what humans and plants need to be healthy.
- Ask the participants to provide ideas and add the ideas into the pictures. E.g. plate of food = compost and mulch, sun, glass of water = watering can, etc. Use the ideas below if the participants need prompting.

The base for good health for plants and people is also the same:

- A balanced variety of nutrients and minerals = a good variety of food.
- Healthy, living, non-compacted, mulched soil to grow in = a comfortable house.
- Water, sun, and a healthy environment.
- Family and friends = companion planting.

See the "Healthy soil" and "Healthy environment" sections of **PC Book MOD 9 – Integrated Pest Management** and other exercises in this book for reference and ideas.

Presentation : Encouraging natural pest predators

Method : **Facilitator presentation and discussion**

Tools : **Images, black/white board, markers**

References : **PC Book MOD 9 – Integrated Pest Management**

Objective : **Participants learn about the benefits of pest predators and how to attract them into a system**

Nature's method of pest control, which has been working for centuries, is the relationships within delicate ecosystems. This includes a range of pest predators that keep pests in check.

As the quality of the environment and its delicate ecosystems are being impacted by mismanagement and pollution (including pollution from unsustainable agriculture), these natural pest predators are dying off, which is one of the reasons that pest problems are increasing.

While presenting the following ideas, the facilitator can encourage a discussion by asking the participants what they think could attract pest predators to a garden.

You can have a big impact on pest control in your area by attracting natural pest predators into the garden, farm, or orchard.

You can do this by:

- **Intercropping colorful flowers and herbs amongst vegetables and fruit trees** – Attracts insect-eating birds, spiders, wasps, lacewings ladybugs, and praying mantis.
- **Building habitats for pest predators with hollow logs, old bamboo, or piles of stones** – Insect-eating lizards, spiders, ground beetles, and frogs will live in these.
- **Build a small pond** – Attracts many beneficial predators.
- **Plant trees near the garden, farm, or orchards** – Attracts insect-eating birds and bats.

It can take a few years to build up a good natural pest predator population. Other pest control methods, like natural pesticides, may need to be used in the meantime.

However, chemical pesticides and even some natural pesticides also kill pest predators and beneficial insects. Use them very carefully, only when necessary, and only after trying all other methods.

See **PC Book MOD 9 – Integrated Pest Management** and other exercises in this book for reference and ideas. More explanation about these techniques as well as practical exercises for doing them are presented on the following pages.

Creative thinking : Known local pest predators

Method : **Participatory group brainstorm**

Tools : **Large paper, markers**

References : **PC Book MOD 9 – Integrated Pest Management**

Objective : **Participants create a local pest predators list**

Facilitator's note: As well as increasing awareness and familiarity with local pest predators, this exercise can help to raise the participants' awareness about the local environment and its connection to farming systems.

Running the exercise

- On the board create a table something like the following. Leave the answers to the questions blank so that the participants come up with their own ideas.
- Conduct a group brainstorm with the participants to fill in the list of local natural pest predators and their natural habitats (table 1).
- Then have the participants split up into workgroups to brainstorm ideas about what could be done so they would stay close to gardens/farms (table 2).
- Have the workgroups present their ideas to the entire group when they are done to compare ideas and give each other feedback.
- Use the information from the previous "Pest predator presentation" if it is needed to prompt the participants.

Local pest predators	Their natural habitats
Frogs	Dry and wet rice fields, ponds, trees, rivers, bush, etc
Snakes	Rice field, bush, trees, rivers, forest, farms, etc
Lizards	Trees, bush, rice field, rivers, forest, farms, etc
Birds	Trees, rice field, forest, rivers, sea, etc
Lady bugs	Garden, rice field, ponds, farms, forest, rivers, etc
Spiders	Garden, farms, forest, trees, etc
Ants	Garden, rice field, farms, trees, etc

Table 1.

What could be done so they stay close to gardens/farms
Create ponds in the garden
Have frogs to attract snakes
Stack rotten wood to create a habitat for lizards
Plant organic and natural plants and flowers
Plant beans
Create living fences to attract insects
Create compost heaps

Table 2.

Note: the facilitator should compile the results of the small group brainstorms onto the main list as the presentations are delivered. Place the result in the training space to be referenced during the rest of the workshop.

Field activity : Encouraging pest predators

Method : **Practical pest predator habitat building exercise**

Tools : **See preparation below**

References : **PC Book MOD 9 – Integrated Pest Management;**
PC Book MOD 6 – Home and Community Gardens
PC Book MOD 8 – Forests, Tree Crops, and Bamboo

Objective : **Participants practice building pest predator habitats**

There are 4 different exercises that are explained here for building pest predator habitats. The facilitator can choose the number and type of exercises which suit your time frame and workshop focus. If there are enough participants they can be split into 4 groups and each group can do 1 exercise. Try to prepare each group so that each exercise runs for the same length of time.

Preparation encouraging pest predators exercise No 1:

Inter-planting colorful flowers and herbs amongst vegetables

Materials to collect:

- Seedlings and cuttings of flowers/herbs to plant and places to plant them.
- Compost.
- Mulch.
- Water.
- Appropriate tools.

Preparation encouraging pest predators exercise No 2:

Building homes and habitats for pest predators

Materials to identify for collection by participants:

- Hollow logs.
- Old bamboo.
- Piles of stones.
- Appropriate tools for collection and to set in place.

Preparation encouraging pest predators exercise No 3:

Building a small pond in the centre of the garden

Materials to collect:

- Clay/thick plastic for pond lining, if needed.
- Water plants and pond edge plants.
- Water.
- Soil for planting around the pond edge.
- Mosquito eating fish.
- Hollow logs, old bamboo, or piles of stones to place around pond edge.
- Appropriate tools.

Preparation encouraging pest predators exercise No 4:

Plant small productive trees around the outside of the garden

Materials to collect:

- Tree seedlings.
- Mulch.
- Tree guards, if necessary.
- Compost.
- Water.
- Appropriate tools.
- Bamboo watering pipes - See PC Book MOD 6 - Home and Community Gardens.

Running these exercises

Hints for integrating the exercises:

- Place hollow logs, old bamboo, or piles of stones around the pond and trees.
- Flowers and herbs can be planted around the pond and around the trees.
- Hollow logs, old bamboo, or piles of stones can be used as garden borders.

Step 1 - Participant workgroups choose their exercises

- The participants can be divided into groups.
- Write down the different techniques that will be implemented, each technique on a different piece of paper.
- Fold up the papers and let a representative from each group choose a technique or techniques.

Step 2 - Implement the activities

- Each group can implement their chosen projects.
- Encourage as much integration between groups and creativity as possible.
- See the references listed for more detailed information.

Step 3 - Feedback and suggestions

- After each workgroup has finished, they can present the results to the entire group for feedback and other suggestions.

Presentation : Seed selection for IPM

Method : **Facilitator presentation**

Tools : **Images, black/white board, markers**

References : **PC Book MOD 9 – Integrated Pest Management**
PC Book MOD 5 – Seed Saving and Nurseries
IDEP GMO Fact Sheets

Objective : **Participants learn about types of seeds and their connection to IPM**

Saving local, non-hybrid seeds

- Saving, using, and improving good quality local seed is very important for IPM. It will increase the natural pest and disease resistance of the plants.
- By saving some seed from the BEST plants of each crop the plants will become more used to the local climate, soils, and conditions.

Observe the plants that are most disease and pest resistant

- Observe which crop is the best (most disease and pest resistant) and choose the seeds from those plants.
- Find out why the crop did so well (good soil, pest predators, use of compost, amount of water and sunlight, etc).
- Breed better crops each year by collecting the best seed - They will grow better and be more resistant to pests and diseases.

About hybrid seeds

- Hybrid seeds are often less resistant the local pests than locally grown non-hybrid varieties.
- Hybrid seeds are made by forced crossed pollination of 2 or more species of plants. The result is that hybrid plants might not produce seeds for the next crop. The quality of the next crop is often lower.
- Non-hybrid seeds can be saved and replanted year after year, hybrid seeds must be bought every year.
- Hybrid (or factory produced) varieties of seed often need to be grown using a range of chemical pesticides and fertilizers. This gives the companies that sell the seeds and chemicals increased profits, but it costs farmers more money.

Do not use Genetically Modified Organism (GMO) seeds

- GMO seeds are made by combining the genes of different species. These are factory produced seeds.
- It is very important that farmers do not grow genetic modified plants, as these questionable GMO plants can cross breed with other plants in the area where they are grown and this will pollute the local varieties of seeds for future generations of plants.

For more details about GMO, see IDEP's fact sheets about GMO seeds.

Creative thinking : Local open pollinated seeds

Method : **Participatory group brainstorm**

Tools : **Large paper, markers**

References : **PC Book MOD 9 – Integrated Pest Management**
PC Book MOD 5 – Seed Saving and Nurseries

Objective : **Participants create a list of local non-hybrid open pollinated seeds**

This is a good exercise to follow the presentation about seeds and IPM. It helps to encourage a practical follow up for after the workshop.

On the large paper create a table something like the following. Leave the answers to the questions blank so that the participants come up with their own ideas.

Have the participants suggest local non-hybrid open pollinated seed that they know about in the area. Then ask them to list the best time to collect them (table 1).

Then ask the participants to explain where they think they could get stocks of the seeds/ plants that can be used for propagating the seeds (table 2).

Local non-hybrid open pollinated seed varieties	Time to collect
Vegetables	
• Carrot	8 months
• Tomato	4 months
• Eggplants	6 months
Grains	
• Rice	6 months
• Corn	4 months
• Beans	5 months
Herbs/medicines	
• Coriander	8 months
• *Sambiroto*	1 year
Fruits	
• Papaya	1 year
• Mango	5 years

Table 1.

Where the seeds can be found in the local community
Around villages (in high altitudes)
Around villages everywhere
Around villages everywhere
Around villages in rice farming areas
Around villages everywhere
Around villages everywhere
Around villages (in high altitudes)
Around villages (in high altitudes)
Around villages everywhere
Around villages everywhere

Table 2.

Place the list in the training space so that it can be referenced during the rest of the workshop.

Presentation : Crop and land management

Method : **Facilitator presentation**

Tools : **Images, black/white board, markers**

References : **PC Book MOD 9 – Integrated Pest Management; PC Book MOD 6 – Home and Community Gardens; PC Book MOD 7 – Farming; PC Book MOD 10 – Animal Systems**

Objective : **Participants understand the connection between crop management, land management, and pest management**

There are many methods of crop management and land management that will help to:

- **Reduce the chances of pest problems happening.**
- **Reduce the size of the pest problem if it does happen.**

Before presenting the following ideas the facilitator could encourage a discussion by asking the participants what natural methods of crop management and land management that they know about which support good pest management.

Then introduce and discuss (using images) different techniques including:

- Inter-cropping instead of monoculture.
- Crop rotation.
- Natural patterns.
- Using animals and animal tractors.
- Part of a fruit tree crop system.
- Part of a vegetable crop system.
- Feeding insects to the animals.

The facilitator should ask the participants to provide relevant examples or stories to help explain the techniques. If they cannot, the facilitator can do so.

See **PC Book MOD 9 – Integrated Pest Management, PC Book MOD 6 - Home and Community Gardens, PC Book MOD 7 – Farming,** and **PC Book MOD 10 - Animal Systems** for information on these techniques.

Presentation : Companion planting

Method : **Facilitator presentation**

Tools : **Images, black/white board, markers**

References : **PC Book MOD 9 – Integrated Pest Management**
PC Book MOD 6 – Home and Community Gardens

Objective : **Participants learn about the benefits of companion planting**

Companion planting is about what should and should not be grown together. It is a very effective way to increase environmental health and productivity while reducing pest problems.

Companion planting works when we understand the natural characteristics of plants and the relationship that those characteristics create with other plants and other things in the environment, and use them for the maximum benefit in an integrated system.

These characteristics include:

- The smells and substances that plants emit.
- How plants impact the physical environment.
- The way plants look.
- Plant root systems.

Some basic examples of companion planting

Aspect	How it works	Examples
Using companion planting for pest management		
Repel insects	Plants which have strong scented leaves or flowers will confuse and repel pest insects which use their sense of smell to find plants they want to eat	Garlic, marigolds, daisies, ginger, frangipani
Attract predators	Flowers help to attract pest predators. Flowers can be planted around vegetables and fruit trees	Roses, dill, hibiscus, marigolds, legume shrubs
Slow down the spread of pests	Planting different crops together slows pests from spreading and reduces pest numbers. This method is effective for small gardens, large crops, and trees	Marigolds repel nematodes, which live in the soil and can damage plant roots
Using companion planting for increasing health and biodiversity		
Know what plants can be grown close together	Different types of plants have different types of root growths. Knowledge of the different root growths will allow plants and trees to be planted closer together	See examples below and in following exercises
	There are some types of plants, like the eucalypt trees, which release a substance from their roots and this can make it difficult for other crops to grow close to them	Eucalypt trees
"Guilds" are plants that help each other	Corn provides trellising for the beans, which provides nitrogen, pumpkin provides ground cover and weed control	Corn, beans, and pumpkins
	The strong smell of the basil disguises the smell of the tomatoes to pests and the bean's roots fix nitrogen into the soil to fertilize the tomato and the basil, the garlic smell helps to repel pest insects	Tomato, basil, garlic, and beans

Creative thinking : Local companion planting chart

Method : **Creative thinking exercise**

Tools : **Large pieces of paper, markers**

References : **IDEP Companion Planting Chart;**
PC Book MOD 9 – Integrated Pest Management;
PC Book MOD 6 – Home and Community Gardens

Objective : **Participants make a local companion planting chart**

There is a lot of traditional knowledge in Indonesia about plants that grow well together. This knowledge needs to be collected and shared so that it is not forgotten. One way to do this is to create a local companion planting chart which can be shared and referenced by people in the community.

A companion planting chart (see example) is:

- A grid with names of plants written across the top and down the side of the grid.
- In each box of the grid there is a symbol which explains whether those two plants together:
    - **Will help each other** to grow well - for example: ☺
    - **Will NOT help each other** to grow well - for example: X

Running the exercise

Step 1 - Create three workgroups:

- **GROUP 1 - Focuses on:** Creating a list of local plants that they think will help each other to grow well.
- **GROUP 2 - Focuses on:** Creating a list of local plants that they think will NOT help each other to grow well.
- **GROUP 3 - Focuses on:** Creating a list of local plants that they think will help to reduce pests in the area and explains the reasons why.

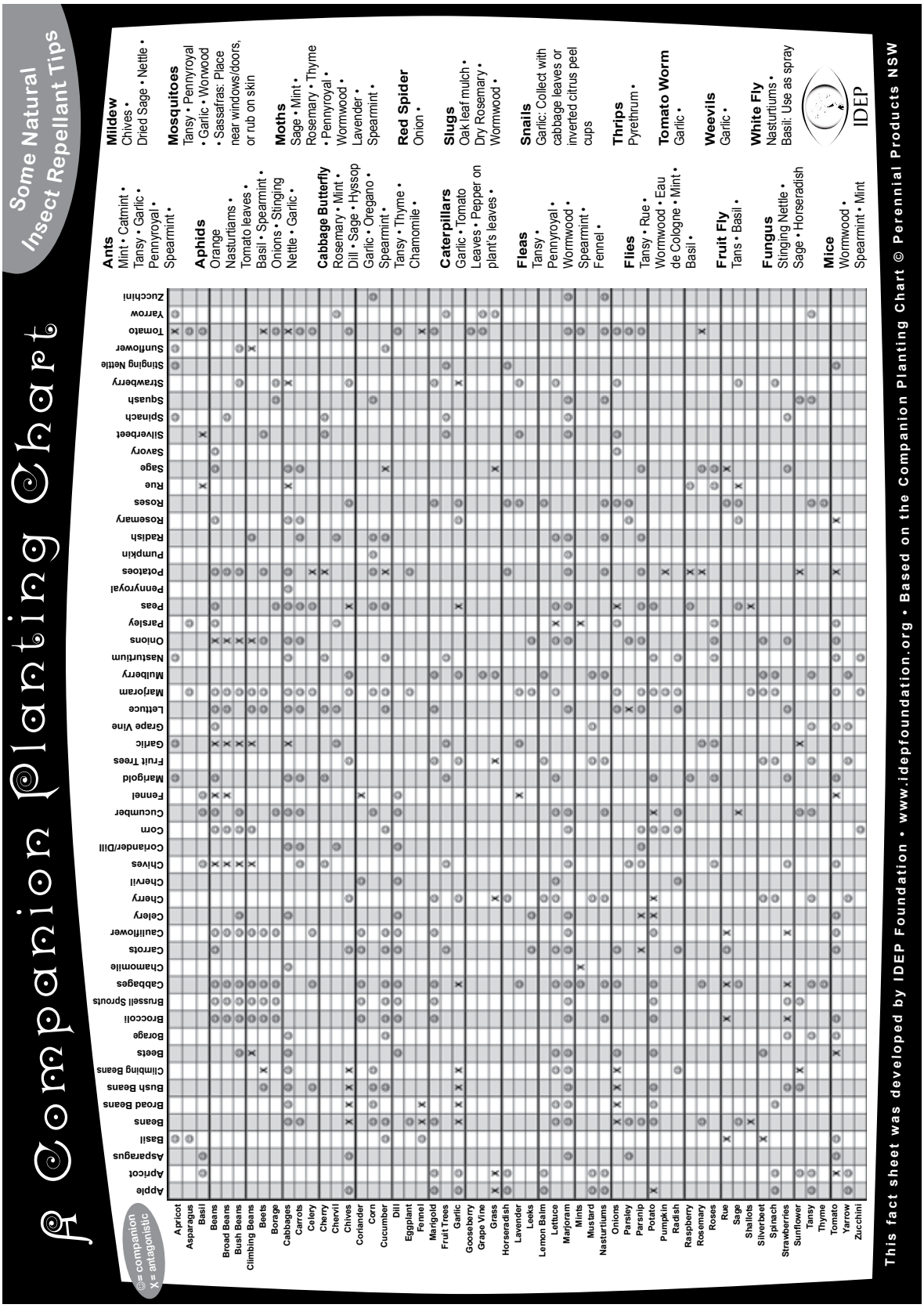
- Give each work group pens and paper to write down their ideas.

Step 2 - Fill in the companion planting chart

- On a large piece of paper create a blank grid like the one shown in the example.
- Ask the participants from groups 1 and 2 to call out all of the plants that they have been using for their lists.
- Write the list of plants across the top and then down the side of the grid.
- Ask GROUP 1 to draw in the symbols for beneficial combinations in the appropriate boxes.
- Ask GROUP 2 to draw in the symbols for non-beneficial combinations in the appropriate boxes.

- Ask GROUP 3 to write the list of plants that they think will help to reduce pests.
- As the groups are fill in their ideas the facilitator and the other participants can give feedback and suggestions.

Keep the resulting companion planting chart in the training space so that it can be referenced during the rest of the workshop.



Creative thinking : Make a list of local 'guilds'

Method : **Participatory group brainstorm**

Tools : **Large paper, markers**

References : **PC Book MOD 9 – Integrated Pest Management**

Objective : **Participants integrate guilds into different systems**

Step 1 - Identify local guilds and their benefits

Using something like the table below, the facilitator can ask the participants to identify local guilds (examples of different planting companion plant combinations, including flowers, herbs, vegetables, trees, etc) and the benefits of the guild (table 1).

The answers listed below are only supplied as ideas for the facilitator if the participants need help for prompting ideas and discussions.

Guild	Benefit of the guild
Corn, beans, and pumpkins	• Corn provides trellising for the beans. • Beans provide nitrogen. • Pumpkin provides ground cover and weed control.
Tomatoes, garlic, basil, and beans	• The strong smell of the basil disguises the smell of the tomatoes to pests. • The bean's roots fix nitrogen into the soil to fertilize the tomato and the basil. • The garlic smell helps repel pest insects.
Eggplant, coriander, and beans	• The strong smell of the coriander stops insect attacking the eggplant. • The bean roots fix nitrogen into the soil to fertilize the eggplant and coriander.
Carrot, cucumber, and lettuce	• The carrot smell confuses the insect to come to the cucumber. • Each of the plants needs different nutrition from the soil.

Table 1. Guilds and their benefits

Integrate guilds with systems
• Part of a legume terraced vegetable and grain rotation system. • Planted in strips in an orchard. • Part of an animal rotation system.
• Home gardens. • Market gardens. • Part of a vegetable rotation system. • Part of an animal/crop rotation system.
• Home gardens. • Market gardens. • Part of a vegetable rotation system. • Part of an animal and crop rotation system.
• Home gardens. • Market gardens. • Part of a vegetable rotation system.

Table 2. How the guild is integrated into different systems

Step 2 - Suggest integration of guilds with other systems

Ask the participants to split up into smaller workgroups and have each workgroup come up with lists of how those guild can be used and integrated into different farming systems – With vegetables, grains, fruit trees, tree crops, animals, fish, etc (table 2).

Step 3 - Presentation with feedback and suggestions

After each workgroup has created their lists, ask them to present the results to the entire group for feedback and other suggestions.

Place the lists in the training space so that it can be referenced during the rest of the workshop.

Field activity : Create a plant guild

Method : **Group field activity**

Tools : **See preparations below**

References : **PC Book MOD 9 – Integrated Pest Management;**
PC Book MOD 6 – Home and Community Gardens

Objective : **Participants trial planting different plant guilds**

If this exercises is done in a community demonstration plot then a good ongoing exercise would be to suggest is that the participants can continue to observe and document the results of these guild trials over time.

Preparation

Together with the participants choose some of the plant guilds from the previous exercises that are in season for planting.

- Collect seeds, seedlings, bulbs, or cuttings ready for planting.
- Prepare garden beds for planting.
- Collect compost.
- Collect mulch.
- Prepare water.
- Prepare appropriate tools for planting.

Running this exercise

Step 1 - Create groups and choose guilds

- Ask the participants to split up into smaller workgroups.
- Each of the groups can choose one of the guilds to plant.

Step 2 - Groups plant their guilds

- Each group can plant their guilds in a test plot, add compost and mulch and then water the new garden beds.
- See the "Seed and seedling planting ideas" section of PC Book MOD 6 - Home and Community Gardens and PC Book Ch 4 - Healthy Soil for more detailed information.

Step 3 - Feedback and suggestions

After each workgroup has finished, they can present the results to the entire group for feedback and other suggestions.

Presentation : Pest prevention with baits and traps

Method : **Facilitator presentation**

Tools : **Images, black/white board, markers**

References : **PC Book MOD 9 – Integrated Pest Management**

Objective : **Participants learn about preventing and reducing large pest problems**

If pests and diseases are discovered early then management of the problem is much easier. **Preventative measures will dramatically help to reduce the chances of pest attack and minimize crop damage.**

Observation can help to prevent many pest problems before they start

- Are the plants healthy and growing well?
- Are pests attacking the plants?
- If yes, what types of pests?
- Where are the pests coming from?
- Are predators eating the pests?
- If not, is there an appropriate habitat for pest predators to live?

Knowledge is also very important

- Knowledge of which pests tend to attack which plants.
- Observation and control of plant diseases and fungus.

These techniques can be implemented once the problem has been identified

- Using a specific control or pest repellent spray rather than a general spray.
- Pest control for seedlings to increase resilience.
- **"Bait crops" –** Non productive plants or weeds that attract pests and then are and fed to animals, put in liquid compost, or burnt.
    - Baits for fruit fly.
- **"Pest traps" –** Techniques for catching pests before they attack.
    - Snail and slug traps.
    - Rat and mouse traps.
    - Grease rings.

See the "Preventative measures" and "Making and using baits and traps" sections in **PC Book MOD 9 – Integrated Pest Management** for more information about these techniques.

Creative thinking : Using pest baits and traps

Method : **Participatory group brainstorm**

Tools : **Large paper, markers**

References : **PC Book MOD 9 – Integrated Pest Management**

Objective : **Participants make a list of traditional pest control techniques**

Traditional knowledge about preventative pest measures, like those listed in the earlier presentations, is important to keep in the community.

It can be used together with modern natural pest control methods.

Running the exercise

- On the board create a table something like the following.
- With the participants conduct a group brainstorm
- List all of the all the known pest prevention techniques, including baits and traps.

Leave the answers to the questions blank so that the participants come up with their own ideas.

Pest prevention techniques	Materials that are used/ How it is done	Insects or animals that are controlled
Holes	Dig hole and cover with tree branches	Wild pig, tigers
Scarecrows	Make with used clothes, bamboo, straw, rope	Birds
Bamboo drums	Made from bamboo and hung with rope	Birds, monkey
Catapults	Made from wood, rubber, stone	Birds, squirrel
Natural poisons	Local trees (e.g. gadung)	Rats
Traps	Rope	Birds, monkey, rats

Place the list in the training space so that it can be referenced during the rest of the workshop.

Field activity : Observation and hand control

Method : **Garden/farm field visit and exercise**

Tools : **See preparation below**

References : **PC Book MOD 9 – Integrated Pest Management**

Objective : **Participants identify pests and diseases and determine control methods**

Preparation

- Identify large garden or farm where the participants can walk around and identify pest or disease problem.
- Arrange transport and snacks if necessary.
- Old rags.
- Pens, paper, and clipboards for the participants.

Running this exercise

Step 1 - Take the participants to the site and ask them to walk around the garden and identify any pest or disease problems.

Step 2 - Ask the participants to create a list by answering the following questions:

- What is the type of pest or disease? They can describe the pest or disease if the name isn't known.
- What plants are being attacked/damaged?
- How many pests are there?
- How many plants are damaged?
- Are there any pest predators?
- Does the damage/pest population require a spray or other control method?
- If so, what is a good method that could be used?

Step 3 - Have the participants use the old rags and practice hand pest control on any pest populations that can be controlled with this method.

Step 4 - Once you are back in the class space, use the results of the pests and diseases identified on the field visit to create a list with the participants so that everyone can contribute ideas and comment on what they have learned.

Place the list in the training space so that it can be referenced during the rest of the workshop.

See **PC Book MOD 9 – Integrated Pest Management** for more information about these techniques.

Presentation : Natural pesticides and fungicides

Method : **Facilitator presentation**

Tools : **Images, black/white board, markers**

References : **PC Book MOD 9 – Integrated Pest Management**

Objective : **Participants learn about natural pesticides and fungicides**

There are many different types of natural pesticides and fungicides that can be made and used.

They can be made from traditionally known materials or from new recipes using locally available materials.

Principles of using natural pesticides and fungicides as part of IPM:

- Natural pest control sprays need to be part of a system of pest management and should be used only when necessary.
- **DO NOT use natural pesticides or fungicides if there are no pests and no crop damage.**
- A small amount of crop damage is OK. Take time to observe if pest predators are eating the pests and if the pests are spreading quickly or slowly.
- Some natural pesticides are very strong and will kill all insects, good and bad. Be careful because most insects will not harm your crops and can be good pest predators – Killing them will create problems in the future.

How to apply natural pesticides and fungicides

Types of sprayers:

- Brooms (*sapu lidi*).
- Plastic hand sprayer.
- An aqua bottle with small holes in the lid.
- Hand made bamboo sprayer.
- See the "Natural pesticide sprayers" section in PC Book MOD 9 – Integrated Pest Management.
- Spray pack.

Important points when using natural pesticides and fungicides:

- Bamboo sprayers, spray packs, and plastic hand sprayers MUST be cleaned with water after every use.
- Some natural pesticides can cause skin problems and make you sick if you get too much on your skin or in your mouth, nose, or eyes.
- Always wear long pants, long shirt, gloves, shoes, and cover your nose and mouth, when using stronger natural pesticides, glasses are also recommended.

Ideas for using all natural insecticides and fungicides

- VERY IMPORTANT - Stop using at least 2 weeks before harvest. This will prevent food from containing pesticides or fungicides that can also make people sick.
- Change the types of sprays you use to stop the insects becoming resistant to any one type of insecticide or fungicide.
- Some insecticides and fungicides will work better than others, there are many factors that influence this so experiment and study the results.
- Only spray early in the morning or late in the afternoon to prevent burning the plants from the hot sun.
- In the wet season try to spray at least 3 hours before the rain starts so that the sprays have enough time to work properly.

Some types of natural pesticide sprays

- Traditional sprays.
- Neem spray.
- Papaya spray.
- Taro leaf spray.
- Glue sprays.
- Tobacco leaf spray.
- Insect spray (biological spray).
- Chilli/garlic spray.
- Ginger juice.
- Tomato leaf spray.
- Soap spray.

Some types of natural fungicides

- Neem Spray.
- Diluted urine.
- Sweet potato.
- Papaya.
- Seaweed tea.
- Milk.
- Garlic.

See **PC Book MOD 9 – Integrated Pest Management** for more information about these techniques.

Creative thinking : Local natural pesticides and fungicides

Method : **Participatory group brainstorm**

Tools : **Large paper, markers, examples of sprays to show**

References : **PC Book MOD 9 – Integrated Pest Management**

Objective : **Participants make a local pesticides and fungicide list**

There are many traditional or local natural pesticides and fungicides.

Some of these are in use today and some are not used any more.

- On the board create a table something like the following.
- With the participants conduct a group brainstorm to list any pesticide and fungicide sprays they use and/or have heard of people using either currently or in the past.
- Create a list so that everyone can learn about locally available sprays.

Leave the answers to the questions blank so that the participants come up with their own ideas.

Local pesticide/ fungicide sprays	How to make it	Insects or animals that are controlled
Neem oil	Mix with natural soap and water	Caterpillars, bugs
Garlic	Garlic powder mixed with water	Bugs, mosquitoes, caterpillars
Mint leaf	Mint juice mixed with water	Ants, butterfly, flies
Basil leaf	Basil juice mixed with water	Flies, fruit fly, white fly
Coriander leaf	Coriander juice mixed with water	Caterpillars, bugs
Chili powder	Chili powder mixed with water	Bugs
***Moringa* leaf**	*Moringa* juice mixed with water	Ants

Place the list in the training space so that it can be referenced during the rest of the workshop.

Field activity : Make natural pest control sprays

Method : **Small group field activity**

Tools : **See preparation below**

References : **PC Book MOD 9 – Integrated Pest Management**

Objective : **Participants practice making natural pesticides**

See "Making and using natural pesticides" section of **PC Book MOD 9 – Integrated Pest Management** for detailed instruction for this exercise.

Preparation

- Identify pests that need to be sprayed.
- Choose the appropriate natural pesticides to make that will control these pests, that the participants will be able to easily make themselves in the future.

Materials to prepare:

- Ingredients needed to make the chosen sprays.
- Tools for making the pesticides – Cooking equipment, stirrers, funnel, etc.
- Large mortar and pestle or similar crushing device.
- Mixing containers.
- Protective gloves.
- Storage bottles.
- Handouts and/or clear instructions on how to prepare the natural pesticides.

Running this exercise

Step 1 - Create the workgroups
Ask the participants to split up into smaller workgroups - If only 1 type of pesticide is being made then all the groups can make the same type, but making and trying different types is better.

Step 2 - Making the sprays
Each group can make their natural pesticide and then store it properly to be used in the next exercise.

Step 3 - Presentation with feedback and suggestions
After each workgroup has finished, they can present the process and results to the entire group for feedback and other suggestions.

Step 4 - Collect the sprays for future exercises
Ask the participants to leave the natural pesticides at the workshop space so that they can be used by the group at the appropriate time.

Field activity : Test natural pest control sprays

Method : **Small group practical**

Tools : **See preparations below**

References : **PC Book MOD 9 – Integrated Pest Management**

Objective : **Participants practice using natural pesticides**

See "Making and using natural pesticides" section of **PC Book MOD 9 – Integrated Pest Management** for detailed instruction for this exercise.

Preparation

- Identify pests that need to be sprayed.
- Choose the appropriate natural pesticides to make that will control these pests.

Materials to prepare:

- Sprayers.
- Protective clothing and equipment.
- Natural pesticides.
- Water.

Running this exercise

The groups can now use the pesticides that they have made on the pests that were identified in the previous exercise.

Step 1 - Orientation

- Discuss with the participants the correct method for using natural pesticides.
- Some natural pesticides are very strong and can harm people. Participants that use the pesticides should wear protective clothing.

Step 2 - Create the workgroups and prepare the sprays for use

- Ask the participants to split up into smaller workgroups - If only 1 type of pesticide is being used then all the groups can use it, but trying out different types is better.
- Each group can mix their pesticide with water and pour it into the sprayer

Step 3 - Using the sprays

- Go to the identified pest problems and have the groups spray the pests.
- **Remind the participants they should only spray the affected plants.**
- When done, store the remaining natural pesticide in bottles.
- Clean the sprayers and equipment.

Step 4 - Store the sprays for future use

- Ask the participants to leave the natural pesticides at the workshop space so that they can be used for the demonstration plots.
- For the rest of the course and afterward observe and record the results and recommend changes in type of spray used.

Presentation : Chemical pesticides 'costs chain'

FACILITATOR PRESENTATION

Method	**: Facilitator presentation, group discussion**
Tools	**: Copies of 'Chain of pesticide' illustration shown below black/white board, markers**
References	**: PC Book MOD 9 – Integrated Pest Management**
Objective	**: Participants understand the full costs of using chemical pesticides**

Preparation

Draw the 'Chain of pesticide' illustration shown below on a board big enough for all to see.

Running this exercise

Ask the participants to discuss the polluting effects and costs at each stage of the chain:

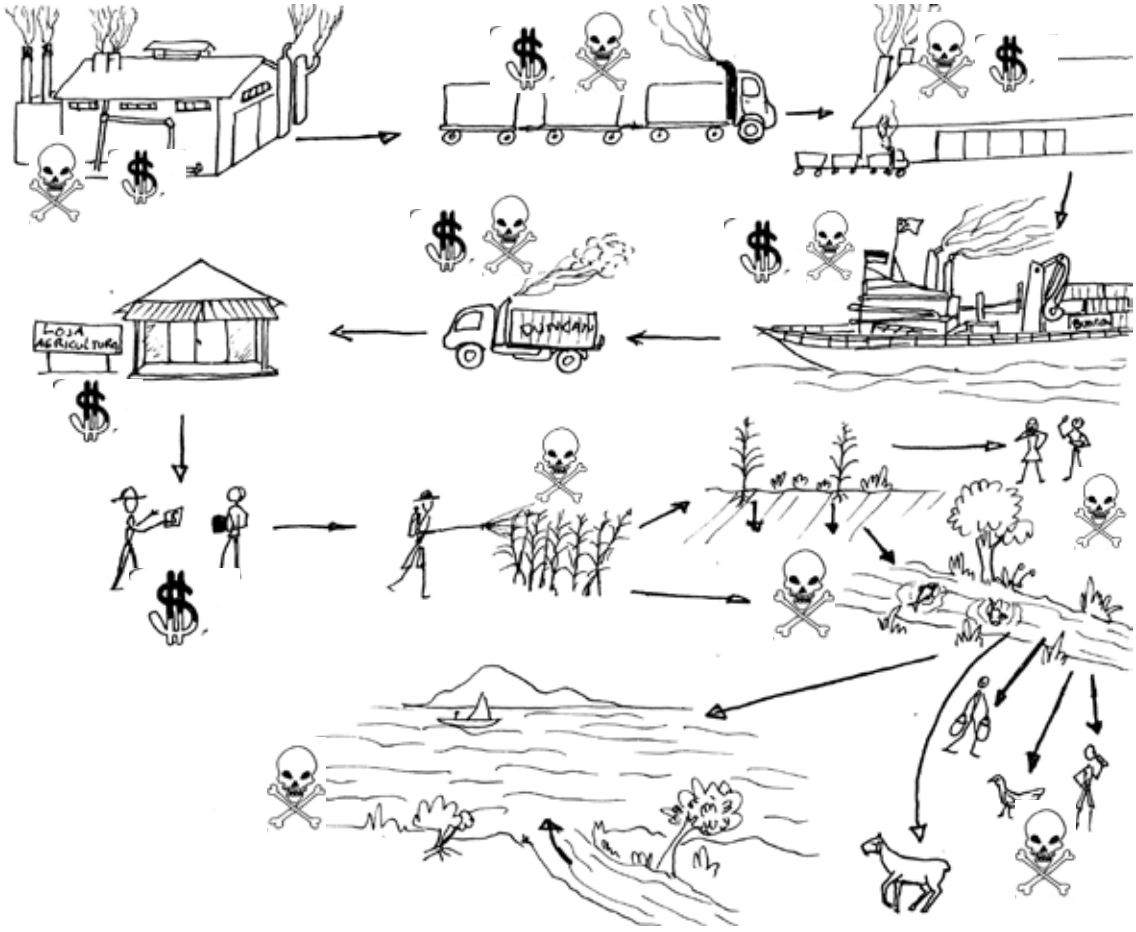
1. Production. **2. Transportation.**

3. Warehouse storage. **4. Shop storage/purchasing.**

5. Pesticide use effect on:

- People using the pesticides.
- Environment (soil, insects, small animals, birds).
- People eating the food.
- Water, rivers, and oceans and aquatic life.
- People and animals that use that water.

Also discuss: Pesticides and herbicides are expensive, and the more they are used the more they are needed.



Creative thinking : Make a community IPM plan

Method : **Group planning exercise**

Tools : **Large paper, markers**

References : **PC Book MOD 9 – Integrated Pest Management**

Objective : **Participants create an IPM plan for their communities**

The goal of this exercise is for participants to create an IPM plan for a community using as many aspects of IPM as possible. **The plan should include:**

- Short-term, medium, and long-term objectives (e.g. 3 months, 1 year, 5 years).
- Techniques for the whole community as well as for individual farms and gardens.
- An integrated approach to gardens, farms, animals, and community forests.
- A plan for testing techniques and for spreading information. Note: The more farmers that use IPM, the better the results are for everyone.
- Information from the many lists of local materials and techniques for IPM that the participants have created from other exercises in this module.

Step 1 - Orientation

The facilitator can give a brief review of IPM basics including how IPM works through:

- Healthy, living soil.
- Healthy environment.
- Using baits and traps.
- Using natural pesticides.
- Good crop management, including:
  - Crop rotation.
  - Natural patterns for garden shapes.
  - Crop diversity, not monoculture.
  - Pest barrier crops.
  - Companion planting.
- Using natural pest predators.
- Open-pollinated, non-hybrid seeds.
- Use of animals in pest control.
- Biological controls.

Step 2 - Workgroups make IPM plans

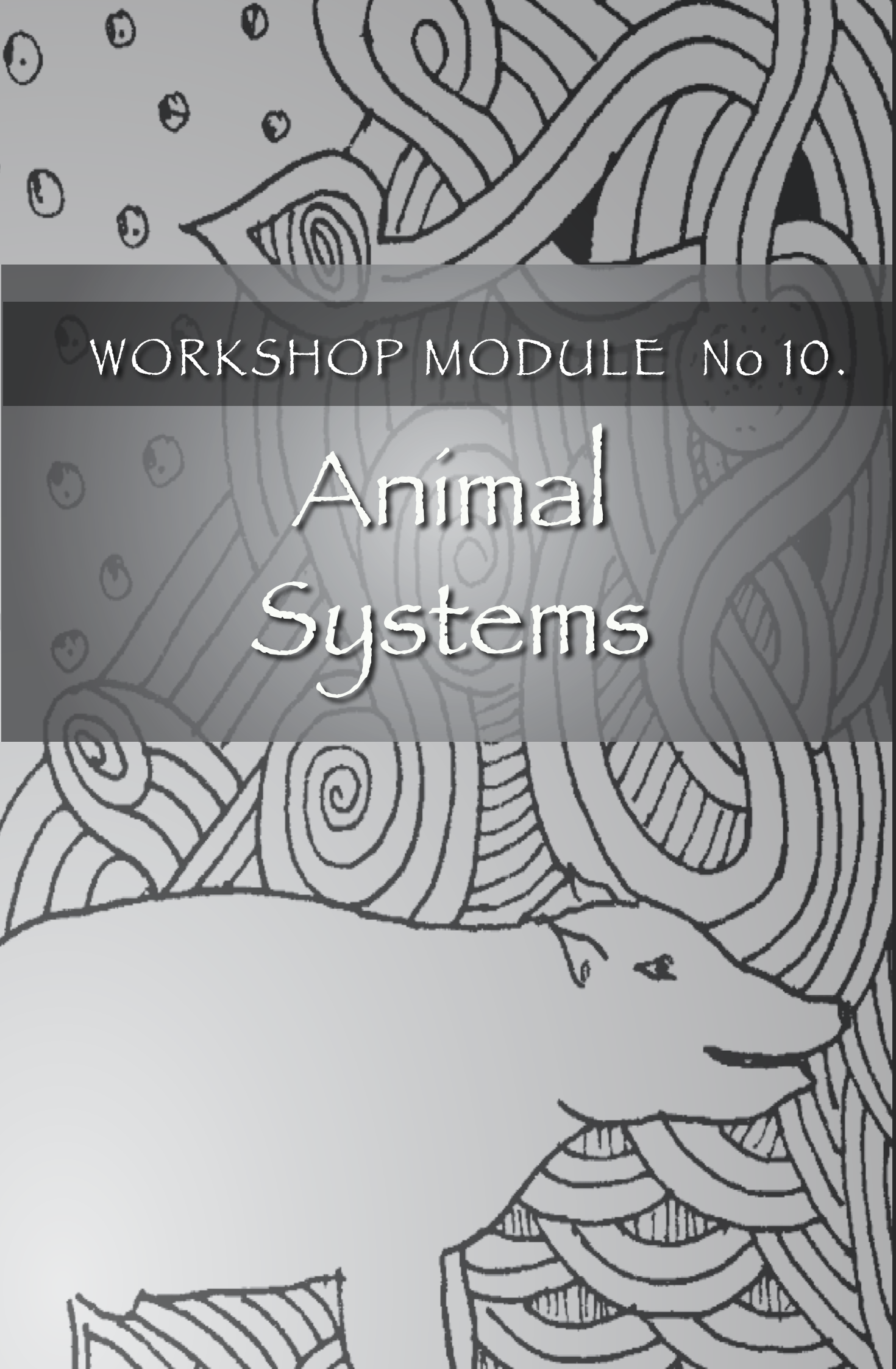
- Ask the participants to split up into smaller work groups and have each workgroup make an IPM plan.

Step 3 - Presentation with feedback and inputs

- After each workgroup has created their IPM plans, they can present them to the entire group for feedback and other suggestions.

See **PC Book MOD 9 – Integrated Pest Management** for more information about these techniques.

Notes...



WORKSHOP MODULE No 10.

Animal Systems

Notes...

Presentation : Animals and animal systems

Method : **Facilitator presentation**

Tools : **Images, black/white board, markers**

References : **PC Book MOD 10 - Animal Systems**

Objective : **Participants learn about sustainable and integrated animal management**

Animals are part of most households and farms, and are very important to people's culture and life. **Within a community or household animals represent:**

- Food.
- Health of a family and community.
- Labour.
- A part of traditional culture and ceremony.
- Wealth.

It is important to manage animals in a sustainable manner to maximize their uses and benefits.

To achieve good health, animals must be well cared for - If animals are healthy and happy they will produce more meat, eggs, and offspring.

The best medicine for your animals is to manage them well and maintain their good health - This will help to prevent any diseases or problems and improve survival rates and size of the animals.

You can achieve good animal health by:

- Providing good quality food and clean water.
- Providing clean and comfortable shelter.
- Keeping newly born animals fed and watered in a secure animal house for a few weeks after birth.

Planning for optimal management and integration of animals is also essential for designing and creating a sustainable and productive Permaculture system.

Good animal systems include good:

- Shelter.
- Water source.
- Foods.
- Medicine.

- Integration with other farming systems and community forests, including:
  - Rotation systems.
  - Grazing areas using legume living fences planted on contoured swales.
  - Pest and weed management.
  - Controlled grazing with community forests.
- Cost effectiveness and profitability.
- Good ratio of animals to land space.
- The right animals for the right environment.
- Planning for extreme climate and other conditions.
- Good animal systems also work together with communities - This makes animal management easier and cheaper, and improves the wealth and health of the whole community.

All of these components required for healthy animal systems can and should use local materials wherever possible, combined with appropriate modern technology.

All animals are important, however breeding smaller animals provides more benefits than larger animals because:

- Small animals breed more often.
- Small animals, including fish, produce more meat for less land, less food, and less water than large animals.
- Small animals are better for the environment.
- Small animals can be killed for meat as is needed, so no meat is wasted.
- Chickens and ducks also provide eggs.
- Small animals are easier to manage.

See exercises later in this module and in **PC Book MOD 10 - Animal Systems** for more detailed information.

Creative thinking : Animal value added products

Method : **Group participatory brainstorm**

Tools : **Large paper, markers**

References : **PC Book MOD 10 - Animal Systems**

Objective : **Participants create lists of uses and products of animals**

Animals produce many valuable resources, which are often unknown and even wasted. Many of animal products can be value added to produce even more resources and products. Value adding means making a new product which adds value to an existing product. Some examples of the valuable resources that can be created from value adding animal products include:

- Fertilizer – Made from animal manure.
- Clothes, bags, wallets, shoes, etc – Made from animal skins.
- Wool - Spun from the fur of some goat and sheep breeds.
- Jewelry, art, and handicrafts – Made from horns, bones, and teeth.
- Cheese, yogurt, and other dairy products - Made from cow, buffalo, and goat milk. Note: Dairy products can be fed to children to make them healthy.
- Labour - Animals can be put to work to pump water, pull loads, plough fields, and clear vegetation.
- Transport - By pulling wagons.

Do a group brainstorm with the participants. On the board create a table something like the following. **Leave the answers to the questions blank so that the participants come up with their own ideas.**

Animal	Use	Value added product
Goats	Meat, manure, leather	Fresh, dried, and salted meat - Fertilizer - Souvenir
Cows	Meat, manure, leather, intestines	Fresh, dried, and salted meat - Fertilizer - Cloths, drum, souvenir, shoes - Liquid compost
Chickens	Meat, manure, eggs, feathers	Fresh, dried, and salted meat - Fresh and salted egg - Fertilizer, - Bacteria media - Souvenirs, dusters
Ducks	Meat, manure, eggs, feathers	Fresh, dried, and salted meat - Fresh and salted egg - Fertilizer - Souvenirs, dusters
Pigs	Meat, manure	Fresh, dried, and salted meat - Fertilizer
Buffalo	Meat, manure, leather, intestines	Fresh, dried, and salted meat - Fertilizer - Cloths, drum, souvenir, shoes - Liquid compost
Bees	Honey, nest	Fresh

Place this list in the training space so that it can be referenced during the rest of the workshop.

Creative thinking : Animal needs

Method : **Participatory small groups brainstorm**

Tools : **Large paper, markers**

References : **PC Book MOD 10 - Animal Systems**

Objective : **Participants create lists of needs for sustainable animal management**

Preparation

Prepare small 'animal cards' - Draw a different animal on each card using the list of local animals identified by the participants, e.g. cow, goat, duck, chicken, etc.

Running this exercise

Step 1 - Orientation

Go through the following ideas with the participants, encouraging them to contribute as much as possible. Write the key points on the board.

When designing animals into a system it is very important to include all of the things that are needed to take care of all the animal's needs including:

- **Clean water all day, every day.**
- **Foods with the right types and amount of nutrients** – For healthy growth and disease resistance.
- **A secure and comfortable shelter** – Protection from weather and predators, sleeping area, feeding and watering area, egg laying area for chickens and ducks, and enough space to move around.
- **Appropriate fencing** – To manage and control animal movement.
- **Shade** – Animals should have access to shade, especially in the middle of the day.
- **Medical care** – Using natural medicines whenever possible. Note: Good animal management will minimize this need.
- **Space** – A good ratio of animals to land space. Too many animals on the land can cause environmental problems and disease in the animals.
- **Appropriate choice of animal** - For the environment and conditions.
- **Planning for extremes in climate and conditions** – so that the animals always have enough food and water in the dry season to keep them fat and healthy, and shelters that will give protection from extreme rain and wind.
- **Most animals are social animals** - Animals are happier and healthier when they have other animals to interact with, lonely animals become stressed.
- **Properly designed and positioned ropes/tethers** - So they don't cause wounds or sores from rubbing as this can result in infections which lead to diseases. Treat all wounds and sores with antiseptic and as soon as possible. Harnesses made with natural fibre woven ropes are better.

Step 2 - Form workgroups and choose themes

- Ask the participants to split up into smaller workgroups.
- A representative from each group can choose a card or a few cards, depending on how many groups and animal cards there are.

Step 3 - Workgroups brainstorm lists of animal needs

- Have each workgroup come up with lists of what can be used to supply each need and how to supply it.
- The table below is a simple format that can be used by each of the groups to create their lists.

Show the groups how to make blank tables. The answers provided here are only for stimulating the discussion if needed.

Need	What can be used?	How to supply it
Clean water source	Well, river, rain water	Make pipe from bamboo, drainage, water collection (container)
Food	Grass, leaves, straw, food scraps	Put the animal near the food source
Shelter characteristics	Bamboo, coconut leaf, straw	Collect from around the area
Social needs	Other animals	Make the cages closer to each other
Ropes and tethers	Wood, bamboo, trees	Collect from around the area
Fencing	Bamboo, trees	Collect from around the area
Shade	Trees, cage	Around the area
Medical care	Vacinnation, *galing-galing* leaf (to avoid itching in animals)	Invite local mantri, collect from the area
Optimal space	Bamboo, rope, trees	Collect from around the area
Right animal for the environment	Cows, chickens, fish, goats	Put it in the middle of the rice field
Protection from extreme conditions	Best food, clean water, another animal, good cage	Check it often

Step 4 - Presentations for feedback and inputs

- After each workgroup has created their lists, ask them to present them to the entire group for feedback and other suggestions.
- Post the resulting lists in the teaching space for references during the workshop

See exercises later in this module and in **PC Book MOD 10 - Animal Systems** for more detailed information.

Field activity : Construct an animal watering system

Method : **Practical design and construction exercise**

Tools : **See preparations below**

References : **PC Book MOD 10 - Animal Systems**

Objective : **Participants design and construct an animal watering system**

Animals should have their own drinking facility, separate from human drinking water, springs, wells, and water tanks. This will dramatically minimize health risks due to contaminated water, as well as prevent damage and pollution of water sources.

The overflow from water tanks or water sources can be diverted to animal drinking trough.

The water trough can be:

- A simple cement trough made from cement bricks and cement.
- Or, dug into the ground and lined with clay or cement.

Preparation

- Identify an appropriate site.
- Collect tools for:
  - Diverting and running the water.
  - Securing pipes, digging trenches, etc.
  - Making the animal drinking trough – Digging and making the trough.
  - Creating the shade for the trough and planting the fruit trees.
  - Creating overflow food production system – Digging and creating the area.
- Collect materials for:
  - Diverting and running the water - Bamboo or plastic for pipes, wire, etc.
  - Making the animal drinking trough - Rocks, clay, cement, cement blocks, etc.
  - Creating the shade for the trough and planting the fruit trees - Bamboo poles, palm leaves, twine, fruit trees, compost, mulch, bamboo watering pipes, rocks, tree guards, etc.
  - Creating an overflow food production system - Water loving plants, mulch, fertilizer, rocks, etc.

Construction ideas for the animal watering system

- It should be at least 1m x 1m and 50cm deep.
- If it is dug into the ground, place rocks around the side to help prevent soil from entering the trough.
- It is best if the animal watering system is located downhill from a constant water source so that gravity can be used to fill the water trough.
- Provide some shade using a simple structure covered with palm leaves and plant fruit trees for future shade and to make use of the animal manure. The shade will keep the water and the animals cooler.
- Overflow from the trough can then be run into a food production system containing water loving plants. The food production system will use any overflow and prevent stagnant water and mosquito breeding.

Running the exercise

Step 1 - Orientation and design

- **Take the participants to the chosen location.**
- **Give the orientation and work with the participants to design:**
  - The water trough.
  - Water inflow.
  - Water outflow.
  - Food production system that collects the overflow water.
  - Location of the fruit trees.

Step 2 - Assign tasks to workgroups

- Ask the participants to divide themselves into 4 groups.
- Assign one of the following tasks to each of the groups:
  1. Construction of the water inflow and outflow.
  2. Construction of the water trough.
  3. Construction of the food production system.
  4. Construction of the shade for the water trough and planting the fruit trees.

Step 3 - Construction

- Have the workgroups construct their section of the system with the different groups working together where needed to make sure the system works well.

Step 4 - Review results

- Review the results and the exercise with the whole group, answer any questions they may have.

Creative thinking : Animals cost and profit analysis

Method : **Small group participatory brainstorm and whole group discussion**

Tools : **Large paper, black/white board, markers**

References : **PC Book MOD 10 - Animal Systems**

Objective : **Participants calculate costs and profitability of different animals**

Prepare small 'animal cards' - draw a different animal on each card using the list of local animals identified by the participants – E.g. cow, goat, duck, chicken, etc - Each card should contain two different types of animals.

Step 1

Go through the following ideas with the participants, encouraging them to contribute as much as possible, and write the key points on the board.

Before choosing the best animals for your system, take some time to consider the following cost and profit factors:

- Price to buy the animals.
- Costs to build appropriate shelter for the animals.
- Cost to feed the animals.
- Breeding capacity:
    - How many offspring they can produce at one time?
    - How many times per year will they produce?
    - How many years will they produce for?
- Time needed for the animals to mature for reselling.
- Transportation costs.
- Price you can get when selling the animals on the local market.
- Cost of value adding animal by-products.
- Resale value of animal by-products.
- Other uses the animals can provide.

Step 2

- Ask the participants to split up into smaller workgroups
- A representative from each group can choose two or more animal cards depending on how many groups and animals there are.

Step 3

- Have each workgroup come up with estimated costs for the different factors for the animals they have chosen.
- The table on the following page is a simple format that can be used by the groups to create their lists.

Cost factors	Duck	Cow
Breeding costs per year		
Price to buy	Rp. 10,000 x 20 chicks = Rp. 200,000	Rp. 4,000,000 for 2 cows (to breed)
Costs to build shelter	Rp. 250,000	Rp. 250,000
Cost to feed	Rp. 30,000/month x 12 = Rp. 360,000/year	Rp. 150,000/month x 12 = Rp. 1,800,000/year
Transportation costs	Rp. 100,000	Rp. 300,000
TOTAL COST TO BREED:	**Rp. 910,000**	**Rp. 6,350,000**
Breeding capacity per year		
Number of offspring/season	14 chicks x 18 ducks = 252 chicks	1 calf
Number of seasons/year	2 per year	1 per year
Number of years can breed	3 years	6 years
Time needed to mature	5 months	1.5 years
Number of offspring/ year:	**400 ducks**	**1 calf**
Value added by-product	**Eggs**	**Manure**
Cost value adding by-products	No extra cost	No extra cost
Quantity/year	100 ducks x 60 eggs = 6,000 eggs	40kg x 12 months = 480kg
Resale value of by-products	Rp. 700/egg x 6,000 = Rp. 4,200,000	Rp. 25,000 x 40kg = Rp. 1,000,000

Profit analysis	Duck	Cow
Total costs	**Rp. 910,000**	**Rp. 6,350,000**
Resale value offspring	**Rp. 35,000 x 400: Rp. 14,000,000**	**Rp. 3,000,000**
Resale value by-products	**Eggs: Rp. 4,200,000**	**Manure: Rp. 1,000,000**
Potential profit	**Rp. 17,290,000**	**Rp. 2,350,000**

Note: In low-literacy areas this exercise will not be appropriate to run as described. However, the participants will have other methods for deciding on profits and can be encouraged to use them.

Step 4 - Presentations for feedback and inputs

After each workgroup has done their profit analysis, ask them to present them to the entire group for feedback and other suggestions.

Note: This is a valuable exercise for each local area and each training, but remember that the costs and profitability of each animal will change from area to area. Therefore the figures need to be recalculated by the participants each course.

Presentation : Systems for animal integration

Method : **Facilitator presentation**

Tools : **Images, black/white board, markers**

References : **PC Book MOD 10 – Animal Systems; PC Book MOD 7 – Farming; PC Book MOD 8 – Forests, Tree Crops, and Bamboo; PC Book MOD 11 – Aquaculture**

Objective : **Participants learn to integrate animals with other agriculture systems**

Animals can be integrated with different agriculture systems using various methods including:

- **Permanent small animal and tree crops systems** – Ducks or chickens permanently grazing in an orchard.
- **Animal tractors** – Moveable animal cages with an open bottom so that the animals can clean the ground wherever the house is put.
- **Animal rotation systems with vegetables and grains** – Agriculture land is divided into sections and crops and animal grazing is rotated.
- **Large animal rotation systems with tree crops** – Goats, cows, or buffalo graze land with tree crops using living fences to divide the land.
- **Animals and fish** – Chickens, ducks, or pig pens can be built above fish ponds to provide manure for the fish ponds.

There are many different benefits from these systems:

- **Soil improvement and nutrients for plants** - From the manure.
- **Weed control** – From animals eating weeds and weed seeds.
- **Grass management** – From animal grazing.
- **Pest control** – From animals eating pest insects and their eggs.
- **Food for the animals** – From the weeds, grasses, and insects; and the animal manure creates food for the fish.

Other animal integration ideas:

- **Moveable chicken houses** – Chickens can be kept in houses with open bottoms moved every few months to continuously clean and fertilize the land.
- **Ducks with rice paddies** – Ducks will eat the rice stubble, weeds, and insects, while providing manure at the same time.
- **Ducks with irrigation water** – A duck pond is a continual source of liquid fertilizer and can be combined with irrigation to provide nutrients in the irrigation water for the plants.
- **Tethered animals can be used to clean and prepare ground for planting** – Goats, cows, pigs, or buffaloes can be used.

These techniques are all explained in more detail in **PC Book MOD 10 – Animal Systems.**

Field activity : Visit an integrated animal/agriculture system

Method : **Field visit**

Tools : **See preparation below**

References : **PC Book MOD 10 – Animal Systems**

Objective : **Participants learn from observation and from people with experience**

Field visits are excellent for bringing what the participants have learned into a practical framework.

Preparation

- Identify sites that provide good examples of sustainable animal systems that are integrated with agriculture systems.
- Identify people involved in the development, management, or ownership of the site. These people could be:
    - Land owners.
    - Site workers.
    - Community leaders.
    - Project managers, etc.
- Speak to these people about the hope to conduct a field visit to their area/ project and explain the objectives of the field visit. Ask them if they would be willing to share their knowledge and participate in the workshop by being available to explain the agriculture systems and answer participants' questions.
- Make an agreement about the date and time for the site visit, ideally just following the presentations and practical exercises on this topic.
- Organise vehicles for transport and water, snacks, or meals for the participants if the field visit is longer than 2 hours.
- Organise clipboard, paper, and pens for the participants so that they can write notes, draw sketches, maps, etc during the field visit.

Running this exercise

- At the arranged time, go to the site and let the guides walk the participants around the site, explaining the plans and techniques used.
- Encourage the participants to write notes, draw sketches, maps, etc, and to ask as many as questions as possible. Encourage them to critically analyze the site as well (every site and project can be improved).
- After (or during) the field visit, the facilitator can conduct a group discussion where the participants can share what they learned and the facilitator can answer any further questions and add ideas if needed.

Presentation : Making integrated animal rotation systems

Method : **Facilitator presentation and discussion**

Tools : **Images, black/white board, markers**

References : **PC Book MOD 10 – Animal Systems; PC Book MOD 7 – Farming; PC Book MOD 6 – Home and Community Gardens; PC Book MOD 8 – Forests, Tree Crops, and Bamboo**

Objective : **Participants design a productive, sustainable animal rotation system**

Ideally, if time during the workshop allows, the 7 following activities in this module which relate to animal rotation systems can all be conducted during the workshop as an integrated exercise. If time does not allow for this, then the facilitator can choose the most relevant components.

The animal rotation system exercises include:

- Design an animal rotation systems (Animal Ex. 1)
- Plan chicken/duck and vegetables (Animal Ex. 2)
- Fences for chicken/duck and vegetables (Animal Ex. 3)
- Integrate the chickens/ducks (Animal Ex. 4)
- Plan goat/cow/buffalo and trees (Animal Ex. 5)
- Fences and swales for goat/cow/buffalo (Animal Ex. 6)
- Integrate the goat/cow/buffalo (Animal Ex. 7)

Develop a different aspect of the system project on different days so that over the duration of the course the system will be added to step-by-step and the participants will gain a full understanding of the process of how to design, implement and maintain an integrated animal rotation system.

Preparation

- **Identify land to use** – The components developed should be able to be maintained as an ongoing demonstration site, not just for the time of the workshop, therefore the land that is used needs to be available long-term. It will take around 2 years to show the real results of how the rotation system benefits the land, crops, and animals.
- **Prepare other materials and tools needed** – There should be enough materials and tools for all of the workshop participants to be actively involved in all of the hands-on activities. If needed, participants can be asked to bring their own tools to use for various exercises.
- **The importance of the design step** – The following exercise 'Design an animal rotation system' is essential no matter how many of the other exercises are used.

Running this exercise

- Introduce to the participants each of the activities that will be part of the 'Animal rotation system exercises' process over the duration of the workshop.
- Answer any questions they may have about the process that will be undertaken.
- Encourage them to participate by preparing the tools, animals, and other materials that can be used later as the process unfolds.

Creative thinking : Design an animal rotation system

(Animal Ex. 1)

Method : **Participatory small group designs**

Tools : **Large paper, markers**

References : **PC Book MOD 10 – Animal Systems; PC Book MOD 7 – Farming; PC Book MOD 8 – Forests, Tree Crops, and Bamboo; PC Book MOD 9 – Integrated Pest Management**

Objective : **Participants practice designing animal rotation systems**

Note: This exercise is essential no matter how many other exercises in this series are used.

Identify a few different system ideas for the participants to use as a base to create their designs. The systems will vary depending on each location and the participants. Write or draw up a 'Rotation system card' to represent each system, for example**:**

- Chickens and vegetables.
- Chickens, pigs, and vegetables.
- Cows and tree crops.
- Ducks, rice, and beans.
- Ducks and vegetables.
- Goats and tree crops.
- Goats and large grain/bean crops.
- Buffalo, ducks, and rice.

Step 1 - Form workgroups

Ask the participants to split up into smaller workgroups.

Step 2 - Orientation and design

- Each group chooses a 'Rotation system card' at random.
- Each group can create a simple map or list to explain their rotation plan. The groups can design their rotation systems any way they choose using the following guidelines:
  - How large is each section?
  - How many animals is the optimum number for the system?
  - How many sections will there be in the rotation system?
  - How long will the animals stay in each section?
  - How will the animals be controlled and kept in each section?
  - How many times can energy and resources, like water or fences, be reused or shared in the rotation system?
  - Where are the animals housed at night?
  - Do the animals need extra food?
  - How will the animals receive water?

Step 3 - Presentation for feedback and inputs

After each workgroup has completed their rotation systems, they can present them to the entire group for feedback and other suggestions.

Field activity : Plan chicken/duck and vegetables (Animal Ex. 2)

Method : **Participatory field activity**

Tools : **See exercise below**

References : **PC Book MOD 10 – Animal Systems; PC Book MOD 7 – Farming; PC Book MOD 6 – Home and Community Gardens; PC Book MOD 8 – Forests, Tree Crops, and Bamboo**

Objective : **Participants design an integrated animal system**

Preparation

- Large paper and markers and/or 3-D model making materials for making the design.

Design the chicken/duck and vegetable rotation system

- Design the animal rotation system with the participants.
- If an appropriate design has already been made in the "Design an animal rotation system" exercise earlier in this module then this can be used. If not, create the design, including the design factors listed in the "Design an animal rotation system" exercise.
- The designs can be made on paper or a simple 3-D model. The design does not need to be too detailed as the details of the designs will become clear as they are implemented in the development of the garden and related components.
- **Note:** The designs will need to last the duration of the workshop so 3-D models will need to be protected from the rain.

Needs for making the chicken/duck and vegetable rotation system

Once the system to be implemented following the design, the facilitator can ask the group to help identify and (when appropriate) supply some or all the following tools and materials for running the next exercises:

- Animals to be used.
- Legume tree seeds or cuttings for living fences.
- Tools for planting legume tree seeds or cuttings.
- Temporary fencing/gate making materials.
- Permanent fencing/gate making materials.
- Fence making tools.
- Housing or shade materials for the animals if needed.
- Housing or shade making tools.
- Watering containers for the animals.

Note: Use local sustainable materials to construct the fences and gates.

Field activity : Fences for chicken/duck and vegetables

(Animal Ex. 3)

Method : **Participatory field activity**

Tools : **See chicken/duck and vegetables (Animal Ex. 2)**

References : **PC Book MOD 10 – Animal Systems; PC Book MOD 7 – Farming; PC Book MOD 6 – Home and Community Gardens; PC Book MOD 8 – Forests, Tree Crops, and Bamboo**

Objective : **Participants practice making fences for an integrated animal system**

This exercise involves building swales on contour, with living fences of legume trees planted on them. The living fences create sections for the animals, reduce erosion, protect the soil, and provide food for the animals. Even mostly flat land will benefit from using the contoured swale technique for dividing the land into sections.

- This exercise can be designed and constructed on land already used for vegetables and/or on a new piece of land.
- Temporary fences can be made so that the system can be used immediately, and long-term living fences grown using legume trees like gliricidia or leucaena.
- **The temporary structures will need to be strong enough to:**
  - Last for at least 1 year.
  - Protect the new trees from the chicken or ducks.
  - Stop the chickens from escaping.

Running this exercise

- Ensure that all the tools and materials needed are on hand.
- Together with the participants survey the site.
- If there is a slope on the land, any long, straight sides/fences in the design should be contoured to maximise soil and water retention.
- The participants can divide themselves into groups to each complete a section of the fence. Each section will also need a gate.
- Mark out where the living fences will be planted.
- Prepare the ground for planting and swales.
- Build the swales and plant out the legume tree seeds or cuttings.
- When they are done, the whole group can work together to water and mulch the legume tree seeds or cuttings.

Review and feedback

Review the results of each work group's construction with all of the participants and discuss the functions and benefits of the different system. Answer any questions.

See **PC Book MOD 6 – Home and Community Gardens, PC Book MOD 8 - Forests, Tree Crops, and Bamboo, PC Book MOD 10 - Animal Systems,** and other exercises in this book for reference and ideas.

Field activity : Integrate the chickens/ducks (Animal Ex. 4)

Method : **Participatory field activity**

Tools : **See below and chicken/duck and vegetables (Animal Ex. 2)**

References : **PC Book MOD 10 – Animal Systems; PC Book MOD 7 – Farming; PC Book MOD 6 – Home and Community Gardens; PC Book MOD 8 – Forests, Tree Crops, and Bamboo**

Objective : **Participants prepare needs and introduce animals into the system**

In the designs that were developed during the exercises 'Creative thinking : Design an animal rotation system (Animal Ex. 1)' and 'Plan chicken/duck and vegetables (Animal Ex. 2)' factors such as shelter, food, water, and temporary shade for the animals should all have been addressed.

Before the animals can be added to the rotation system, the appropriate structures to address these needs should be prepared and integrated.

Preparation

- With the participants, review the designs that have been created and assess what structures are actually needed so that materials and tools can be prepared.
- Collect the appropriate tools and materials to create the infrastructures:
  - Animals to be used.
  - Fencing, gate, and tree guard materials.
  - Tools for making fencing, gates, and tree guards.
  - Housing or shade materials for the animals if needed.
  - Tools for making housing or shade for the animals.
  - Watering and feeding containers for the animals.
- Prepare the animals so that they can be introduced as soon as the infrastructure is ready.

Running this exercise

- The components to integrate at this time include:
  - Shelter.
  - Food.
  - Water.
  - Temporary shade.
- Divide the participants into the appropriate number of groups for activities that will be undertaken. Each group can select the activity of their choice and complete it.
- Introduce the animals.

See **PC Book MOD 10 - Animal Systems** and other exercises in this book for reference and ideas.

Field activity : Plan goat/cow/buffalo and trees (Animal Ex. 5)

Method : **Participatory field activity**

Tools : **See exercise below**

References : **PC Book MOD 10 – Animal Systems; PC Book MOD 7 – Farming; PC Book MOD 6 – Home and Community Gardens; PC Book MOD 8 – Forests, Tree Crops, and Bamboo**

Objective : **Participants design an integrated animal system**

Preparation

- Large paper and markers and/or 3-D model making materials to make the design.

Design the goat/cow/buffalo and trees rotation system

- Design the animal rotation system with the participants.
- If an appropriate design has already been made in the "Design an animal rotation system" exercise earlier in this module then this can be used. If not, create the design, including the design factors listed in the "Design an animal rotation system" exercise.
- The designs can be on paper or as a simple 3-D model. The design does not need to be too detailed as the details of the designs will become clear as they are implemented in the development of the garden and related components.
- **Note:** The designs will need to last the duration of the workshop so 3-D models will need to be protected from the rain.

Needs for making the goat/cow/buffalo and trees rotation system

Once the system to be implemented has been designed, the facilitator can ask the group to help identify and (when appropriate) supply some or all the following tools and materials for running the next exercises:

- Animals to be used.
- Legume tree seeds or cuttings for living fences.
- Tools for planting legume tree seeds or cuttings.
- Temporary fencing/gate making materials.
- Permanent fencing/gate making materials.
- Fence making tools.
- Housing or shade materials for the animals if needed.
- Housing or shade making tools.
- Watering containers for the animals.

Note: Use local sustainable materials to construct the fences and gates.

Field activity : Fences and swales for goat/cow/buffalo

(Animal Ex. 6)

Method	**: Participatory field activity**
Tools	**: See Plan goat/cow/buffalo and trees (Animal Ex. 5)**
References	**: PC Book MOD 10 – Animal Systems; PC Book MOD 7 – Farming; PC Book MOD 6 – Home and Community Gardens; PC Book MOD 8 – Forests, Tree Crops, and Bamboo**
Objective	**: Participants practice making fences for an integrated animal system**

This exercise involves building swales on contour, with living fences of legume trees planted on them. The living fences create sections for the animals, reduce erosion, protect the soil, and provide food for the animals. Even mostly flat land will benefit from using the contoured swale technique for dividing the land into sections.

- Temporary fences can be made so that the system can be used immediately, and long-term living fences grown using legume trees like gliricidia or leucaena.
- **The temporary structures will need to be strong enough to:**
  - Last for at least 1 year.
  - Protect the new trees from the animals.
  - Stop the animals from escaping.

Running this exercise

- Ensure that all the tools and materials needed are on hand.
- Together with the participants survey the site.
- If there is a slope on the land, any long, straight sides/fences in the design should be contoured to maximise soil and water retention.
- The participants can divide themselves into groups to each complete a section of the fence. Each section will also need a gate.
- Mark out where the swales and living fences will be planted. Follow the "Designing and making productive swales exercises in Module 8 - Forests, Tree Crops, and Bamboo" of this book.
- Divide the participants into 3 groups, each group can choose to either:
  - Construct the fences.
  - Construct the gates.
  - Construct the tree guards.
- If any exercise takes less time than the others, the groups can help others.

Review and feedback

Review the results of each work group's construction with all of the participants and discuss the functions and benefits of the different system. Answer any questions.

See **PC Book MOD 6 – Home and Community Gardens, PC Book MOD 8 - Forests, Tree Crops, and Bamboo, PC Book MOD 10 - Animal Systems,** and other exercises in this book for reference and ideas.

Field activity : Integrate the goat/cow/buffalo (Animal Ex. 7)

Method : **Participatory field activity**

Tools : **See below and Plan goat/cow/buffalo and trees (Animal Ex. 5)**

References : **PC Book MOD 10 – Animal Systems; PC Book MOD 7 – Farming; PC Book MOD 6 – Home and Community Gardens; PC Book MOD 8 – Forests, Tree Crops, and Bamboo**

Objective : **Participants prepare needs and introduce animals into the system**

In the designs that were developed during the exercises 'Creative thinking : Design an animal rotation systems (Animal Ex. 1)' and 'Plan goat/cow/buffalo and trees (Animal Ex. 5)' factors such as shelter, food, water, and temporary shade for the animals should all have been addressed.

Before the animals can be added to the rotation system, the appropriate structures to address these needs should be prepared and integrated.

Preparation

- With the participants, review the designs that have been created and assess what structures are actually needed so that materials and tools can be prepared.
- Collect the appropriate tools and materials to create the infrastructures:
  - Animals to be used.
  - Fencing, gate, and tree guard materials.
  - Tools for making fencing, gates, and tree guards.
  - Housing or shade materials for the animals if needed.
  - Tools for making housing or shade for the animals.
  - Watering and feeding containers for the animals.
- Prepare the animals so that they can be introduced as soon as the infrastructure is ready.

Running this exercise

- The components to integrate at this time include:
  - Shelter.
  - Food.
  - Water.
  - Temporary shade.
- Divide the participants into the appropriate number of groups for activities that will be undertaken. Each group can select the activity of their choice and complete it.
- Introduce the animals.

See **PC Book MOD 10 - Animal Systems** and other exercises in this book for reference and ideas.

Field activity : Build an animal tractor

Method : **Practical construction activity**

Tools : **See preparations below**

References : **PC Book MOD 10 - Animal Systems**

Objective : **Participants design and construct a chicken tractor**

This tractor can be used for chickens, ducks, or pigs, but you will need to adjust the size of the tractor and the amount of materials needed accordingly.

For this exercise the facilitator should preferably have experience in constructing an animal tractor or at least in using bamboo and bamboo constructing. Making an animal tractor can be a fairly long process, especially as more than 1 tractor will have to be made if it is a large group of participants and every participant is to be included in the process.

Preparation

- Collect enough materials for making 1 animal tractor per 10 students.
- For a chicken tractor of 3m x 4m collect 4 large bamboo poles.
- **Other materials needed will include:**
  - Grasses, rattan, hammer, nails, string, wire, etc for binding the bamboo together.
  - Grass, coconut leaves, or plastic sheeting to attach as a roof for shade and protection from rain.
  - Old fishing nets to cover the tractor to prevent escapes or intrusions.
- Animals to put in the tractors (chickens, ducks or pigs).

Running this exercise

- **With the whole group:** Discuss the basic principles and techniques of animal tractor design including the best size and shape.
- Decide where the animal tractors will be used.
- **Then ask the participants to divide into smaller workgroups** - Each group can then construct their own animal tractor.
- Once the tractors are completed, the groups can put their animals into the tractors to trial and test the results.
- Suggest that the participants monitor and document the effects of using the tractors during the remainder of the workshop.

See **PC Book MOD 6 – Home and Community Gardens, PC Book MOD 10 - Animal Systems,** and other exercises in this book for reference and ideas.

Creative thinking : Community animal management plan

Method : **Participatory planning and designing 3-D models**

Tools : **See preparations below**

References : **PC Book MOD 10 – Animal Systems**

Objective : **Participants create a community animal management plan**

Preparation

- Enough soil so that groups of 8-10 participants can each work together to create models of 3-D hillsides.
- A supply of water and at least 1 watering can per group (if regular watering cans are not available, use large tin cans with small nail holes in the bottoms).
- Shovels, spades, hoes, and rakes for modeling the hillsides.
- Hand trowels and smaller tools for the finer detail of the models.
- Other items that can be useful for making creative models (twine, cardboard, pens, small stones, cards or models to represent animals, etc).

Step 1 - Exercise orientation

With the participants, the facilitator should discuss the key principles of animal management that will benefit from a community approach. The following components can be listed on a board or a large piece of paper so all the participants can see.

Encourage the participants to include as many of the following principles as possible in their models:

- **Animal health** - Identifying diseases, separating diseased animals from other animals, preventing diseases, and quickly treating disease.
- **Animal breeding** - The healthiest males for breeding can be used to improve stock quality, reduce individual costs and labour, and improve the overall wealth of the community.
- **Land animal feeding** - Labour time is reduced and resources such as water supply can be shared.
- **Animal yards and houses** - Provides many benefits including:
    - Less labour and resources to build 1 big shelter than many small shelters.
    - Manure can be easily collected for fertilizer, trading, or selling.
    - Easier to provide feed and water.
    - Better for marketing and selling animals.

- **Stopping animal damage to crops and trees** - The community can make an agreement to overcome problems including:
    - Long-term plans for animal feeding, crop, and tree areas.
    - Community and individual fences.
    - Where animals can and cannot feed.
    - Penalties for animals eating crops or trees.
- **Land, river, and spring protection** - To reduce and prevent damage to the land, rivers, and springs by animals on a community level. This is essential for a healthy environment and sustainable production.
- **Marketing** - Marketing animals is an essential part of animal production. Within communities animals can be easily traded or sold and when animals are to be sold elsewhere, transport and holding/selling yards costs can be shared.

Community management plans are an excellent method for involving and educating communities about the benefits of managing animals on a community level. For more information see the "Working together with communities" section in PC Book MOD 10 – Animal Systems.

After the discussion the participants can be divided into smaller workgroups to create their community management plans.

Step 2

- Each group can choose an integrated animal system. Remind the participants that larger animals have more impact on the environment and are more expensive, so more benefits will be derived from community management plans for larger animals rather than smaller animals.

Step 3

- Each group can brainstorm and create a community management plan.
- The plan should focus on the points listed in the discussion and how benefits can be achieved for each of the points by working together as a community.

Step 4 - Design presentations and feedback

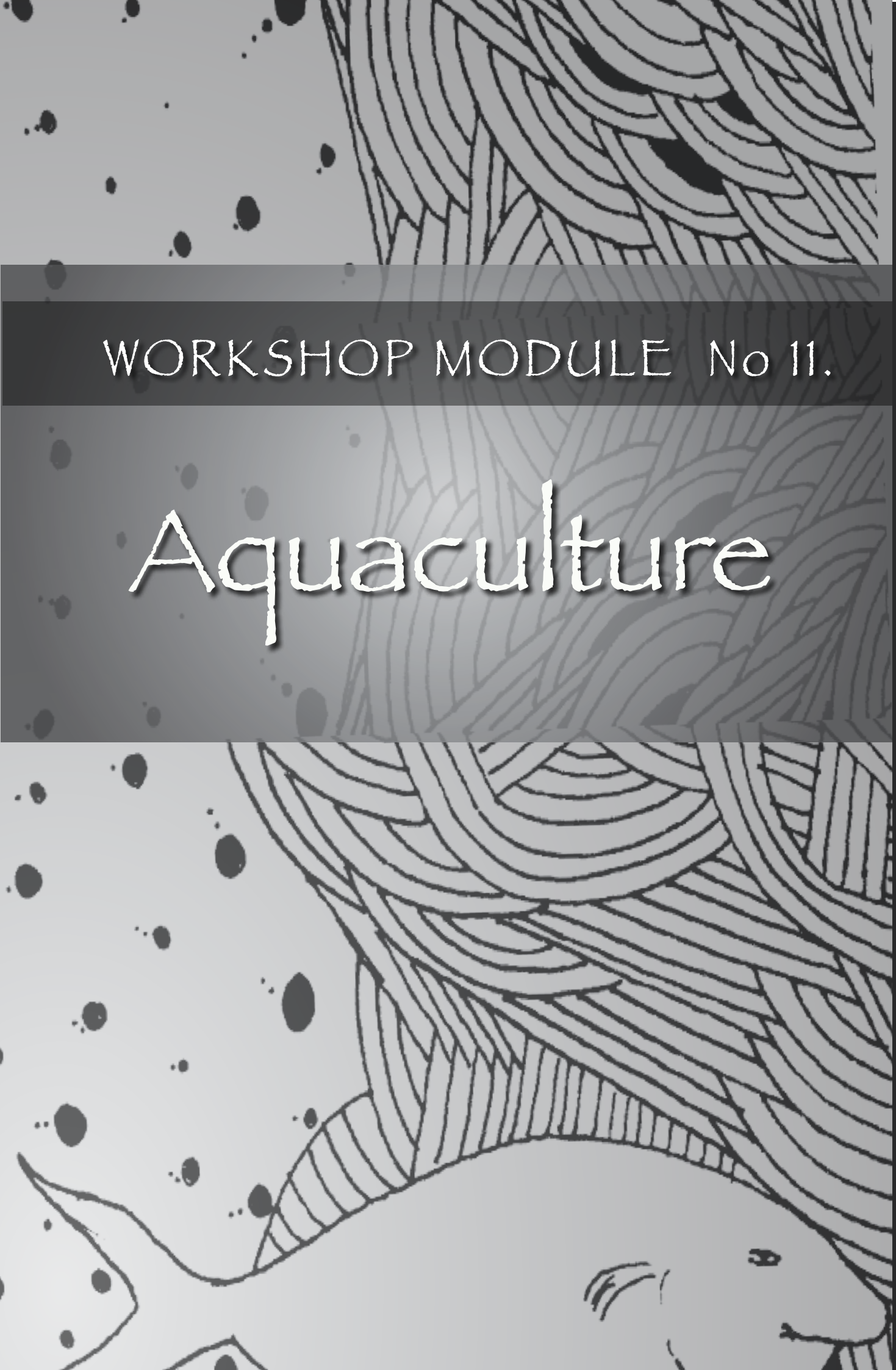
- Have the workgroups present the results of their 3-dimensional community animal management models and explain their designs for feedback and suggestions.
- Document the results of the exercise either using images or by drawing the conclusions on large sheets of paper. This documentation will be useful for socializing the idea in the community as well as for ongoing brainstorms and use in future trainings.

Notes...

Notes...

WORKSHOP MODULE No 11.

Aquaculture



Notes...

Presentation : Aquaculture and aquaculture systems

Method : **Facilitator presentation**

Tools : **Images, black/white board, markers**

References : **PC Book MOD 11 - Aquaculture**

Objective : **Participants learn about integrated aquaculture systems**

Breeding fish is only one part of a healthy aquaculture system. There are many other factors that help keep the system healthy and productive - Plants, bacteria, insects, trees, and other animals.

There are also many valuable products and uses for an aquaculture system - Animal and food production can be integrated, for example:

- Fish, prawns, and eels can be raised for eating or selling.
- Water spinach, watercress, taro, bull rushes, and lotus are some of the many water plants that can be grown for food.
- Bamboo, fruit trees, vegetables, and other plants can be grown around pond edges.

Some of the benefits from aquaculture include:

- **Fish and other water animals are an excellent source of protein and nutrition as well as income -** Aquaculture systems provide more meat for the same area of land than any other animal system.
- **Productive water plants and pond edge plants can be grown and harvested.**
- **Pest management of gardens and farms is assisted** as pest predators are attracted.
- **Aquaculture systems can be used to turn animal waste and plant waste into food for fish and water plants.** Then after fish are harvested the ponds can be cleaned to provide high quality fertilizer for plants.
- **Aquaculture systems can be made on land that has low productivity or cannot be used for other plants and animals,** such as swamp land.
- **Rice, chicken, pig, and duck production can all be combined with aquaculture to improve production in both systems.**
- **Aquaculture systems assist water flow and drainage in the wet season. In the dry season they provide a store of water that can be used for animal water.**
- **Aquaculture systems change and modify the climate.** They make the surrounding temperature less hot or cold therefore making it a more comfortable climate. This is beneficial for trees and crops and for house areas as well.

Objectives of aquaculture

- To create ponds that are as productive, healthy, and as self-maintaining as possible.
- To create ponds with as much edge as possible: more edge = more food = bigger, healthier fish.
- To produce as many different foods and products as possible in the same area.

Considerations for aquaculture location and construction

There are many factors that are important to consider for aquaculture construction, and many techniques for constructing them once the site is chosen.

Some of the factors to consider are:

- Water supply.
- Sun.
- Size.
- Depth.
- Shape.

Some construction techniques are:

- Clay.
- Cement.
- Inflow.
- Outflow.

PC Book MOD 11 – Aquaculture has detailed explanations of the factors and techniques listed here. This covers the basics for low maintenance simple aquaculture systems.

There are many different ideas and techniques. The facilitator can encourage a discussion by asking the participants what they know about aquaculture site location and construction.

Write the points raised by the participants on the board big enough for everyone to see and ask them to comment and give their inputs.

Field activity : Assessing aquaculture systems

Method : **Field visit**

Tools : **See preparations below**

References : **PC Book MOD 11 - Aquaculture**

Objective : **Participants visit, observe and assess working aquaculture systems**

Field visits are excellent for bringing what the participants have learned into a practical framework.

Preparation

- Identify sites that provides examples of aquaculture systems that are natural, self-maintaining, and integrated with other farming systems.
- Identify people involved in the development, management, or ownership of the site. These people could be:
    - Land owners.
    - Site workers.
    - Community leaders.
    - Project managers, etc.
- Speak to these people about the hope to conduct a field visit to their area/ project and explain the objectives of the field visit. Ask them if they would be willing to share their knowledge and participate in the workshop by being available to explain the agriculture systems and answer participants' questions.
- Make an agreement about the date and time for the site visit, ideally just following the presentations and practical exercises on this topic.
- Organise vehicles for transport and water, snacks, or meals for the participants if the field visit is longer than 2 hours.
- Organise clipboard, paper, and pens for the participants so that they can write notes, draw sketches, maps, etc during the field visit.

Running this exercise

- At the arranged time, go to the site and let the guides walk the participants around the site, explaining the plans and techniques used.
- Encourage the participants to write notes, draw sketches, maps, etc, and to ask as many as questions as possible. Encourage them to critically analyze the site as well (every site and project can be improved).
- After (or during) the field visit, the facilitator can conduct a group discussion where the participants can share what they learned and the facilitator can answer any further questions and add ideas if needed.

Presentation : Preparing ponds

Method : **Facilitator presentation**

Tools : **Images, black/white board, markers**

References : **PC Book MOD 11 - Aquaculture**

Objective : **Participants learn about preparing self-sustaining ponds for fish**

To create a healthy, sustainable aquaculture system and good fish production, all the components of the system need to be addressed as a whole.

This may include:

- Plants.
- Plankton.
- Leaves.
- Other animals.
- Manure.
- Frogs.
- Fruit.
- People.
- Bacteria.
- Insects.
- Trees.

A healthy fishpond will have water that is light green in color. This means that there is plenty of plankton and other foods for the fish. To achieve this light green color, a fishpond needs to be properly prepared and well managed.

Step 1 - Prepare the fishponds

- **Lime** will balance any pH problems, especially in acidic soil and water, this will help keep the water clear. Lime will also help to control any initial pest and disease problems.
- **Manure** promotes plankton growth, which is an important natural food source for fish.
- **Plant material** will also promote bacteria and plankton growth and will provide fish food as well.

Step 2 - Provide shade if needed

- **Some shade** will keep the fishponds cooler which will improve production.
- **Sun** at least half a day of sunlight is recommended, morning sun is best.

Step 3 - Add water plants and animals

Water plants provide:

- **Habitat for small fish.**
- **Food for the fish.**
- **Rotting leaves,** which helps plankton and bacteria (fish food) to grow.

- **Water cleaning functions** to remove excess nutrients and toxins.
- **Shade.**
- **Food for people.**

Water animals like water snails, small prawns, frogs, and other small animals are food for some larger fish like catfish and help to keep an aquaculture system healthy.

Step 4: Provide homes for the fish

- Small fish sometimes need protection from bigger fish, especially if the fish eat other fish.
- A place for fish to make their nests is also needed.
- All water animals are healthier if they have a good habitat.

Step 5: Plants around the pond edge

- Plant around the edges of the pond immediately to hold the soil and prevent erosion.
- Pond edges make excellent production areas because the plants receive lots of water and nutrients.

Step 6 - Add the fish

This is the subject of the next presentation. See the "Fish production" section of **PC Book MOD 11 – Aquaculture** for more information about all these steps including the amounts of the different materials needed.

Presentation : Raising different fish species together

Method : **Facilitator presentation**

Tools : **Images, black /white board, markers**

References : **PC Book MOD 11 - Aquaculture**

Objective : **Participants learn about how to raise different fish species together**

Fish can be divided into three categories:

- **Herbivores** - Fish that only eat plants, plankton, leaves, grains, etc. For example carp.
- **Carnivores** - Fish that only eat meat or animals, including insects, small pond animals and other fish. For example eels and catfish.
- **Omnivores** - Fish that are herbivores but also eat, meat, insects and other very small pond animals as well. For example tilapia, catfish, and carp.

About common local species:

- There are many different types of catfish, some are carnivores and some are omnivores - **The common type of catfish in Indonesia are omnivores.**
- There are also many types of carp, some are herbivores and some are omnivores - **In Indonesia the carp that are raised are omnivores.**
- Most fish in Indonesia are omnivores. Catfish will eat small fish and therefore should be added last. Other omnivores usually won't.

A healthy aquaculture system should contain different types of fish because:

- Different types of fish feed at different layers in the water and will maximize the use of food and space in the pond.
- The fish that eat on the top and middle of the pond eat most of the fish food, and eat mosquito larvae and other insects, for example tilapia.
- Different types of fish play different roles in keeping the pond healthy.
- Bottom feeders will eat any food and plant material that drops to the bottom, as well as plankton and other fish food growing on the bottom. They help to keep the pond environment healthy by managing excess nutrients and waste products that build up on the bottom, for example carp and catfish.

For the long-term aim of sustainability and a self-maintaining fishpond, raising different types of fish together is the best method.

If you want to use all three types of fish in your system you must:

- **Introduce them in the right order:**
  - 1st: Herbivore fish.
  - 2nd: Add omnivore fish when the herbivore fish are 3 months or older.
  - 3rd: Add carnivores 3 months later.
- **Have a pond which has enough room for the different types of fish** - 5m x 5m or more is recommended.

Once established, the pond will mostly look after itself:

- Some food and general maintenance will be required.
- Continuously observe the health of the fish and the amount and types of fish.
- The omnivores and carnivores will control the number of baby fish, eating many of them. This helps to prevent overstocking of the pond. But if they are introduced too early they might eat all the other fish.
- Protection for small fish is needed so that some baby fish survive (rocks, water plants, used cans tied together, etc).

Stocking rates

- 3 fish per $1m^2$ is a good for most fishponds.
- For a $100m^2$ pond stock 300 fish - This is for a fishpond that has manure and leaves added as well as some food.
- The number of fish can be increased to 5 fish per $1m^2$ with extra food and good management, but the amount of food must be given accurately and a good knowledge of fishpond maintenance is needed.

The following example of stocking rates is a good as a general guide:

- Approximately 30% Tilapia or similar local species.
- Approximately 50% Carp or similar local species.
- Approximately 20% Catfish.

About eels

- Raising eels with other fish can create problems, especially in smaller ponds.
- The eels can reduce other fish stocks.
- Sometimes eels will naturally enter fishponds from rivers or rice paddies.
- Try to keep eel numbers low and only introduce them if you are confident of managing them well. It is better to keep them separate.

Creative thinking : Identify local aquaculture species

Method : **Participatory small groups brainstorm**

Tools : **Large paper, markers**

References : **PC Book MOD 11 - Aquaculture**

Objective : **Participants list local fish species and their characteristics**

Step 1

Using something like the table below, the facilitator can ask the participants to identify local fish species (table 1).

The answers listed below are only supplied as guidelines for the facilitator should the participants need help or prompting to develop ideas and discussions.

Local fish species
Carp
Catfish
Wras
Gurami
Gold fish
Fresh water prawn

Table 1.

Feeding	Habitat characteristics	Breeding characteristics	Time till harvest
Medium feeder	Shady, running water, naturally found in rivers	Capable of producing thousands of offspring every year	2 years
Bottom feeder	Muddy floor, running water, dark, love hiding places	Capable of producing thousands of offspring every year	1 year
Surface feeder	Sunny water, often found in stagnant water	Capable of producing thousands of offspring every year	6 months
Surface feeder	Shady, running water, muddy floor	Capable of producing thousands of offspring every year	3 years
Medium feeder	Shady, running water, muddy floor	Capable of producing thousands of offspring every year	1 year
Bottom feeder	Clean and running water, shady, rocky floor	Capable of producing thousands of offspring every year	1 year

Table 2. Fish characteristics

Step 2

Ask the participants to split up into smaller workgroups and have each workgroup come up with lists of the characteristics for the fish (table 2):

- Their feeding characteristics – What do they eat?
- Habitat characteristics – Where do they live and eat in the pond?
- Their breeding characteristics.
- Time from birth to harvest.

Step 3

- After each workgroup has created their lists, ask them to present the results to the entire group for feedback and other suggestions.
- Place the lists in the training space so that it can be referenced during the rest of the workshop.

There is more information about some fish species in the "Types of fish" section in **PC Book MOD 11 – Aquaculture** if needed.

Presentation : Aquaculture management

Method : **Facilitator presentation**

Tools : **Images, black/white board, markers**

References : **PC Book MOD 11 - Aquaculture**

Objective : **Participants learn natural fishpond and fish management techniques**

There are many different aspects to pond management.

All of these aspects can be managed using natural and sustainable local materials and simple techniques.

Many fishpond management techniques can be easily integrated with other farming systems.

All of the following key points of good aquaculture systems management are covered in detail in the "Pond management" section of PC Book MOD 11 – Aquaculture.

The facilitator can introduce the following key points and encourage a participatory discussion about aquaculture management as the participants may know of other techniques or aspects of management not covered here.

Fish food

- Natural food from the ponds for herbivore and omnivore fish.
- Local types of natural feed for herbivore and omnivore fish.
- Local types of natural feed for carnivore fish.

Fish diseases, pests, and other problems

- Parasites.
- Worms.
- Birds.
- Humans.

Oxygen and its importance in ponds

- What uses it.
- What replaces it.

The importance of cleaning the ponds and avoiding

- Pollution.
- Mosquitoes.
- Over feeding.

Presentation : Integrating aquaculture with other systems

Method : **Facilitator presentation**

Tools : **Images, black/white board, markers**

References : **PC Book MOD 11 - Aquaculture**

Objective : **Participants learn some of the integration possibilities for aquaculture**

There are many other food production systems that aquaculture can be integrated with, including all of the following.

The facilitator can encourage a discussion with the participants about using these techniques and building on the ideas to try new techniques and ideas.

Animals	Plants
• Chickens. • Ducks. • Pigs.	• Vegetables. • Grains. • Rice. • Bamboo. • Fruit trees.

People

- The water from kitchens and washrooms can be used for aquaculture but it MUST be cleaned of the washing detergents in separate ponds before it can be used for growing food plants or in fishponds.
- See the "Washing area" section of PC Book MOD 3 - Houses, Water, and Waste Management for more about water cleaning techniques.

Catchment systems and swales

- Aquaculture can also be integrated with water catchment techniques to improve the self-sufficiency of the aquaculture systems and improve overall production.
- Swales (described in PC Book MOD 8 - Forests, Tree Crops, and Bamboo and PC Book MOD 6 - Home and Community Gardens) catch and store rainfall.
    - With heavy rains water can flow from one swale to another and into fishponds.
    - Swales can also collect the water that runs out of fishponds.
    - Other types of water catchments like banana pits, boomerang swales, terraces, and Chinampas can also be used.

These examples are explained in the "Fish integration with other systems" section of **PC Book MOD 11 - Aquaculture.**

Creative thinking : Design an aquaculture 3-D model

Method : **Small group planning and designing 3-D models**

Tools : **See preparations below**

References : **PC Book MOD 11 - Aquaculture**

Objective : **Participants practice designing integrated aquaculture systems**

Preparation

- Large paper and markers for the groups to make their plans.
- Clay for building their models, approximately 2m x 2m model size per group if possible. Prepare enough soil so that groups of 8-10 participants can each work together to create models.
- A supply of water and at least 1 watering can per group (if regular watering cans are not available, use tin cans with small nail holes in the bottoms).
- Shovels, spades, hoes, and rakes for modeling.
- Hand trowels and smaller tools for the finer detail of the models.
- Other items that can be useful for making small models such as trees and plants, animal houses, animals, fish habitats (twine, cardboard, pens, small stones, cards or models to represent animals, etc).

Step 1 - Exercise orientation

The facilitator should discuss the objectives of the design exercise. The following components can be listed on a board or a large piece of paper so all the participants can see. Encourage the participants to include as many of the following principles as possible in their models:

1. **To create a pond or system of ponds that are productive, healthy, and are as self-maintaining as possible.**
2. **To create ponds with as much edge as possible - More edge = more food = bigger, healthier fish.**
3. **To produce many different foods and products from the same area.**

Some of the design factors to consider are:

- Water supply.
- Sun.
- Size.
- Depth.
- Shape.
- Water inflow.

- Water outflow.
- Fishpond preparation – Water plants, fish habitats, pond edge plants, etc.
- Reducing maintenance and minimizing potential problems.
- Integrating with other human, animal, plant, and water catchment systems.

After the discussion the participants can be divided into smaller workgroups to create their aquaculture systems plans and models

Step 2

- Each group can choose an integrated aquaculture system. Remind the participants that the more the aquaculture is integrated with other systems, the more productive they will be.
- **Some ideas that could be integrated into the models include:**
  - **Animals –** Chickens, ducks, pigs.
  - **Plants –** Vegetables, grains, rice, bamboo, fruit trees.
  - **People –** The water from kitchens and washrooms can be used.
  - **Catchments and swales.**

Step 3

- Each group can create and draw their designs on large paper, keeping this stage of the design work simple.
- The plan should focus on the points listed in the discussion and achieve the three objectives of the design project listed.
- Each group can build their 3-D models according to their designs. The facilitators should encourage as much creativity as possible.
- Note: This is just a design exercise and it is a good opportunity for the participants to practice as many techniques as possible.
- When the models are ready they can add the water to test their aquaculture systems, especially the water inflows and outflows.

Step 4 - Design presentations and feedback

- Have the work groups present the results of their aquaculture models and explain their designs for feedback and suggestions.
- Document the results of the exercise either using images or by drawing the conclusions onto large sheets of paper. This documentation will be useful for socializing the idea in the community, as well as for ongoing brainstorms and use in future trainings.

Presentation : Create an aquaculture system

Method : **Facilitator presentation and discussion**

Tools : **See preparations below**

References : **PC Book MOD 11 - Aquaculture**

Objective : **Participants plan to design, build, and stock an aquaculture system**

This exercise will take a lot of time, and can be split up into different sections. It is most appropriate if the focus of the workshop is about aquaculture or water catchments.

The Aquaculture System Exercises include:

- Design an aquaculture system (Aquaculture Ex. 1)
- Pond construction (Aquaculture Ex. 2)
- Pond preparation (Aquaculture Ex. 3)
- Stock the fish (Aquaculture Ex. 4)
- Aquaculture and other systems (Aquaculture Ex. 5)

Develop a different aspect of the system on different days so that over the duration of the course the system will be added to step-by-step and the participants will gain a full understanding of the process of how to design, implement, and maintain an integrated aquaculture system.

Note: If Exercise 2 requires adding lime to the fishponds, then a 3 day break is needed afterward for the lime to settle before Exercise 3 can commence.

Preparation

- **Identify land to use** – The components developed should be able to be maintained as an ongoing demonstration site, not just for the time of the workshop, therefore the land that is used needs to be available long-term. It will take a while to show the real results of how the system benefits the land and the environment.
- **Prepare the materials and tools needed** – There should be enough materials and tools for all of the workshop participants to be actively involved in all of the hands-on activities. If needed, participants can be asked to bring their own tools to use for various exercises.
- **The importance of the design step** – The following exercise 'Design an aquaculture system' is essential no matter how many of the other exercises are used.

Running this exercise

- Introduce to the participants to each of the activities that will be part of the 'Aquaculture system exercises' process over the duration of the workshop.
- Answer any questions they may have about the process that will be undertaken.
- Encourage them to participate by preparing the tools, fish, and other materials that can be used later as the process unfolds.

Creative thinking : Design an aquaculture system
(Aquaculture Ex. 1)

Method : **Participatory small group designs**

Tools : **Large paper, markers**

References : **PC Book MOD 11 - Aquaculture**
PC Book MOD 2 - Natural Patterns and Permaculture Design

Objective : **Participants practice designing animal rotation systems**

Note: This exercise is essential no matter how many other exercises in this series are used.

Identify a few different system ideas for the participants to use as a base to create their designs. The systems will vary depending on each location and the participants.

Step 1 - Demonstration site survey

- Take the participants to the aquaculture site to survey the land where the demonstration aquaculture systems will be implemented.

Step 2 - Orientation and design

- Ask the participants to split up into smaller workgroups.
- Each group can create a simple plan, which should include all the elements of a sustainable and productive aquaculture system:
    - Fish pond construction including water inflows and outflows.
    - Pond preparation.
    - Stocking the fish.
    - Integration with other systems.
- The designs can be on paper or as a simple 3-D model. The design does not need to be too detailed as the details will be implemented in the building of the aquaculture system.
- The designs will need to last the duration of the aquaculture system creation process so 3-D models will need to be protected from the rain.
- Refer to the creative thinking exercise "Design and build an integrated aquaculture 3-D model" for more information and ideas.

Step 3 - Presentation for feedback and inputs

- After each workgroup has completed their aquaculture system, they can present it to the entire group for feedback and other suggestions.

Field activity : Pond construction (Aquaculture Ex. 2)

Method : **Participatory field activity**

Tools : **See exercise below**

References : **PC Book MOD 11 - Aquaculture**

Objective : **Participants practice making a functional fishpond**

Preparation

Ensure that all the tools and materials needed for the following are on hand.

Step 1 - Mark out the location

- Together with the participants go to the demonstration site.
- Based on the designs completed in the previous exercise, together choose the fishponds to make - the number of fishponds that are made will depend on the number of participants, and the time and tools available.
- Mark out the complete site, including all fishponds, water inflow and outflow, and any extra components such as gardens, animal houses, swales, etc.

Step 2 - Make the ponds

- The participants can divide themselves into groups to each complete a section of the fish ponds as follows:
    - Inflow.
    - Outflow.
    - Drainage pipe.
    - Extra components.
- Follow the instructions for making fish ponds in PC Book MOD 11 - Aquaculture.
- Note: This exercise will require a lot of physical labour and the participants groups can to take turns working and resting.

Step 2 - Finishing the ponds

- Line the fishponds with clay and fresh manure to help seal the pond.
- If necessary, add lime but remember that if lime is added, the ponds must settle for 3 days before other manure, leaves, water plants, and fish are added.
- Add the water.

Review and feedback

Review the results of each workgroup's construction with all of the participants and discuss the functions and benefits of the different system. Answer any questions.

Field activity : Pond preparation (Aquaculture Ex. 3)

Method : **Participatory field activity**

Tools : **See exercise below**

References : **PC Book MOD 11 - Aquaculture**

Objective : **Participants practice making a functional fishpond**

See the "Prepare the fishponds" section of PC Book MOD 11 – Aquaculture for details of running this exercise.

Preparation

Make sure that all the tools and materials needed are on hand:

- Manure.
- Leaves and materials for making shade structures.
- Water plants.
- Fish habitats - Piles of rocks, water plants, old tires, etc.
- Plants, rocks, logs, etc for around the pond edges.
- Appropriate tools.

Step 2 - Complete the Ponds

Divide the participants into 5 groups to each complete a section of the fish ponds preparations as follows:

- **Group 1** – Add manure and leaves to the fishponds.
- **Group 2** – Provide shade if necessary.
- **Group 3** – Add water plants.
- **Group 4** – Add fish habitats.
- **Group 5** – Add plants, rocks, logs, etc around the pond edges.

Ongoing pond maintenance

Explain to the participants that to provide ongoing food for the fish and to keep the pond environment healthy, they will need to continue to add manure and leaves:

- 1 week after the fish have been added, start adding more manure:
  - 30-40kg of cow, horse, or pig manure per $100m^2$ once every week.
  - 8-10kg of cow, horse, or pig manure per $25m^2$ once every week.
  - 5kg of bird manure per $100m^2$ or 1-2kg per $25m^2$ once every week.

Step 2 - Review and feedback

Review the results of each workgroup's construction with all of the participants and discuss the functions and benefits of the system. Answer any questions.

Field activity : Stocking and feeding fish (Aquaculture Ex. 4)

Method : **Participatory field activity**

Tools : **See exercise below**

References : **PC Book MOD 11 - Aquaculture**

Objective : **Participants practice fish stocking and feeding**

Preparations

A healthy aquaculture system should contain different types of fish. However they need to be introduced in the right order.

Tools and materials to prepare:

- The fish (see below).
- Manure.
- Leaves.
- Herbivore fish food (see below).
- Tools for feeding the fish.

Guidelines about quantity of fish to stock

- 3 fish per $1m^2$ is a good for most fishponds.
- For a $100m^2$ pond stock 300 fish - This is for a fishpond that has manure, leaves, and some additional food.

Herbivore fish feeding

With the participants, try out different types of natural feed combinations for the fish. Ingredients can include:

- **Grains:** Rice, crushed corn, millet.
- **Legumes:** Beans, sesbania, moringa, acacia, mung beans, peanuts, soybeans, pigeon pea.
- **Leaves and fruit:** Legume trees, cassava, sweet potato, vegetables, fruit trees, water plants.
- **Root vegetables:** Cassava, taro, sweet potato, yam, potato – Must be cooked before feeding to fish.
- **Oil seeds:** Soybeans, sunflower, kapok, candle nut, coconut, peanut.

See **PC Book MOD 11 – Aquaculture** for more information about all these steps, including amounts of the different materials needed.

Field activity : Aquaculture and other systems (Aquaculture Ex. 5)

Method : **Participatory field activity**

Tools : **See exercise below**

References : **PC Book MOD 11 - Aquaculture**

Objective : **Participants integrate their aquaculture site with other systems**

In the designs that were developed during the exercises 'Design an aquaculture system' (Aquaculture Ex. 1) ideas for aquaculture integration with other systems should have been addressed.

Preparation

- Review the designs and discuss the best option for adding some additional components to the system. Achievable ideas will depend on time, materials, and tools available. Note: It is best if the facilitator has some practical experience in the activities involved in successful implementation of the components chosen. Optional components could include:
    - Animal integration: Chickens, ducks, pigs - Before any animals can be added to the rotation system, the appropriate structures to address animal needs will need to be prepared and integrated.
    - Plant integration: Vegetables, grains, rice, bamboo, fruit trees.
    - Integrating water from kitchens and washrooms.
    - Integrating with water catchments: Swales, banana pits, terraces.
    - Chinampas could be made above and/or below the fishponds.
- With the participants, assess and collect materials and tools needed.

Depending on the components chosen reference:

- The "Fish integration with other systems" section of PC Book PC Book MOD 11 - Aquaculture.
- The "Washing area" section of PC Book MOD 3 - Houses, Water, and Waste Management.
- PC Book MOD 8 - Forests, Tree Crops, and Bamboo and PC Book MOD 6 - Home and Community Gardens can be referenced for water catchment techniques.

Running this exercise

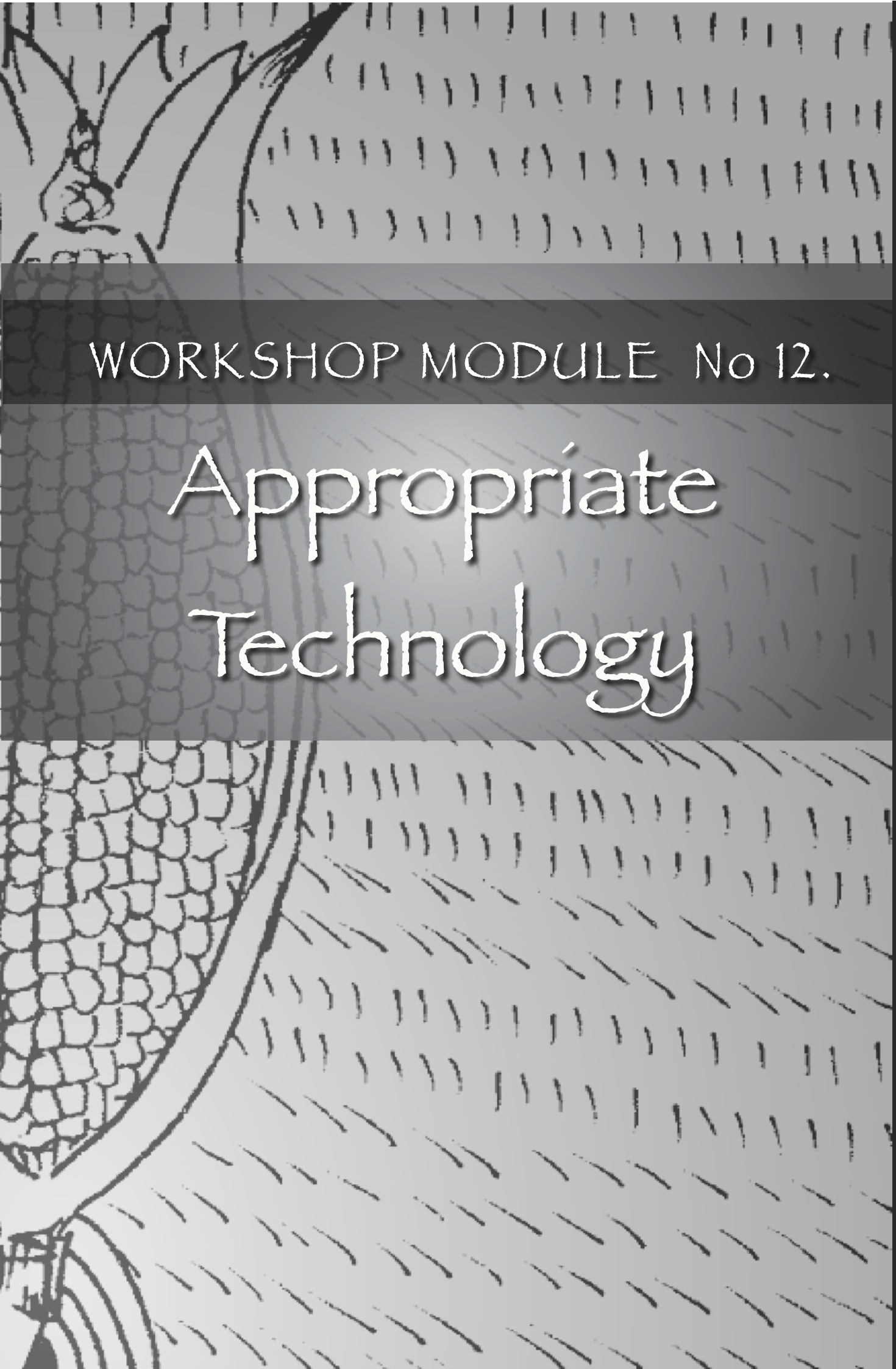
- Divide the participants into the appropriate number of groups for activities that will be undertaken, then implement the activities.

Review and feedback

Review the results of each workgroup's construction with all of the participants and discuss the functions and benefits of the system. Answer any questions.

Notes...

Notes...



WORKSHOP MODULE No 12.

Appropriate Technology

Permaculture Facilitator's Handbook Module 12. Appropriate Technology

Notes...

Presentation : Appropriate technology

Method : **Facilitator presentation**

Tools : **Images, black/white board, markers**

References : **PC Book MOD 12 - Appropriate Technology**

Objective : **Participants learn about the importance of appropriate technology**

Much of our current technology harms our planet through pollution or by stripping the environment of non-renewable resources. This causes many local problems. This is also creating more extreme cycles of weather. It is a situation that will get worse unless changes are made worldwide and more sustainable technologies are used. If Indonesia's large population becomes sustainable it can make a huge contribution to the world's sustainable future.

There are many technologies that can replace these destructive conventional practices. **These are called appropriate technologies because they:**

- Are maintained and repaired using local skills.
- Do not pollute the environment.
- Do not deplete the environment of non-renewable resources.
- Are understood and maintained by the communities using them.
- Are affordable.
- Reduce energy use – Electricity, labor, fuel, firewood, etc.
- Use natural, reusable energy whenever possible.

Well-designed, locally available technologies can be used to replace existing less appropriate models, for example:

- **Ovens and stoves** made from clay, drums, cement and sawdust, tin metal, and solar cookers.
- **Cooking fuels** made from charcoal bricks, bamboo charcoal.
- **Solar driers** made from wood, glass, and plastic for drying fish, meat, vegetables, nuts, and fruit.
- **Natural cold food storage systems.**
- **Electricity** made from hydroelectric, biogas, solar, and wind systems.
- **Car fuels** made from coconut oil for diesel cars and diesel engines.
- **Pumps** – Ram pumps, foot pumps, treadle pumps, and solar powered water pumps.
- **Pedal powered grinders.**
- **Oil extraction.**
- **Buffaloes and cows for ploughing fields.**

Appropriate technology helps to improve the quality of life while protecting the land and environment and progressing towards a sustainable future.

Creative thinking : Local appropriate technologies

Method : **Participatory brainstorm, small groups discussion**

Tools : **Black/white board, large paper, markers**

References : **PC Book MOD 12 - Appropriate Technology**

Objective : **Participants list local appropriate technologies and their benefits of those technologies**

Step 1

Using something like the table below, the facilitator can ask the participants to identify local appropriate technologies (table 1).

Use the technologies list in the previous exercise if the participants need help for prompting ideas and discussions.

Appropriate technology
Wood stove
Charcoal bricks
Solar cooker
Solar seed dryer
Wind compost mixer

Table 1.

Who can use it?	Where to get the materials	Who can build and maintain it?	Earnings/ savings from using it	Environmental benefits
Housewives	In the area	Families	Saves firewood	Reduces tree cutting
Housewives	Used materials	Families	Saves money	Reduces waste
Housewives	Used materials	Families	Saves firewood and money	No smoke
Farmers, seed sellers	Used materials	Farmers	Saves money and labor	More sustainable organic seeds
Farmers	Used materials	Farmers	Saves labor, more effective	Creates productive compost

Table 2.

Step 2

Ask the participants to divide into smaller workgroups and have each workgroup come up answers to the following questions for one of the technologies (table 2).

- Who could use the technology?
- Where would they get the materials needed to make the technology?
- Who could build and/or maintain the technology?
- How much money could be made or saved by doing so?
- What are the benefits to the environment?

Step 3

After each workgroup has created their lists, ask them to present the results to the entire group for feedback and other suggestions.

Place the lists in the training space so that it can be referenced during the rest of the workshop.

Presentation : Appropriate technology ovens and stoves

Method : **Facilitator presentation**

Tools : **Images, black/white board, markers**

References : **PC Book MOD 12 - Appropriate Technology**

Objective : **Participants learn about a range of ovens and stoves and their benefits**

Ovens and stoves are a very important appropriate technology that can easily improve peoples health and livelihoods, as well as the environment. They use a lot less firewood, **therefore:**

- You will save a lot of money and help to protect the environment.
- You will save time and effort collecting firewood.
- A lot less smoke is produced which is very important for improving health.

Types of appropriate technology ovens and stoves include:

- **Clay stoves** - Are very simple to make and cook on. The fire is made in the bottom of the stove and the pot is placed on top. The clay directs the heat and flames to the bottom of the pot. The clay also becomes hot providing more heat for cooking.
- **Clay ovens** - Can be made in many different ways. Small simple ovens can be used for cooking inside (bread, cakes, etc). Larger ovens can also be used like a stove to cook food on top. These ovens can also have a chimney to draw smoke away from people and out of the kitchen. Clay ovens are made from clay, dry cow manure, and a small amount of cement.
- **Cement/sawdust stoves** - Are cheap, long lasting, easily movable, and easy to make. They use sawdust as cooking fuel. They may also work with rice husks and coffee husks, but these fuels haven't been tried yet.
- **Drum ovens** - Are a simple way to cook a lot of food using a drum, sand, rocks, and banana leaves. It uses a lot less wood to cook the same amount of food as a cooking fire. It also keeps more nutrients in the food than boiling or frying.
- **Tin metal stoves** - Use rice husks or coffee husks as a fuel instead of wood.
- **Gas stoves** - Are much easier and much cleaner to use than wood fires. They don't produce smoke and reduce the very serious problem of deforestation.
- **Solar ovens and cookers** - Use the heat from the sun to cook food. Solar ovens collect and store heat using reflective material, glass, and insulating material. Solar cookers use reflective materials to intensify the sunlight and direct it onto the pot. The oven or cooker uses the sun to slowly cook the food. Food can be heated on a stove or fire until it is boiling and then put in the solar oven or cooker to speed up the cooking process.

These are only a few of the many different oven and stove designs. For more information and explanatory pictures see the "Ovens and stoves" section from **PC Book MOD 12 - Appropriate Technology.**

Field activity : Make a clay stove

Method : **Practical demonstration model building**

Tools : **See preparation below**

References : **PC Book MOD 12 - Appropriate Technology**

Objective : **Participants build clay stoves or ovens**

For this exercise to run, some experience with making and using clay stoves or ovens is recommended so the facilitator can be flexible with what style of stove is made and to ensure the stoves are made correctly.

Many different types of clay stoves and ovens can be made. Choose a type that:

- Ideally is locally known.
- Can be made from local materials.
- Will provide the most benefits to the participants and their communities, including improving cooking ability, reducing smoke, and reducing wood use.

This will maximize the chances of use and replication in the participants' communities.

There are picture of some different examples in the "Stoves and ovens" section of PC Book MOD 12 – Appropriate Technology. These pictures can be used as a guide.

Choose an exercise from PC Book MOD 12 - Appropriate Technology:

- Clay stoves.
- Clay ovens.
- Drum ovens.
- Cement/sawdust stoves.
- Tin metal stoves.

Preparation

- Collect the materials and tools needed for making the stove or oven

Running this exercise

- If there are enough materials, divide the participants into small groups of 3-4 people.
- Make the chosen stove using the instructions from PC Book MOD 12 - Appropriate Technology.
- When the stoves are finished review the process and results of the exercise with the whole group.

Field activity : Make a solar cooker

Method : **Practical demonstration model building**

Tools : **See preparations below**

References : **PC Book MOD 12 - Appropriate Technology**

Objective : **Participants make and test simple solar cookers**

In the "Stoves and ovens" section of PC Book MOD 12 – Appropriate Technology there are pictures which describe how to make simple reflective solar cookers. Use these pictures with the following simple instructions.

Preparation

Prepare enough of the "Solar cookers" section of the PC Book MOD 12 – Appropriate Technologies, so that each participant can take one set of references home.

Collect the materials and tools needed for:

- **Making the solar cooker:**
  - Large cardboard boxes.
  - Glue or flour and water glue.
  - Aluminium foil or aluminium drink cans.
  - Rocks.
  - Packing tape.
- **Testing the solar cooker**
  - A large pot.
  - Food to cook. Remember that they are slow cookers, so rice, soups, curries, or stews are best.

Running this exercise

If there are enough materials, divide the participants into small groups of 3-4 people.

Each groups can make a solar cookers using the pictures on the handouts as a reference:

1. Cut the cardboard box into the pattern.
2. Use the glue to stick the aluminium foil onto the cardboard - Tin cans can also be cut up and used instead of aluminium foil, but this takes more time.
3. Make the final shape of the solar cooker, and use packing tape and rocks to hold it in place.

Once the cookers are finished the groups can test them by cooking various foods.

Presentation : Food preservation and storage

Method : **Facilitator presentation**

Tools : **Images, black/white board, markers**

References : **PC Book MOD 12 – Appropriate Technology**
PC Book MOD 6 – Home and Community Gardens
PC Book MOD 13 – Cooperatives and Enterprise Development

Objective : **Participants learn techniques to improve food preservation and storage**

Good food storage and preservation means that:

- Food lasts much longer.
- Food keeps more vitamins and minerals.
- Food is available to eat all year round.
- Less food goes rotten.
- There is more chance of selling food and a much larger range of products to sell.

Some appropriate technologies which help with good food storage and preservation include:

- **Solar driers** – Use the sun to dry large amounts of food much faster than normal, and keep food protected from insects and animals. There are many different types depending on the materials available and the needs of the community.
- **The Coolgardie safe** – Invented in Coolgardie, a town in Western Australia, is an aerated box which keeps food cooler and fresher, therefore lasting much longer, as well as protecting it from animals and insects.
- **Clay pots** – Excellent for storing vegetables and fruit, keeping them fresh for many days longer.
- **Pedal-powered grinders** – A grinder that can be used to grind corn, rice, nuts, and more. It is connected to and powered by a bicycle.
- **Oil extraction** – Oil can be extracted from a number of fruits, nuts, and seeds for use in cooking and for adding to other foods. An oil press can be used to extract the oil.

With the participants brainstorm a list of how they could use a solar dryer to preserve foods for their own use and for making products to sell, by asking the following questions:

What kinds of foods can be dried using a solar dryer?

- List of local types of meats and fish.
- List of local types of fruits and vegetables.

What kinds of saleable products could you make using a solar dryer?

For more information about these topics see the "Food storage and preservation" section of **PC Book MOD 12 - Appropriate Technology.**

Creative thinking : Make a solar drier

Method : **Practical demonstration model building**

Tools : **See preparations below**

References : **PC Book MOD 12 - Appropriate Technology**

Objective : **Participants make and test simple solar driers**

There are a number of pictures describing different types of driers in the "Solar driers" section of PC Book MOD 12 – Appropriate Technology. Each type requires different materials and different amounts of time to construct. If appropriate for the workshop other styles of solar driers can be built, but this will require more information, tools, and materials. Some experience in building and using these types of solar driers is recommended for facilitating these exercises.

For this exercise the plastic solar drier can be easily made in a short period of time.

Preparation

- Prepare enough of the "Solar driers" section of the PC Book MOD 12 – Appropriate Technologies, so that each participant can take one set of references home.
- Identify the location for the solar drier – A sunny and dry place is required, preferably not exposed to too much strong wind.

Collect the materials and tools needed for making the solar drier:

- **Strong clear plastic -** For a large solar drier approximately 9m x 2m, for smaller driers much less is needed
- **Wood for the solar drier frame -** 13m x 2m and 6m x 1m lengths.
- **Wood for the inside shelves -** 12m x 1.75m and 8cm x 80cm lengths will be enough to make 4 shelves.
- **Good quality small hole wire mesh for preventing any insects entering -** Approximately 2.2m x 1m.
- **Wire or plastic mesh for the shelves -** Approximately 7.5m x 1m.
- **Medium and small size nails for making the frame** - Approximately 100 nails.
- **Small nails/tacks for attaching the plastic and wire mesh** - Approximately 100 nails/tacks.
- **Hammers, saws, measuring tape, scissors, and other tools.**
- **4 tin cans to put the shelf legs into.**
- **Water to put in the tin cans.**
- **Small rocks placed on the ground inside the solar drier once it is finished** - The rocks will collect and store heat.

Preparations needed for testing the solar drier

- **Food to test in the drier –** Meat/fish and vegetables/fruit can be tested but should be dried in separate solar driers to keep the smells and taste separate.
- **Knives and cutting boards for preparing the food.**
- **Salt for the meat or fish.**

Running this exercise

- Divide the participants into smaller groups. If there are enough materials, 1 drier per 10 people is a good exercise ratio.
- The groups can then make the solar driers using the pictures and information provided as a reference:
    - **Make the frame of the solar drier -** 2m high, 2m long, and 1m wide.
    - **Attach the plastic and wire mesh to the frame -** Secured well to prevent any animals or insects from entering.
    - **The back plastic section of the solar drier is permanently attached at the top to provide access**, it must be tightly secured to prevent animals or insects from entering, it can overlap the sides and bottom.
    - **Make the frame for the shelves -** 1.75m high, 1.75m long, and 80cm wide, with frames to attach 4 shelves.
    - **Attach the mesh to the frame to make the shelves.**
    - **Set the solar drier in its location.**
    - **Place the small rocks on the ground inside the drier.**
    - **Place the shelving inside the drier with legs placed in the tin cans.**
    - **Add water to the cans.**

Once the solar driers are finished, prepare various foods to dry in them:

- Cut the food into slices approximately 1cm thick.
- Meat can be cut into strips approximately 1cm thick, 3cm wide, and 10cm long.
- Add salt to meat or fish to help preserve it.
- Place the food on the shelves.
- Secure the back of the drier.

The food will be ready in 3 days to 1 week depending on the type of food and the size of the slices.

Note: Appropriate measures should be taken to protect the solar drier and its contents from dogs.

Field activity : Make a Coolgardie safe

Method : **Practical demonstration model building**

Tools : **See preparations below**

References : **PC Book MOD 12 - Appropriate Technology**

Objective : **Participants build and test a Coolgardie safe**

PARTICIPATORY FIELD ACTIVITY

Preparation

Prepare enough of the "Coolgardie safe" section of the PC Book MOD 12 – Appropriate Technology, so that each participant can take one set of references home.

Collect the materials and tools needed for making the Coolgardie safe:

- Wood for the frame, 3 shelves, and a door - 28 x 1m lengths.
- Good quality wire mesh to cover the frame to prevent any insects and animals from entering - 7m x 1m.
- Wire mesh to make the shelves - 3m x 1m.
- 2 hinges and screws, and 1 latch for the door.
- Hessian material - 3m x 1m.
- Strong wire for hanging the Coolgardie safe from the roof - 10m.
- A large tray.
- Water.
- Hammer, nails, saw, screwdriver, measuring tape, scissors, and other tools necessary for making the Coolgardie safe.
- Fresh vegetables for testing the Coolgardie safe.

Running this exercise

If there is enough materials, divide the participants into groups of 3-4 people.

The groups can make Coolgardie safes using the handouts as a reference:

1. Make the frame for the Coolgardie safe.
2. Add the wood for the shelve frames and the wire for the shelves.
3. Cover the outside frame tightly with the wire mesh.
4. Make the door, add the wire mesh to the door, and attach the door.
5. Attach the wire and use it to hang the Coolgardie safe from a roof (outside in a place with wind).

Once the Coolgardie safe is finished the groups can try using it:

1. Fill the tray with water and place the tray on top of the safe.
2. Place the hessian on the safe so that it sits in the water and hangs down 2 sides of the box.
3. Put some fresh vegetables in the safe and some vegetable outside the safe.

Continue to check the freshness of the vegetables each day for the duration of the workshop.

Presentation : Water pumps and water storage

Method : **Facilitator presentation**

Tools : **Images, black/white board, markers**

References : **PC Book MOD 12 - Appropriate Technology**

Objective : **Participants learn about different appropriate water pumps and water storage techniques**

Collecting water is very hard work, especially if the water has to be carried up hill. There are ways of pumping water from the ground or uphill from a river.

Motor pumps can be used but they:

- Are expensive to buy.
- Need petrol to operate.
- Need continual maintenance.

There are pumps that don't need petrol and that are much easier to maintain. Some of these pumps include:

- **Ram pumps** - Use water pressure created by gravity to move water a long way uphill to storage tanks. No engine is required.
- **Foot pumps and treadle pumps** - Can be used to pump water from a bore, well, spring, or river using a walking action to work the pump.
- **Solar powered water pumps** – Powered by small solar panels. Can be used to add oxygen to fishponds and ponds that clean water from houses.
- **Windmills** - Use the wind to pump up water from underground to use as house water or for irrigation.

Once the water is pumped it needs to be stored. Various methods include:

- **Water tanks** – Come in many different shapes and sizes, but all should be protected from sun and mosquitoes.
- **Elevated water storage** – When a water tank is elevated above the ground the water that flows from it through pipes, bamboo, or hoses can go a long way because of gravity (moving downwards).
- **Ponds** - Excellent water storage facilities that can be used (carefully) as an irrigation source.

For more detailed information and pictures see the "Water pumps" section of **PC Book MOD 12 - Appropriate Technology.**

Creative thinking : Choose a water collection and storage method

Method : **Participatory group brainstorm**

Tools : **Black/white board, large paper, markers**

References : **PC Book MOD 12 - Appropriate Technology**

Objective : **Participants choose the most appropriate water collection and storage techniques for their community**

Step 1

The facilitator can outline the different types of water collection and water storage techniques and write them on the board - See the previous exercise for examples if needed.

Discuss with the participants the different factors that will affect the choices they make. Create a list of these factors on the board so that everyone can comment and give input.

For example:

- How much water is needed?
- What is the water source?
- Is the water source constant all year?
- What will the water be used for?
- Are different types of collection and storage needed to serve different needs?

Step 2

- Ask the participants to divide into smaller workgroups.
- Each group can choose the types of water collection and water storage technique they think are best.
- Ask them to answer the following questions within their groups:
    - Why have they made their choice?
    - How will the water be distributed in the community?
    - How will it be maintained and who will maintain it?

Step 3

When the groups have finished they can present their results to the whole group for comments and feedback.

Presentation : Natural methods of generating electricity

Method	**: Facilitator presentation**
Tools	**: Images, physical examples, black/white board, markers**
References	**: PC Book MOD 12 - Appropriate Technology**
Objective	**: Participants learn about natural methods of generating electricity**

Note: If any physical examples of natural electricity generation are available for the participants to view this will very much help to explain how it works.

Natural electricity production is very important for the future of Indonesia, especially in rural areas. It produces very little pollution and can be used by individual houses or a small community.

Some natural methods of generating electricity are:

- **Hydro-electric systems** - Use flowing water to create electricity. These systems come in many different sizes with small micro-hydro systems being the cheapest, most efficient, most environmentally friendly, and the best for rural communities.
- **Biogas systems** - Collects methane gas, a flammable gas that can be used as a cooking fuel, to run gas lights, to run internal combustion engines, and to make electricity. Methane gas is made naturally when animal manure, human manure, rice husks, leaves, water plants, and grass decompose. It has many benefits including creating very high quality fertilizer from the left over materials.
- **Solar systems** - Use the light from the sun to create electricity.
- **Wind systems** - Can also be used for generating electricity using a propeller that turns when the wind blows.

These methods are explained in more detail in the "Electricity" section of **PC Book MOD 12 - Appropriate Technology.** However, these explanations are still very simple.

There are many other forms of natural electricity generation such as using waves, thermal energy, and industrial waste, and more are being created all the time.

The facilitator can decide on the types of systems to explain and the detail of the explanations depending on the focus of the workshop, the location, the technical ability of the participants, and most importantly the needs of the participants.

Field activity : Observe examples of natural energy

Method : **Field visit**

Tools : **See preparations below**

References : **PC Book MOD 12 - Appropriate Technology**

Objective : **Participants assess working natural energy generation systems**

Visit as many different examples as possible to show a range of systems. A field visit to see examples of natural energy generation is very important because it will help explain how these appropriate technologies work:

- Technical detail is much easier to understand when seeing models in action.
- Participants will be able to witness the benefits of using natural energy generation.
- Participants will be able to see the connections between natural energy generation, the environment and farming systems, especially with biogas systems and micro-hydro systems.

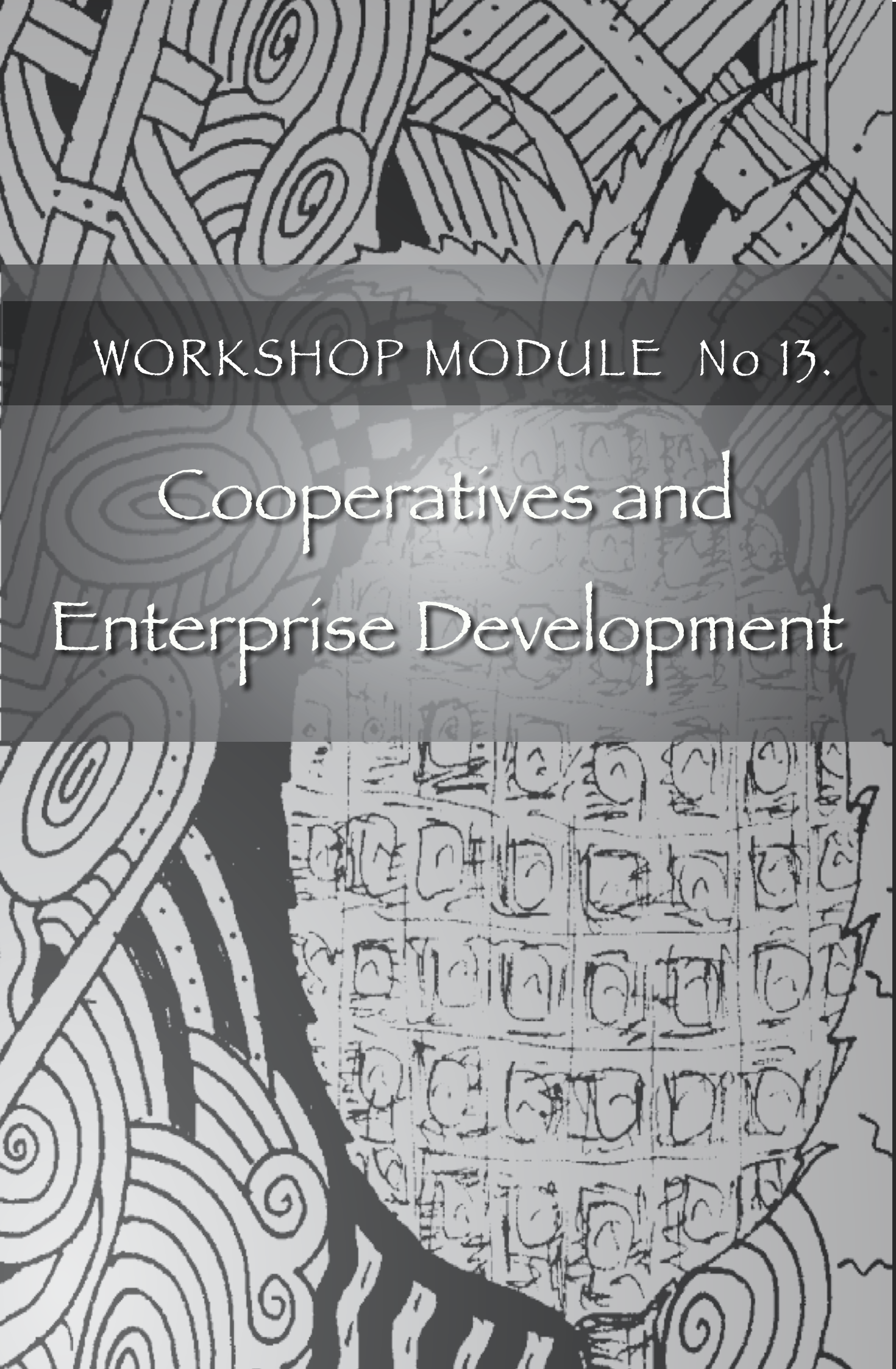
Preparation

- Identify sites that provides examples of natural energy generation.
- Identify people involved in the development, management, or ownership of the site. These people could be land owners, site workers, community leaders, project managers, etc.
- Speak to these people about the hope to conduct a field visit to their area/ project and explain the objectives of the field visit. Ask them if they would be willing to share their knowledge and participate in the workshop by being available to explain the agriculture systems and answer participants' questions.
- Make an agreement about the date and time for the site visit, ideally just following the presentations and practical exercises on this topic.
- Organise vehicles for transport and water, snacks, or meals for the participants if the field visit is longer than 2 hours.
- Organise clipboard, paper, and pens for the participants so that they can write notes, draw sketches, maps, etc during the field visit.

Running this exercise

- At the arranged time, go to the site and let the guides walk the participants around the site, explaining the plans and techniques used.
- Encourage the participants to write notes, draw sketches, maps, etc, and to ask as many as questions as possible. Encourage them to critically analyze the site as well (every site and project can be improved).
- After (or during) the field visit, the facilitator can conduct a group discussion where the participants can share what they learned and the facilitator can answer any further questions and add ideas if needed.

Notes...



WORKSHOP MODULE No 13.

Cooperatives and Enterprise Development

Permaculture Facilitator's Handbook Module 13. Cooperatives and Enterprise Development

Notes...

Presentation : Cooperatives and small enterprises

Method : **Facilitator presentation**

Tools : **Images, black/white board, markers**

References : **PC Book MOD 13 – Cooperatives and Enterprise Development**

Objective : **Participants learn about cooperatives and enterprise development, and the benefits to individuals and communities**

Community cooperatives are organized, managed and run by communities. They can create many benefits for the community.

The objective of a community cooperative can be:

- Economic.
- Social.
- To provide a needed service.

The most important principle for a successful community cooperative is that the members of the cooperative use the principles of equality and working together for the collective benefit.

Why form a community cooperative?

- **They can benefit to the whole community** - By improving local economies and local resources.
- **They make it easier and cheaper to collect and buy materials** – Including transportation, tools, and better quality raw materials.
- **They can make types and amounts of products that can't be made by individuals** – This means more products, with reduced costs, which are more competitive on the market place.
- **They make it easier to voice opinions or work with government, private investors, religious groups, and NGOs** – Groups are more attractive to investors and have a louder voice than individuals.
- **Different people in the community can contribute depending on their skills** – For example builders, cooks, book keepers, agriculture skills, etc.
- **Marketing, transporting, and selling goods** – Is cheaper and easier to organize and the markets are easier to create and expand.

Community cooperatives can make individuals feel better because they:

- Have work that they previously they could not do alone.
- Are working together in the community and participating in their community.
- Can provide more for their family, now and in the future, through continuing collective work within the community.
- Learn new skills and achieve goals that would not be possible working alone.

Community cooperatives can make community members feel better because:

- There is more money/goods circulating in village.
- There are more jobs in the village.
- They can be proud of having their community name on products.

Different types of community cooperatives include:

- **Business/enterprise cooperatives**
- **Resource trading/sharing cooperatives –** Such as:
  - Tools.
  - Materials.
  - Labour.
- **Bulk purchasing cooperatives -** reduces individual costs on food / materials
- **Community resource producing cooperative, including:**
  - Drying and storing foods.
  - Seed saving and distribution.
  - Nurseries.
  - Community improvements such as buildings.
  - Disaster mitigation and management.
- **A combination of any or all of the above.**

Presentation : Cooperative or small enterprise tree

Method	**: Facilitator presentation**
Tools	**: Images, black/white board, markers**
References	**: PC Book MOD 13 – Cooperatives and Enterprise Development**
Objective	**: Participants learn about basic management structures and concepts**

A good co-op or community business model is like a tree

- First it starts with a seed. This seed is an idea.
- Imagine the seed growing, first it will start developing roots, a trunk, and leaves. It searches for water and nutrients which represents and analysis of needs, available resources, products, marketing, and so on.
- The tree will need a place to grow into its full size. This represents the right place, good planning, structure, and vision for the future, providing community support, training, financing, and transportation.

- When the tree is fully established, it will be a healthy tree with a strong root system, a strong trunk, many branches and leaves, and it will produce lots of flowers, fruits, and new seeds which will grow into new trees.
- The roots are the resource base. These resources could be land, labour, natural resources, skills, equipment, buildings, money, or connections with NGOs, the government, and support groups.
- The trunk is the management structure. It enables efficient flow from resources to projects, and must be strong and supporting. Management decides which projects (branches) to support.
- The branches are the different projects. Many smaller projects are better and more sustainable than only 1 big project. Diversity is important.
- The leaves are the people responsible for these projects. They work together to ensure the projects are successful, because without people, the cooperative is like a tree without leaves, it cannot live or grow.
- The fruit is the produce from the projects. It must be harvested, stored, marketed, and sold so that the projects can make money for members of the cooperative in a sustainable manner.
- The seeds are new cooperatives or businesses which grow from the first tree.
- Many trees growing together is better than only 1 tree growing alone. They will support and shelter each other from storms, strong winds, and the hot sun, and provide nutrients (resources) for each other, while providing a habitat for animals and birds. It is the same with cooperatives and community businesses.

Management structures will vary according to the size and type of cooperative or small enterprise, but all management structures should include:

- **A vision -** Which can be used as a vision statement.
- **An ethical structure.**
- **A management system.**
- **A wages, prices, and profits structure.**
- **A thorough bookkeeping system.**
- **A plan for future changes and development.**

For more detailed information see the "Management structure" section of **PC Book MOD 13 – Cooperatives and Enterprise Development.**

Creative thinking : Products for cooperatives and small enterprises

Method : **Participatory group brainstorm**

Tools : **Black/white board, markers**

References : **PC Book MOD 13 – Cooperatives and Enterprise Development**

Objective : **Participants create a list of different products that can be made and sold in their area**

Together as a whole group, conduct a participatory brainstorm to create a list of potential products that a cooperative or small enterprise in that area could make and sell.

Include in the list:

- Base material/source for the product.
- Products that can be sold without value adding.
- Products that can be sold by value adding.

Value adding is a term for making a new product to add value to an existing product. For example making jam from fruit, making *tempe* from soy beans, making oil from sandalwood, coconut, or candle nut, and making bamboo furniture from bamboo.

On the board create a table something like the following.

Leave the answers to the questions blank so that the participants come up with their own ideas.

Material/source	Products that can be sold without value adding	Products that can be made with value adding
Bamboo	Poles, propagates, fresh shoots	Furniture, musical instruments, cans of shoots, potted plants
Tomato plants	Seeds, seedlings, fresh tomatoes	Tomato sauce, tomato chutney, natural pesticides, dried tomatoes
Buffalo	Meat, milk, labour – ploughing fields, offspring, leather	Dried meat, leather products – bags, wallets, clothes

For more information refer to the "Value adding" section of **PC Book MOD 13 – Cooperatives and Enterprise Development.**

Creative thinking : Enterprise brainstorm

Method : **Participatory small group project brainstorm**

Tools : **Black/white board, large paper, markers**

References : **PC Book MOD 13 – Cooperatives and Enterprise Development**

Objective : **Participants create a cooperative or enterprise**

This exercise uses the knowledge that the participants have gained from the previous exercises to develop ideas about appropriate small enterprises through a group brainstorm.

The following modules all contain exercises that could be used as ideas for developing products and services for a community cooperative or small enterprises.

- Module 03 - Houses, Water Supply, and Waste Management.
- Module 05 - Seed Saving and Nurseries.
- Module 06 - Home and Community Gardens.
- Module 07 - Farming.
- Module 08 - Forests, Tree Crops, and Bamboo.
- Module 10 - Animal Systems.
- Module 11 - Aquaculture.
- Module 12 - Appropriate Technology.

Participants can choose products or a system on which to base their cooperative or enterprise from any of those modules or use other ideas. They may also choose to combine various components from different modules.

For example:

- An aquaculture system + a solar dryer = dried fish product.
- A community seed saving group + nursery + potting soil production.

Step 1 - Create workgroups and define focus areas

- Ask the participants to divide into smaller workgroups.
- Each group should choose a base idea for their cooperative or small enterprise to work from.

Step 2 - Brainstorm the cooperative ideas

- The groups can develop their cooperative or enterprise.
- Each enterprise should include a range of products to sell, including value added products.

Each group can brainstorm the following questions:

- **Product questions:**
  - What is the base material for making the products?
  - What products can be made without value adding?
  - What other products can be made using value adding?
- **Resource questions**
  - Where will the base material for making the product come from?
  - How will this support the local community?
  - What tools are needed for making the products?
  - What skills are needed for making the products?
- **Marketing questions**
  - Who would use or buy the product or service?
  - How would you let them know about the product or service?
  - How many could you sell? How often?
  - What price could you sell them for?
  - Where would you sell them?

How are the Permaculture ethics covered by the enterprise?

1. CARE FOR THE EARTH
2. CARE FOR THE PEOPLE
3. CARE FOR THE FUTURE

How many of the Permaculture principles are covered by the enterprise?

- Diversity.
- Energy planning.
- Scale.
- Multiple elements.
- Natural succession.
- Personal responsibility.
- See solutions, not problems.
- Edge effect.
- Energy cycling.
- Biological resources.
- Multiple functions.
- Relative location.
- Cooperation not competition.
- Observation.

Step 3 - Presentations for feedback and inputs

Once they have finished workgroup brainstorm, each group should present their business plan and have the other groups give comments and feedback.

Step 4 - Link the community cooperatives and enterprises together

Once all the groups have finished presenting and receiving feedback, brainstorm with the participants about how the proposed small enterprises could support each other and cooperate to further improve the community economy.

Creative thinking : Resources and products analysis

Method : **Participatory small groups brainstorm**

Tools : **Analysis questionnaire, large paper, markers**

References : **PC Book MOD 13 – Cooperatives and Enterprise Development**

Objective : **Participants apply an analysis questionnaire to potential products**

A resource and products analysis is an important part of working out what are the best projects and products for a community group or cooperative.

When you have a list of ideas you can ask some simple questions to help decide the best projects or products for your cooperative or small enterprise.

This exercise is good for the participants to:

- Become familiar with these questions.
- Determine what are good products to produce and sell.
- Understand how to improve chances of success.
- Understand how to minimize potential problems.
- See the importance and benefits of value adding.

Preparation

- Prepare enough of the questions from the "Resource and products analysis" section of the PC Book MOD 13 – Cooperatives and Enterprise Development, so that each participant can use them in this exercise and take one set of references home.
- Identify different local examples of base products that can be used to provide products for a cooperative or small enterprise – For example:
    - Coconuts.
    - Soybeans.
    - Bamboo.
    - Community forest wood products.
    - Aquaculture.
- Write or draw these 'base product' examples on small cards.

Running this exercise

Step 1

- Ask the participants to split up into smaller workgroups.
- A representative from each group can choose a 'base product card' to provide their group with a starting point for the exercise.

Step 2 - Workgroups define the products

Apply the following questions to each base product.

- **Product questions:**
  - What products can be made without value adding?
  - What other products can be made using value adding?
- **Resource questions:**
  - Where will the base material for making the product come from?
  - How will this support the local community?
  - What tools are needed for making the products?
  - What skills are needed for making the products?

Step 3 - Asses the viability of the idea

Once the questions have been answered the groups can use the answers to decide:

1. Whether they think that the products are a good idea for a local cooperative to produce and sell.
2. If yes, why?
3. If no, why?
4. How to maximize the potential for success of the viable products.

Step 4 - Presentations for comments and feedback

Each group can present their findings to the whole group for comments and feedback.

Presentation : Local trading systems and currencies

Method : **Facilitator presentation**

Tools : **Images, black/white board, markers**

References : **PC Book MOD 13 – Cooperatives and Enterprise Development**

Objective : **Participants learn about local currencies and trading systems**

An very good way to strengthen a community and its economy is to start a local trading group and/or a local currency.

A local trading group will encourage more trade within the community and reduce the amount of resources that leave the community. This can dramatically strengthen the community's economy.

The Local Enterprise Trading System (LETS) is a trading system that is used in many countries.

Members of the trading system use a credit and debit system where all transactions are written in a book and no money changes hands.

LETS can also be combined with direct trade or part money, part trade.

- **Direct trade** – When one product or products are traded directly for other products.
- **Part money, part trade** – When a trading system combines part trade and part money transactions.

Members of a LETS systems can be:

- Individuals.
- Families.
- Groups.
- Businesses.

A local currency (type of money) is another way to strengthen local communities by keeping money in the communities.

- The local currency is used to buy local products and food.
- Local currencies promote the purchase of local products and help to develop village economies.
- Local currencies have been successful in many communities in countries all over the world.
- Local currencies can be used together with trading systems and the national currency.

For more information and explanatory pictures see the "Local currencies, local goods, and local trading systems" section of **PC Book MOD 13 – Cooperatives and Enterprise Development.**

Notes...

CONCLUDING A WORKSHOP

Final Design Project and Wrap Up

Notes...

Creative thinking : End of course design project

Method : **Groups create a model of Permaculture design**

Tools : **Large paper, markers, natural materials for making 3-D models**

References : **PC Book MOD 1 - What is Permaculture?**
PC Book MOD 2 - Patterns in Nature and Permaculture Design

Objective : **Participants put what they have learned during the course into action**

At the end of each Permaculture workshop, the facilitator should run a final design project for the participants. This will reinforce everything that the participants have learned and give the facilitator an opportunity to assess the success of the course.

The time that is used for this exercise will be relative to the contents of the course, but it is recommended that half a day is the minimum amount of time that is needed to design and map out their design, for a longer course allow 1 day.

Preparation

- Enough soil so that groups of 8-10 participants can each create 3-D models of integrated Permaculture systems that cover all of the components of the workshop materials covered.
- A good supply of water and at least 1 watering can per group (if regular watering cans are not available, use tin cans with small nail holes in the bottoms).
- Shovels, spades, hoes, and rakes for shaping the models.
- Hand trowels and smaller tools for the finer detail of the models.
- Other items that can be useful for making creative models (twine, cardboard, pens, small stones to represent rock swales, etc).

Running this exercise

Step 1 - Exercise orientation

The facilitator may choose to give each group the same design project - In this way participants can see the other groups' ideas and can learn from each other's ideas.

Each end of course design project should match the course contents, however the facilitator should remind the participants that designs should incorporate the Permaculture ethics and principles in all design projects.

A list of the Permaculture ethics and principles can be posted in the class as a reference.

Permaculture ethics

1. Care for the earth. 2. Care for the people. 3. Care for the future.

Permaculture principles

1. Diversity.
2. Edge effect.
3. Energy planning.
4. Energy cycling.
5. Scale.
6. Biological resources.
7. Multiple elements.
8. Multiple functions.
9. Natural succession.
10. Relative location.
11. Personal responsibility.
12. Cooperation not competition.
13. See solutions, not problems.
14. Observation.

Do a quick review of the course contents and goals and how it fits into the overall picture of Permaculture and sustainable community development.

Step 2 - Form workgroups

Divide the participants into smaller groups using a creative group creation technique.

Step 3 - Workgroups define their missions

Before workgroups start building their models, have them define and write down:

- **The project's vision –** One paragraph about the reasoning, benefits, and goals of the project.
- **The design elements –** A list of the key design elements that they plan to integrate into their design project.
- **The list of Permaculture principles -** The workgroups should define at least one design element to demonstrate each of the principles (if possible) - One design element could also demonstrate more than one principle.

Additional options (if there is enough time):

- **A rough time line for implementing the design in their community** – The order in which each of the design components would be done and how long each step is expected to take.
- **A rough budget for implementing the design in their community** – The cost of the design components that would be done, including materials and labor needed.

Step 4 - Create the models

The participants can create on paper and/or create 3-dimensional elements to be included in the models. These elements may include, but not limited to:

- Vegetable gardens.
- Composting and mulching systems.
- Medicinal plants.
- Aquaculture.
- Various animals.
- Water catchment (swales, terraces).
- Water storage.
- Wastewater treatment.
- Fruit trees.
- Forest trees.
- Marketplaces and shops.
- Medical facilities.
- Nurseries.
- Paths, bridges, and roads.
- Ponds.
- Animal enclosures.
- Homes and other buildings.
- Water sources.
- Waste treatment.
- Components of small industries.
- Windbreak trees.
- Farms and rice paddies.
- Schools.
- Power supply.

The map should be big enough to include all the zones that apply to their design project and all the components that will be added.

During the process, the facilitator should move around from group to group to monitor progress and answer questions, while ensuring that all participants are having sufficient opportunities to give their inputs. The facilitator can also offer inputs and ideas about how the various components interconnect or could be repositioned or improved to fulfill the maximum amount of Permaculture Principles.

Presentations for feedback and inputs

At the end of the project, each workgroup should present their design to the whole group. The other participants and facilitator can ask questions and give supporting feedback about each component of the design.

Document the results of the mapping exercise either using images or by drawing the conclusions onto large sheets of paper which can be posted in the classroom for ongoing reference throughout the course. This documentation will be useful for ongoing brainstorms and use in future trainings.

Creative thinking : Future actions and networking

Method : **Creative thinking exercise**

Tools : **Meta board, meta cards, enough markers for everyone**

References : **Forum on problems and solutions (see Opening Day 1)**

Objective : **Provide a forum for the participants to plan for the future**

Preparation

- The facilitator should prepare a meta board that is big enough for all the participants to read, also prepare cards for the meta board. If a meta board is not available then the exercise can be done with the cards on the floor.
- Make 4 headings for the meta board that match the questions below.

Running this exercise

Ask the participants to:

- Reflect and share what they have learned.
- Plan the next steps they can take to put what they have learned into action.
- Divide the participants into small groups, preferably using a creative group creation method.
- Within their workgroups, participants can share their answers to the following questions and then write the ideas on the meta cards:
    - What are important techniques, methods, and ideas learned in this course?
    - What techniques, methods, or ideas do you want to learn more about?
    - How do you plan to put what you've learned into practice?
    - How can we support each other to put our new learning into action?
- Use as many cards as are needed for each question.
- Once the groups have completed their brainstorms, group representatives can pin the group's ideas onto the meta board and explain the ideas their group has generated to the rest of the participants.
- Participants can then give feedback and suggestions about other ideas.

The facilitator may choose to bring out the results of the "Forum on problems and solutions" exercise done on the first day and ask the students to give additional comments and inputs on their original ideas now that they have completed the course.

Presentation : Wrap up – Evaluation and congratulations

Method : **Evaluation, certificate presentation, and celebration**

Tools : **Evaluation kits, certificates, closing celebration materials**

Objective : **The workshop is evaluated, participants receive their certificates**

The wrap up session of the course is an important event.

During the Permaculture workshop, a strong sense of camaraderie and cooperation is created that can move those involved in profound ways.

Taking the time to celebrate the completion of the course and congratulate each other leaves a lasting sense of joy and inspiration to the people involved. It is also very important for the facilitator to spend some time at the end of each course to self evaluate the results of the course and of each course session - See the Trainer's Resource book for assessment techniques.

Remember, your best teachers are your participants and your own willingness to self evaluate. Through experience and feedback, Permaculture teachers can get better over time.

Participant course evaluation and feedback

Pass out course evaluation sheets (see the Resource Book) to the participants and ask them to fill them in and return them to you directly.

- Encourage them to be honest with their answers, explaining that their constructive criticism is invaluable to help you improve the course.
- Make sure that you get filled in evaluation sheets from all the participants.
- As some participants with low literacy levels may need help filling in their forms, ask assistants or other participants who are more proficient to provide help to fellow participants if needed.

Facilitator self evaluation

The facilitator may choose to take the time while the participants are filling in their evaluation forms to go back through their lesson plans and note which parts and aspects of the course they feel were most successful and which could be improved, and how. This process is preferably based on notes that have been made at the end of each lesson while it is still fresh in the facilitator's minds.

Pass out course contact lists

The facilitator can take this opportunity to distribute copies of the contact list that was created on the first day. Ideally, the facilitator can also use this process to encourage everyone to network with each other for ongoing support. Announce any post-training follow up meetings if any have been planned.

Conduct closing ceremonies

If there are any traditional closing ceremonies, they can be conducted at this time. The "final night party" is a Permaculture course tradition. Plan a party for the end of the course so you and the participants can have fun and celebrate your achievements together.

Other creative ideas may include:

- **Playing games together –** For example, a Permaculture quiz with two teams.
- **Have the participants contribute performances –** This could be songs, theatre, juggling, poetry, spoken word, etc.
- **Give out funny prizes** to students who did silly things during the course.

Congratulations!

You have completed your Permaculture workshop.

Through your dedication and efforts you are helping to make environmental rehabilitation, sustainability and the strengthening of community resilience a reality.

Please refer to the companion book 'The Permaculture Facilitator's Handbook for Training and Assessment' for:

- Handouts and fact sheets for participants.
- Creative facilitation techniques.
- Post-course assessment tools.

Please help us develop this book

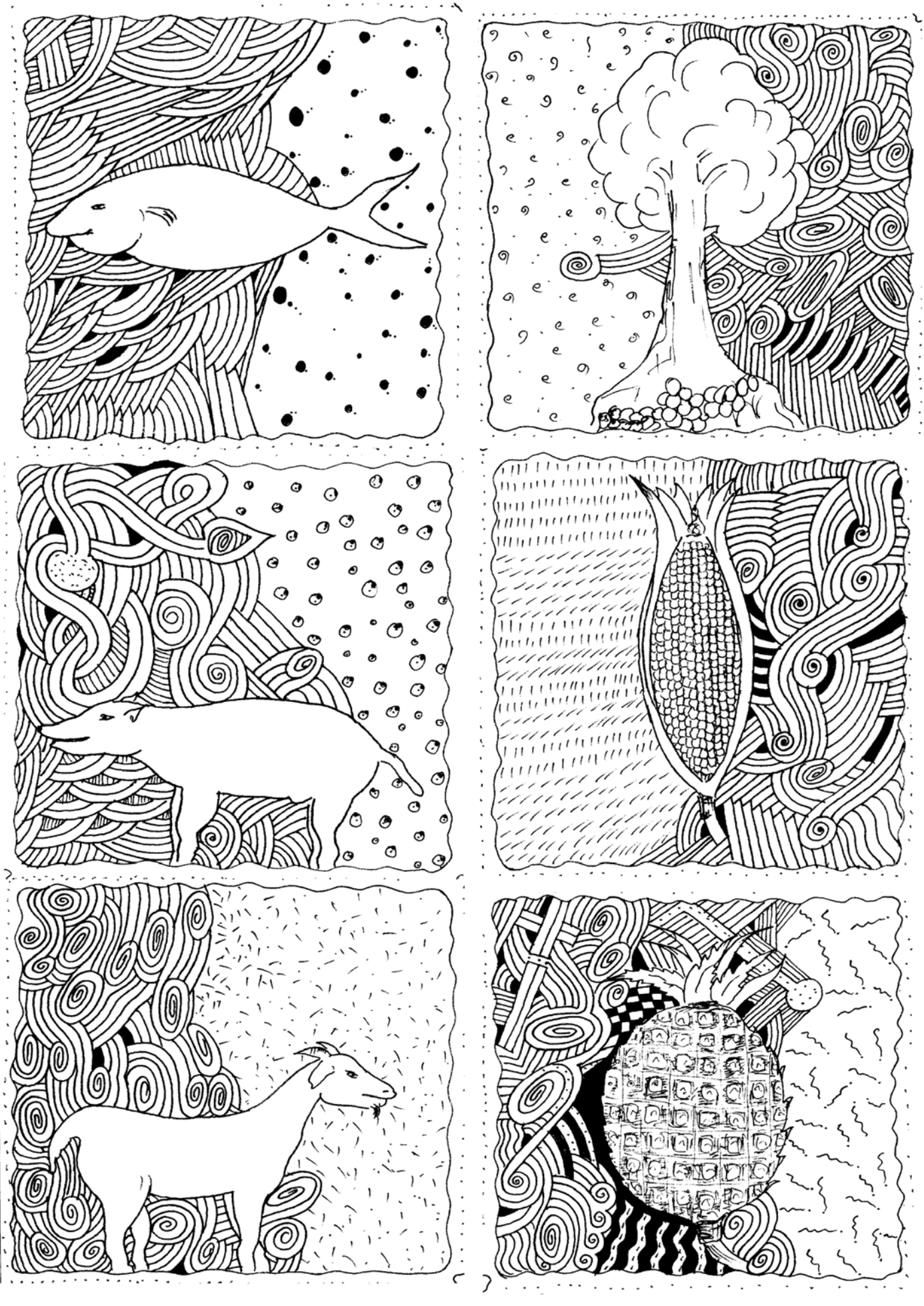
This book is a work in progress and we very much appreciate any comments, suggestions, and inputs you have. Please contact us if you would like to contribute your ideas and lessons for the next editions.

info@idepfoundation.org

Best regards and appreciation,
The IDEP Foundation Permaculture Team

Notes...

Notes...



Background about this book....

About IDEP Foundation

THE ORGANIZATION THAT DEVELOPED THIS BOOK

IDEP Foundation is a local Indonesian NGO, which specializes in the development and dissemination of curriculum media, and practical programs that educate and empower local communities in sustainable development and disaster management. For examples of IDEP publications, visit: www.idepfoundation.org

Since 1998 IDEP has been delivering Permaculture workshops for NGOs and communities from throughout Indonesia. The organization has two Permaculture Field Schools, one in central Bali and another in Aceh, which are teaching sustainable development as well as disaster recovery using Permaculture techniques. For examples of IDEP Permaculture training activities, visit: www.idepfoundation.org

About Permatil

THE ORGANIZATION THAT CREATED THE ORIGINAL COMPANION BOOK

The original version of the Permaculture Resource Book was developed in response to Timor Leste's immediate agriculture and environmental concerns. It was created as a contribution to Timor Leste for a sustainable path for the future. The information for the book was gathered from 5 years of working with farmers and communities in Timor Leste as well as experiences in other countries, books, and the Internet. It was developed by Permatil (Permaculture Timor Lorosa'e), an East Timorese NGO that works towards sustainable development in Timor Leste through education, advocacy, demonstrations and partnerships with local Government, NGOs, and community groups.

About the Companion Resource Book

This book is designed to work in conjunction with "A Resource Book for Permaculture - Solutions for Sustainable Lifestyles', which has been developed using simple language and many detailed illustrations to ensure that the information contained is accessible to all those interested.

First edition, English version 2011 © IDEP Foundation

www.idepfoundation.org

A Facilitator's Handbook

~ for ~

PERMACULTURE

Solutions for Sustainable Lifestyles

THE AIM OF THIS BOOK IS: To provide a wide range of practical and comprehensive guidelines, tools, and techniques for delivering effective Permaculture workshops. It includes over 200 presentations, creative thinking exercises, and practical hands-on exercises which can be used by local facilitators to design and implement effective courses appropriate to the needs in their area. It has been designed to work in conjunction with the companion books "A Resource Book for Permaculture - Solutions for Sustainable Lifestyles" and "The Permaculture Facilitator's Handbook for Training and Assessment." The workshop techniques include knowledge and practical techniques for environmental rehabilitation and sustainability, strengthening community resilience and local economies. The contents of the book are based on concepts of deep ecology, the inter connectedness of our environment and culture and the principles and ethics of sustainable community development.

This Book is an appropriate reference and guide book for use by community cooperatives and sustainable development facilitators, Indonesian community groups, NGOs, farmers' networks, Government workers, universities, and other organizations.

THIS BOOK INCLUDES DETAILED GUIDELINES FOR TEACHING:

- Permaculture and Sustainable Community Design.
- Patterns in Nature and Methods for Design.
- Houses, Water, and Waste Management.
- Healthy Soil.
- Seed Saving and Nurseries.
- Home and Community Gardens.
- Farming.
- Forests, Tree Crops, and Bamboo.
- Integrated Pest Management (IPM).
- Animal Systems.
- Aquaculture.
- Appropriate Technology.
- Cooperatives and Enterprise Development.

It includes over 200 presentations, creative thinking exercises, and practical hands-on exercises, as well as detailed instructions for:

- Conducting pre-training assessments.
- Preparations and tools for conducting workshops.

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