



# SMALL SCALE IRRIGATION DEVELOPMENT LEVEL-I

## Model TTLM

### Learning Guide #09

**Unit of Competence:** Support basic natural resource conservation work and  
Afforestation

**Module Title:** Supporting basic natural resource conservation work and  
Afforestation

**LG code:** AGR SSI1M 09 Lo1-Lo4

**TTLM Code:** AGR SSI1 TTLM 1218V2

**Nominal Duration:** 25 Hours

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This learning guide is developed to provide trainees the necessary information regarding the following content coverage and topic:

- ◆ **Prepare materials, tools and equipment for conservation and afforestation work**
- ◆ **Undertake conservation and afforestation work as directed**
- ◆ **Store, handle and stockpile materials and equipment**
- ◆ **Clean up on Completion of Conservation and afforestation Work**

This guide will assist trainees to attain the learning outcome stated in the curriculum guide. Specifically, upon completion of this Learning Guide, trainees will be able to:

- Identify the required materials, tools, and equipment
- Conduct Checks on all materials, tools and equipment
- Use techniques when loading and unloading materials
- Select and checking Suitable personal protective equipment (PPE).
- provide conservation and afforestation support according to OHS requirements
- Identify and reporting OHS hazards.
- Provide Instructions and directions for conservation and afforestation work
- Undertake conservation and afforestation work
- Store plant debris and waste material produced during conservation activities.
- prepare and processing plant debris and waste materials
- Stockpile Surplus materials for removal
- Maintain a clean and safe work site while completing conservation activities
- Clean, maintaining and storing tools and equipment

### **Learning Activities**

1. Read the specific objectives of this Learning Guide.
2. Read the information written in the “Information Sheets”
3. Accomplish the “Self-check” questions

4. If you earned a satisfactory evaluation, you will proceed to the next “Information Sheet.” However, if your rating is unsatisfactory, see your teacher for further instructions.
5. Submit your accomplished Self-check.
6. Do the “LAP test” (if you are ready) and show your output to your teacher. Your teacher will evaluate your output either satisfactory or unsatisfactory. If **unsatisfactory**, your teacher shall advice you on additional work. But if **satisfactory** you can proceed to the next Learning guide.

<b>InformationSheet-1</b>	<b>Prepare materials, tools and equipment for conservation and afforestation work</b>
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## 1.1 Identifying the required materials, tools, and equipment

### Introduction

### Definitions

- ♣ **Natural resources:** are materials or conditions occurring in nature. These include soil, water, vegetation, minerals, wild animals, etc. they are capable of raising income or have potential for economic exploitations.
- ♣ **Conservation:** is literally preservation of resources; but it can be explained as ‘using of the natural resources to fulfill the needs of the present generation without suppressing the potential and aspirations of the future generation for development.’
- ♣ **Afforestation** is the establishment of a forest or stand of trees in an area where there was no previous tree cover. Reforestation is the reestablishment of forest cover, either naturally (by natural seeding, coppice, or root suckers) or artificially (by direct seeding or planting).
- ♣ **Forestation** is the establishment of forest growth on areas that either had forest or lacked it. Reforestation and afforestation are categories of forestation.
- ♣ **Reforestation** is the natural or intentional restocking of existing forests and woodlands that have been depleted, usually through deforestation. Reforestation can be used to rectify or improve the quality of human life by soaking up pollution and dust from the air, rebuild natural habitats and ecosystems, mitigate global warming since

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forests facilitate bio-sequestration of atmospheric carbon dioxide, and harvest for resources, particularly timber, but also non-timber forest products.

- ♣ **Natural Area** defined as an area of unique scenic, historic, geologic, or ecological value and of sufficient size and character to allow its maintenance in a natural condition by the operation of physical and biological processes, usually without direct human intervention.

These areas are set aside to provide locations for scientific observation of natural systems, to protect outstanding examples of natural interest and beauty. Natural areas can serve as refuges for hunted, threatened, or imperiled species of plants and animals, such as demonstrated for geotopically migrant birds and large vertebrates.

While conducting any conservation activities each practice require different tools and equipments. Among the available materials same one should have to identify the one which can be used for the existing practice

**Tools and equipment for conservation and afforestation work may include:**

**1. Secateurs**

They are strong enough to prune hard branches of trees and shrubs, sometimes up to two centimeters thick. They are used in gardening, arboriculture, farming, flower arranging, and nature conservation where fine-scale habitat management is require



Pruning tools

**2. Spade**

A spade is a tool designed primarily for the purpose of digging or removing earth.

With a metal tip, a spade can both break and move the earth in most situations, increasing efficiency.

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Small spade for clay soil; the other one for sandy soil and loamy soil

### 3. Rake

A rake is a tool used to gather or loosen material or to grade or level a surface.

There are two major kinds of rakes: an attachment for a tractor and a hand tool.



Field rake

### 4. Shovels

A shovel is a tool for digging, lifting, and moving bulk materials, such as soil, coal, gravel, snow, sand, or ore.



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## 7. Watering equipment's



Fittings Watering

### Mix & Match Sprinkler System



- Sprayer: is a tool that adds liquids in small drops on the required place.
- Traditional hoe: for loosen the soil
- Flat pronged fork : for loosening the soil; To lift bare-rooted seedlings and to turn over compost
- Tracing line:

Others (Machete, Flexible steel wire, trowels, Pruning knives, shears, Wheel barrel, Watering can, Pot cutting roll, Scoop, Sieve, Funnel-

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## 1.2 Conducting Checks on all materials, tools and equipment

Before you go to the field work you should have to check the sufficiency of the material (availability), faulty items reported and check on the quality of tools to operate on the field. Before and after using the different materials in the field it is very important to check the equipment. This makes the equipment free from some things unpleasant, undesirable, damaging that happen unexpected during work operation in the work place. If the materials are damaged it is possible to report to the supervisor immediately. Every nursery should have a sufficient supply of tools for different operations. A good care should be taken of the tools, which would then have a long life. It is not wise to keep workers sitting idle at critical periods of work because of shortage of tools. All tools should be hung or otherwise stored in fixed place in the nursery where they can be readily found. They should be stored in-groups of similar articles so that checking to ensure that all have been returned after work done at a glance.

## 1.3 Using techniques when loading and unloading materials

Safety is just as important during loading and unloading materials, as it is during actual transportation. The loading and unloading safety procedures contained in the Hazardous Material Regulations (HMR).

### Basic Safety Procedures

The following rules apply for loading and unloading hazardous materials:

- ♣ Secure packages, including palletized loads, against shifting within a vehicle during transportation. Securing can be accomplished through tying, blocking and bracing the load. Secure bottles of compressed gases to prevent damage to their valves.
- ♣ Load packages with orientation marks (up arrows) so that the marks remain pointed up.
- ♣ Do not allow any smoking or any source of ignition on or near the vehicle when loading/unloading flammable materials.
- ♣ Set the handbrake on the vehicle before loading/unloading.

## 1.4 Selecting and checking Suitable personal protective equipment (PPE)

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Personal protective equipment's (PPE): are devices worn, put on, tied on, or inserted in such as hearing protectors inserted in the ears of workers for protection against industrial hazard health hazards and accidents.

Personal protective equipment's are used:

- ♣ As supplementary means of protection, and
- ♣ As direct means of protection

These materials include:

- ⇒ Protective clothing,
- ⇒ Eye and face protectors,
- ⇒ Ear protectors,
- ⇒ Head protectors(safety helmets),
- ⇒ Respiratory protectors,
- ⇒ Hands and arm protectors,
- ⇒ Foot and leg protectors,
- ⇒ Other personal protective equipment's.

**Consider these factors when selecting PPE:**

- Type of hazardous materials, processes, and equipment involved
- Routes of potential exposure (ingestion, inhalation, injection, or dermal contact)
- Available engineering controls
- Correct size for maximum protection
- Minimal interference with movement

### **1.5 Providing conservation support according to OHS requirements and workplace information**

#### **What is occupational health and safety?**

Occupational health is concerned with health in its relation to work and the working environment. OHS is aiming at the adaptation of work to man and of each man to his job.

Occupational health and safety is a discipline with a broad scope involving many specialized fields. In its broadest sense, it should aim at:

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- the promotion and maintenance of the highest degree of physical, mental and social well-being of workers in all occupations;
- the prevention among workers of adverse effects on health caused by their working conditions;
- the protection of workers in their employment from risks resulting from factors adverse to health;
- the placing and maintenance of workers in an occupational environment adapted to physical and mental needs;
- the adaptation of work to humans

**Hazards are classified into five different types.**

These are

- **physical** - includes floors, stairs, work platforms, steps, ladders, fire, falling objects, slippery surfaces, manual handling (lifting, pushing, pulling), excessively loud and prolonged noise, vibration, heat and cold, radiation, poor lighting, ventilation, air quality
- **mechanical and/or electrical** - includes electricity, machinery, equipment, pressure vessels, dangerous goods, forklifts, cranes, hoists
- **chemical** - includes chemical substances such as acids or poisons and those that could lead to fire or explosion, cleaning agents, dusts and fumes from various processes such as welding
- **biological** - includes bacteria, viruses, mould, mildew, insects, vermin, animals
- **Psychosocial environment** - includes workplace stressors arising from a variety of sources.

**1.6 Identifying and reporting OHS hazards**

A hazard is a source or potential source of human injury, ill health, or disease.

**Identifying hazards in the workplace are:**

Step 1: Identify the hazards (Identify all hazards associated with the systems of work)

Step 2: Assess the risks (Assess the risks arising from the hazards)

Step 3: Control the risks (Decide on and use appropriate control measures)

Step 4: Monitor and review (A cyclical process frisk management programs)

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## 1. Identify the hazards

Hazard identification is identifying all situations or events that could cause injury or illness.

Hazards are classified into five different types. They are: Physical, mechanical and/or electrical, chemical, biological, psychosocial and environment hazards.

## 2. Assess the risks

### Assessment of risks

When you identify a hazard, do a risk assessment. A risk assessment process means you

- Gather information about each identified hazard.
- Consider the number of people exposed to each hazard and the duration of the exposure.
- Use the information to assess the likelihood and consequence of each hazard.
- Use a risk assessment table to work out the risk associated with each hazard.
- Conduct regular, systematic inspections of the workplace.
- Observe what hazards exist in the workplace and ask, ‘what if?’
- Listen to feedback from the people performing work tasks.
- Maintain records of the processes used to identify hazards.
- Talk to your health and safety representatives.

You should consider the following factors during the risk assessment process

- The nature of the hazard posing the risk
- Combinations of hazards

## 3. Control the risks

### Control measures

The correct course of action once a hazard is identified is to use control measures. These generally fall into three categories. You can:

- eliminate the hazard
- minimize the risk
- Use ‘back-up’ controls when all other options in the previous categories have been exhausted

The best way to control a hazard is to eliminate it.

Minimizing the risk

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- ✓ It can be done by: substitution (e. g. substitute a hazardous chemical with a less dangerous one), modification (e.g. redesign plant to reduce noise levels), isolation (e.g. isolate copying equipment and other machinery in soundproof rooms to reduce fumes and noise)

Or, Engineering controls

If you cannot eliminate a hazard or make a substitution to eliminate it, and then reduce the chance of hazardous contact. Redesign equipment, work processes or tools to reduce or eliminate the risk. For example,

- ♣ use mechanical aids to minimize manual handling injuries

Employees have a responsibility to use PPE in accordance with their training and safe usage requirements. For example

- ♣ wear earplugs in noisy areas

#### 4. Monitor and review

##### A cyclical process

Risk management programs are cyclical, once current workplace hazards are successfully controlled the process does not stop. Systematic monitoring and reviews must be implemented because of the potential for new hazards to be introduced into a workplace.

<b>Self-Check 1</b>	<b>Written Test</b>
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Name: \_\_\_\_\_

Date: \_\_\_\_\_

*Directions:* Answer all the questions listed below. Illustrations may be necessary to aid some explanations/answers.

1. What do mean by conservation? (5 points)
2. What is the important of conserving or protecting natural areas? (5 points)
3. What tools and equipment are required for conservation and afforestation work (5 pts.)
4. Explain the guidelines governing the administration of Natural Areas. (5 points)
5. Give some ways to improve natural area conservation in a certain area. (3 point)

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6. What are the factors considered when we select PPE. (3pts.)

**Note: Satisfactory rating - 13 points and above      Unsatisfactory - below 13 points**

**You can ask you teacher for the copy of the correct answers.**

<b>LAP Test</b>	<b>Practical Demonstration</b>
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Name: \_\_\_\_\_ Date: \_\_\_\_\_

Time started: \_\_\_\_\_ Time finished: \_\_\_\_\_

***Instructions:***

1. You are required to perform any of the following:

1.1 Request your teacher to arrange for you to visit the nearby conservation area. You should identify important tools, materials and equipment. Submit your report to your teacher for evaluation.

1.2 Request a set of conservation equipment, then perform the following tasks in front of your teacher

- Name of the tool and
- Its application

1.3 Request your teacher for evaluation and feedback

<b>InformationSheet-2</b>	<b>Undertake conservation and afforestation work as directed</b>
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**2.1 Providing Instructions and directions for conservation and afforestation work**

Supervision is the set of activities carried out by a person in order to oversee the productivity and progress of employees who report directly to that person in an organization. Supervision is a management activity and supervisors typically are considered to have a management role, particularly a leadership role, in the organization.

To Truly Understand Supervision, Be Acquainted With Its Broad Content

--- Know How Organizations Are Typically Structured and Operate

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- Know Major Functions in Management in Organizations
- Know Which Leadership Approach to Use and When in Organizations

Typical Roles in Supervision

- Advocate
- Boss
- Coach
- Facilitator
- Mentor
- Trainer

Typical Responsibilities of a Supervisor

- Designing Job Roles
- Hiring Employees
- Training Employees
- Employee Performance Management
- Leading Employees
- Organizing Teams
- Leading Teams
- Ensuring Conformance to Personnel Policies

In the implementation of conservation and afforestation works or undertaking conservation and afforestation activities, the first you should have to understand the direction given by your supervisors. You should also have to have a good relationship with the staff you are working with and the clients (the farmers and people from other institution that the conservation activity is to be implemented too). The conservation activity should be in a way that is sustainable and environmental friendly. The policies and procedures that formulated by the federal government and the regional authorities have to be referred before implementation.

**2.2 Undertake conservation and afforestation work**

**2.1.1 Undertaking conservation work**

Conservation works are to be implemented for the purpose of land management. Land management is to regulate the use of land resources and protecting them from depletion; i.e. wise

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use of resources on land. The activities under land management are basically related to soil and water conservation measures or techniques incorporation or use in our farm land, grazing land and degraded or eroded lands.

Soil conservation should be interpreted in its broader sense to include both control of erosion and maintenance of soil fertility. To achieve this, control of erosion is one necessary, but by no means sufficient condition. Equally important is maintenance of physical, chemical and biological properties, including nutrient status which together lead to soil fertility.

A broader field is that of soil and water conservation, since reduction in water loss through runoff is an integral part of soil conservation.

**Therefore:** soil conservation = maintenance of soil fertility.

This requires:

- control of erosion
- maintenance of organic matter
- maintenance of soil physical properties
- maintenance of nutrients
- Avoiding of toxicities.

The purpose of soil conservation is to obtain the maximum sustained level of production from a given area of land whilst maintaining soil loss to predetermined level, theoretically a balance, at which the rate of soil loss and soil formation occurs, known as soil loss tolerance which is an acceptable level of erosion. In geological erosion, this acceptable level is in the order of magnitude of 1-10tons/ha/year, corresponding to 0.08-0.8mm of topsoil disappearing annually.

In addition, there may be a need to reduce erosion to control the loss of nutrients from an agricultural land and replace those lost by any case; to decrease of the rates of sedimentation in reservoirs, rivers dams etc; and to limit crop damage by flood or wind.

Since erosion is a natural process, it cannot be prevented but it can be reduced to an acceptable limit. The soil conservation techniques used to combat and control erosion must be designed to do their job efficiently. Their design, layout and construction must be carried out even more accurately. More damage can be caused by improperly surveyed and constructed structure than when there was no any protection measure at all.

Their ultimate success depends on how well the nature of the erosion problem has been identified and on the suitability of the conservation measures selected to deal with the problem

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and relate to as a part of integration for the whole area or land use rather than working for individual piece of arable land.

In addition, maintenance of organic matter and soil physical properties should be incorporated in soil conservation practices to increase infiltration capacity of the soil; reduction of runoff; improving the aggregate stability of soil.

Soil conservation measures can be grouped as follows:

1-Cultural/biological/agronomic

2-Physical/mechanical



Re-vegetation is often undertaken on degraded lands. Photo: Gregory Heath, CSIRO

**Natural area conservation work may include:**

**Land management fieldwork:** including assisting with setting out of conservation works and earthworks, site surveying, manual excavations, erection of structures, draining of dams or other holding areas, and on-site erection or dismantling of structures such as protective fences and signs.

### **2.1.2 Undertake afforestation work**

Afforestation is planting of trees in areas that have not previously held forests. (**Afforestation** is the planting of trees in deforested areas.)

**Afforestation** is the restocking of existing forests and woodlands which have been depleted, an effect of deforestation. Afforestation can be used to improve the quality of human life by soaking up pollution and dust from the air, rebuild natural habitats and ecosystems, mitigate global

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warming since forests facilitate bio sequestration of atmospheric carbon dioxide, and harvest for resources, particularly timber.

The term afforestation is similar to **reforestation**, the process of restoring and recreating areas of woodlands or forests that may have existed long ago but were **deforested** or otherwise removed at some point in the past.



Before afforestation

after afforestation

*Figure 1. Areas before and after afforestation*

**Trees may be planted:**

- ♣ To provide timber and wood pulp;
- ♣ To provide firewood in countries where this is an energy source;
- ♣ To bind soil together and prevent soil erosion and to act as windbreaks.

**Environment and afforestation**

The effects of an increasing population, growing pollution and the consequent decrease in forest area on the environment are well known. Afforestation is the answer to some extent, but needs to be carried out in a structured way with thorough knowledge of local environment, vegetation, soil type and socio-economic issues; not knowing or ignoring local conditions can prove extremely dangerous to the ecosystem.

A sustainable and well-planned afforestation project helps improve soil conservation, management and water quality. Afforestation projects undertaken without a complete understanding of the surroundings can cause additional environmental damages. For instance, fast-growing trees commonly used in timber plantations consume huge amounts of water, hence

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depleting water resources around the area. There are also concerns about irreversible changes in the soil caused by exotic species. For example, pine trees are known to turn the soil acidic. The water from the soil eventually trickles down to local streams and water bodies, which, in turn, causes harm to both the water and land ecosystems.

The concern mainly arises with large-scale monoculture tree plantations in Third World countries. Such plantations are usually set up for the purposes of abundant and cheap supply of raw materials to industrialized countries. A number of non-government organizations have joined hands to form a global network in order to share information and implement joint action against such plantations.

**Afforestation can apply**

**A. For areas of degraded soil**

Some places, forests need help to reestablish themselves because of environmental factors. For example, in arid zones, once forest cover is destroyed, the land may dry and become inhospitable to new tree growth. Other factors include overgrazing by livestock, especially animals such as goats, cows, and over-harvesting of forest resources. Together these may lead to desertification and the loss of topsoil; without soil, forests cannot grow until the long process of soil creation has been completed - if erosion allows this.

**B. For harvesting**

Reforestation need not be only used for recovery of accidentally destroyed forests. In some countries, such as Finland, the forests are managed by the wood products and pulp and paper industry. In such an arrangement, like other crops, trees are replanted wherever they are cut. In such circumstances, the industry can cut the trees in a way to allow easier reforestation. In Canada, the wood product and pulp and paper industry systematically replaces many of the trees it cuts, employing large numbers of summer workers for tree planting work.

Reforestation, if several native species are used, can provide other benefits in addition to financial returns, including restoration of the soil, rejuvenation of local flora and fauna, and the capturing and sequestering of 38 tons of carbon dioxide per hectare per year.

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The reestablishment of forests is not just simple tree planting. Forests are made up of a diversity of species and they build dead organic matter into soils over time. A major tree-planting program in a place like this would enhance the local climate and reduce the demands of burning large amounts of fossil fuels for cooling in the summer.

**C. For climate change mitigation**

Forests absorb carbon dioxide through their photosynthesis cycle, and by using this idea, increasing forests with reforestation and discouraging deforestation will help mitigate global warming. Forest ecosystems are especially important to the global carbon cycle in two ways. First, they are responsible for moving around three billion tons of anthropogenic carbon every year. This amounts to about 30% of all carbon dioxide emissions from fossil fuels. Second, forest ecosystems are terrestrial carbon sinks in that they store large amounts of carbon which accounts for as much as double the amount of carbon in the atmosphere.

There are four major strategies available to mitigate carbon emissions through forestry activities: increase the amount of forested land through a reforestation process; increase the carbon density of existing forests at a stand and landscape scale; expand the use of forest products that will sustainably replace fossil-fuel emissions; and reduce carbon emissions that are caused from deforestation and degradation.

**Maintenance of conservation and afforestation areas**

**Weed control**

If not properly managed, weeds can create several problems. They can compete with trees, especially young ones, for water, nutrients, and even sunlight.

Weeds can also enhance the activities of other pests such as insects, mites, nematodes, and diseases, and create a fire hazard when they dry up in the summer.

**Weed controlling can be performed by;**

Mulching, applying Cover crop (Be sure to select a cover crop such as fall-seeded cereal crops (wheat, oat, cereal rye, or barley), that will not compete with the trees)

**Herbicides**

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Before using any herbicide, identify the weed species to be controlled, then read and follow product label directions carefully.

### **Pre-emergence Herbicides**

Pre-emergence herbicides are applied to bare soil and are leached into the soil with rain or irrigation where they are active against germinating weed seeds.

### **Post-emergence Herbicides**

Post-emergence herbicides are applied to control weeds already growing in the orchard. They may be contact herbicides or translocation (systemic) herbicides. Contact herbicides kill only the parts of the plants that are actually sprayed good coverage and wetting are therefore essential.

### **Cultivation**

This is best accomplished when weeds are still in the seedling stage; it becomes more difficult when weeds are allowed to get large.

### **Animals**

Sheep will eat almost all weeds down to ground level, which reduces weed competition, but does not eliminate it. Be careful about browsers, they eat trees.

### **Mulching**

#### **Benefits of Mulching**

Conserving moisture, adds organic matter to soil, provide insulation, discourages weeds, reduces soil erosion, protects trunk, and looks nice.

#### **Improper Mulching Can Kill Trees**

One of the most common mulching mistakes is *over-mulching*. *Over-mulching* exacerbate the lack of oxygen in the soil (suffocation).

Another common mulching mistake is *placing the mulch against the trunk of the tree*.

Excess moisture at the base of the tree can favor bacterial and fungal diseases that attack and kill inner bark tissues.

### **Pruning**

Pruning is the removal or reduction of certain plant parts that are not required, that are no longer effective, or that are of no use to the plant. It is done to supply additional energy for the development of flowers, fruits, and limbs that remain on the plant. Essentially, it involves removing plant parts to improve the health, landscape effect, or value of the plant. By cutting

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back lateral branches, the tree or shrub is trained to develop a desired shape, to fill in an open area caused by storm or wind damage or to keep it in bounds to fit a given area.

Pruning can be done at any time of the year; however, recommended times vary with different plants.

Prune plants damaged by storms or vandalism or ones with dead limbs as soon as possible to avoid additional insect and disease problems that may develop.

### **Fertilizing**

Fertilizer is not plant food. Plants use water, carbon dioxide, elements from fertilizer, and energy from the sun to produce their own food. Synthetic (manufactured) and natural (sometimes incorrectly called organic) fertilizers provide nutrients for plant growth.

Addition of the correct amount of fertilizer can promote healthy flower production and foliage growth while an excessive fertilizer application can decrease plant health and can lead to decline and death.

Fertilizer applications are used during the growing season to improve the health and appearance trees. Most deciduous trees should be fertilized once every two to three years. Evergreens may be fertilized in the spring, but less often than deciduous trees.

### **Methods of application**

1. Homeowners have two main methods of applying fertilizer to trees. The fertilizer can be applied directly to the soil surface or it can be applied below the soil surface via augured holes.
2. Spreading the fertilizer on the soil surface is the easiest and least expensive method

### **2.3 Carrying out interactions with other staff and clients**

The purpose of this topic is to determine the minimal components of a self-management program necessary to increase positive interactions among staff and clients at work place. Interactions between clients and staff should provide opportunities to develop an understanding of self and others and are characterized by warmth, personal respect, individuality, positive support, and responsiveness. Staff good interaction facilitates interactions among clients to provide opportunities for development self-esteem, social competence, and intellectual growth and accountability as well as transparency in the work.

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## **2.4 Observing policy and procedures in relation to workplace handling and disposal of materials**

### **What is a workplace policy?**

Policies are a statement of purpose, which highlight broad guidelines on action to be taken to achieve that purpose. The statement of purpose should not be more than one page in length, but this will vary depending on the policy. Procedures explain how to perform tasks and duties.

### **The Key Guiding Principles environmental policies of Ethiopia are:**

- a. Every person has the right to live in a healthy environment;
- b. Sustainable environmental conditions and economic production systems are impossible in the absence of peace and personal security. This shall be assured through the acquisition of power by communities to make their own decisions on matters that affect their life and environment;
- c. The development, use and management of renewable resources shall be based on sustainability;
- d. Full environmental and social costs (or benefits foregone or lost) that may result through damage to resources or the environment as a result of degradation or pollution shall be incorporated into public and private sector planning and accounting, and decisions shall be based on minimizing and covering these costs;
- e. Conditions shall be created that will support community and individual resource users to sustainably manage their own environment and resources;
- f. As key actors in natural resource use and management, women shall be treated equally with men and empowered to be totally involved in policy, program and project design, decision making and implementation.

### **So we should dispose the waste in accordance with the frame works of the environmental policy as follows**

#### **1. Land Clearing Debris**

Waste materials (vegetative /green wood) removed from a site:

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## 2. Facility Design

The Contractor is responsible for the means, methods, techniques, sequences, and procedures of construction, which include waste disposal methods. However, the A/E's design team can contribute to waste reduction in several ways. These include:

### 3. Construction Contract Requirements

The Owner and their A/E must determine how their waste management requirements will be represented in the contract documents and incorporated into the project. Several provisions are relevant to the project's overall waste reduction performance

#### 2.5 Reporting problems or difficulties in completing work

The possible problems in conservation work are the problems that affect the participation of farmers. The rest are incorporated under these categories. These obstacles of participation are:

- Structural obstacles: e.g. centralized government structure
- Administrative obstacles: i.e. bureaucracy, technical weakness, attitude
- Social obstacles: cultural, dominancy, poverty and attitude

Most conservation projects concluded without difficulties and the people near by the area will be satisfied with the implemented project. Unfortunately, we may face unforeseen occurrences or difficulties. Some of the common factors why some conservation actions succeed while others do not may be:

- local climate
- labor availability
- equipment utilization
- local cultural characteristics
- conservation site availability
- extent of conservation work
- material shortage
- non-working holidays

Problems or difficulties in completing work to required standards or timelines and reported to supervisor.

**Complete your work:** we try to complete a conservation work by estimated materials and labor costs. In order to successfully bid your job you need to know all aspects of what it is going to cost in order to complete the job.

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**Plan your project carefully**

Study your plans carefully, walk through the project and approve the plans in writing before work begins. Unsuccessful studies of design result in difficulties in completing work.

- ♣ Visit the site where we are going to conserve
- ♣ Estimate your materials costs
- ♣ Communicate with all the concerned bodies

Take immediate action as needed. When permanent correction takes time, take any temporary measures you can, such as roping off the area, tagging out equipment, or posting warning signs.

<b>Self-Check 1</b>	<b>Written Test</b>
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Name: \_\_\_\_\_

Date: \_\_\_\_\_

*Directions:* Answer all the questions listed below. Illustrations may be necessary to aid

1. Why some actions of conservation work succeeds while others do not? (5 points)
2. Mention the three categories of nature conservation. (5 points)
3. What tools and equipment may be required for pruning work? (3 points)
4. Explain the method of weed control. (5 points)
5. Why improper/over mulching can kill trees? (2 point)
6. What is the purpose of interaction with other staff and clients (2pts.)
7. Why we plan conservation area carefully? (3points)

**Note: Satisfactory rating – 12.5 points and above**

**Unsatisfactory – below12.5 points**

<b>LAP Test</b>	<b>Practical Demonstration</b>
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Name: \_\_\_\_\_

Date: \_\_\_\_\_

Time started: \_\_\_\_\_

Time finished: \_\_\_\_\_

**Instructions:**

1. You are required to perform any of the following:

A. Request your teacher to arrange for you to join a survey team. Make sure you survey an area using the GPS survey process. Submit your outputs to your teacher for evaluation.

B. Request a set of survey instruments and ancillary equipment, then perform the following tasks in front of your teacher.

- Measure slope gradient and
- Make counter line
- record data from the survey instrument

2. Request your teacher for evaluation and feedback

<b>Information Sheet-3</b>	<b>Store, handle and stockpile materials and equipment</b>
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#### **1.4 Storing plant debris and waste material produced during conservation activities**

After conservation activities are implemented according to their specification the next activity would be safely remove and store materials that left after work.

#### **Materials storage**

Safe and efficient materials storage depends on good co-operation and co-ordination between everyone involved including, client, contractors, suppliers, and the construction trades.

On all project, the arrangements for materials storage should be discussed and agreed between contractors and the project client. Larger notify able projects should have arrangements for materials storage included in the Construction phase plan.

#### **Waste management**

There is other legislation governing the proper disposal of waste, ranging from low through to hazardous waste.

Top tips for waste management on smaller projects:

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- ♣ **Flammable materials** make sure that all flammable waste materials (such as packaging and timber off cuts) are cleared away regularly to reduce fire risks;
- ♣ **Work areas** - make clearing waste a priority for all trades. Check that everyone is aware of what is required that it is being done;
- ♣ **Skips** - waste materials need storing safely before their removal from the site so make sure that you allow sufficient space for waste skips and bins etc. Plan where the skips can be positioned and how often they will need to be collected;
- ♣ **Waste within buildings** - consider waste generated inside the building and whether you need to provide wheeled bins or chutes etc. to enable it to be brought out of the building safely;

### 3.2 Disposing of waste material to the designated area

Waste processing means any process that modifies the characteristics or properties of waste, including, but not limited to, treatment, incineration, composting, separation, grinding, shredding, and volume reduction; provided, that it does not include the grinding or shredding of landscaping or land clearing wastes or unpainted, unstained, and untreated wood into mulch or other useful products.

**Disposal:** Removing surplus soil material, unsuitable topsoil, obstructions, demolished materials, and waste materials including trash and debris, and legally dispose of them off Owner's property. Separate recyclable materials produced during site clearing from other non-recyclable materials. Store or stockpile without intermixing with other materials and transport them to recycling facilities.

➤ **Designated area of waste material for compost preparation**

“Composting” means the process by which biological decomposition of organic solid waste is carried out under controlled aerobic conditions, and which stabilizes the organic fraction into a material which can easily and safely be stored, handled and used in an environmentally acceptable manner. The presence of anaerobic zones within the composting material will not cause the process to be classified as other than composting. This is the best way of processing plant debris and waste,

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Separation distances are necessary in order to minimize potential environmental conflicts

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between non-compatible land uses, to minimize odour related problems and to ensure the integrity of groundwater systems.

**Table. Separation Distances for Composting Facilities**

	<b>Separation Distance</b>
<b>Neighboring Properties:</b>	
Dwelling	400m
commercial building	300m
industrial building	300m
Farm	100m
<b>Roadways:</b>	
right of way of a local road and arterial or collector highways	50m
<b>Watercourses:</b>	
rivers/streams	150m
private well	150m
Lakes	300m
<b>Buffer Zones:</b>	
minimal buffer strip between composting facility boundary and adjacent property	30m

*Note: compost is a fertilizer made from leaves, weeds, manure, house hold waste and other organic material.*

✓ **Compost**

Compost is organic matter that has been decomposed and recycled as a fertilizer and soil amendment. The decomposition process is aided by shredding the plant matter, adding water, and ensuring proper aeration by regularly turning the mixture

**Ingredients**

**Composting organisms require four equally important things to work effectively:**

1. **Carbon:** For energy, the microbial oxidation of carbon produces the heat.
  - High carbon materials tend to be brown and dry.
2. **Nitrogen:** is used to grow and reproduce more organisms to oxidize the carbon.
  - High nitrogen materials tend to be green (or colorful, such as fruits and vegetables) and wet.
3. **Oxygen:** for oxidizing the carbon, the decomposition process.
4. **Water:** in the right amounts to maintain activity without causing anaerobic conditions.

**3.3 Stockpiling Surplus materials for removal**

A **stockpile** is a pile or storage location for bulk materials, forming part of the bulk material handling process.

Proposing to stockpile surplus material adjacent to the future/removal is very essential activity. The placement of the surplus fill material will be ongoing for approximately four months subject to weather. The placement of the surplus fill material will be ongoing for approximately four months subject to weather. The material will be re-used on future works.

Some studies indicate that about 38,500 cubic meters of material will be placed to a maximum height of about 5.7 meters. The material will be stabilized with vegetation to prevent erosion and dust and will be monitored regularly.

**Storage/Stockpiling**

Areas used for storage of materials are reviewed to ensure that:

- The stockpile is not placed within the clear zone.
- Trucks and other equipment can access the stockpile in a manner that does not impede the flow of traffic.

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- Sight distance is adequate for loaded trucks leaving the area.
- The stockpile will not create a dust hazard for motorists either when the material is produced or when the trucks are being loaded.
- The stockpile should be located to minimize erosion or sedimentation near riparian areas.
- Access to the public is prevented when possible.
- When stockpiling, the following should be considered:
  - Care should be taken when stockpiling in storage facilities. Materials must not be stacked against non-reinforced walls.
  - Stockpiles should be constructed by using stacking conveyors, dozers or loaders whenever possible. Use of trucks to build the stockpile should be a last resort.
  - Extreme caution must be used to eliminate personal injury or equipment damage when stockpiling with trucks.

### **3.4 Maintaining a clean and safe work site while completing conservation activities**

For better environment, all its components should be protected from pollution and the surroundings should be clean. We need to take good care of our land, water resources, forests and atmosphere. It is also necessary to ensure a balance between these resources and living creatures, to meet our needs.

Maintaining a clean environment is important for a number of reasons:

- A clean environment promotes the growth of the natural ecosystem. This includes all forms of life, from trees to tree dwelling animals. The continuation of species is something many people are deeply concerned with, especially considering the cost that our lifestyle accrues to the environment already. Waste dumped in rural areas often leads to injuries and deaths of animals, including some endangered species.
- Many locations depend on tourism to bolster their economies. A clean environment can be a tourist attraction in itself, as people will often travel thousands of miles to spend their holidays in scenic locations. These people are less likely to visit if the environment is polluted or over industrialized and this will have negative implications for the local economy.
- A clean environment also promotes good health. Areas of filth can be rife with disease, and people who are forced to live impoverished in slums often become ill and die due to

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dirty conditions. A clean environment is essential for disease prevention, and it is important that newborn children especially avoid living in dirty conditions.

- An unclean environment may also cause depression in people living near it, due to the stress brought on by worrying about health issues and implications for wildlife.

**A few tips on how to maintain a clean and safe working environment**

Like Health & Safety, maintaining a clean work environment is the responsibility of everyone. As a professional cleaning company we are paid to clean up the workplace. At the end of each day and we take pride in this task.

Working together we can all contribute to creating a safe and healthy workplace and a professional looking facility for employees, visitors and customers?

**3.5. Maintaining a clean and safe work**

Maintenance is critical to ensure continuous productivity, to produce products of high quality and to keep company’s competitiveness. But it also has an impact on occupational safety and health.

Firstly, good maintenance is essential to keep machines and work environment safe and reliable. Secondly, maintenance itself is a high-risk activity and it has to be performed in a safe way, with appropriate protection of maintenance workers and other people present in the workplace.

Maintenance recommendations are based on industry standards and experience in reclamation facilities. However, equipment and situations vary greatly, and sound engineering and management judgment must be exercised when applying these recommendations.

A Maintenance Service requires data for good planning which can be obtained by regular monitoring. Without reliable data on costs for the different units of work and on productivity no realistic planning can be done. Later in this text, productivity data are given for machinery and manpower engaged in maintenance operations. They will be helpful when planning and costing activities if no better data are available, but a project should endeavor to have its own data based on the specific conditions of the area.

**Here are some tips how to maintain the system;**

1. Observing and if necessary cleaning the water tank before every irrigation as well as possible. Filling the tank only when it is clean.
2. Observing and if necessary cleaning the filter before every irrigation and if necessary during irrigation.
3. Checking for clogged drippers and replacing them by in-line drippers. (Or using connectors to connect pipe section of 10 cm with dripper.)
4. Opening the drip laterals and flushing it after the last irrigation and before the next first irrigation.
5. In case of leakage, fixing the leaking fitting or replacing it.

**3.6. Handling and transporting materials, equipment and machinery**

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### 3.6 Materials handling, storing and transporting

**Material handling equipment** is any tool used to aid in the movement, protection, storage, and control of materials and products. The equipment used to do so can be broken down into four main categories. Each category has a wide variety of useful equipment that makes safely moving heavy materials or large volumes of materials easier.

➤ **Storage and Handling Equipment**

The title of this equipment category is pretty self-explanatory. Storage equipment is used to hold materials while they wait to be transported from the manufacturer or wholesaler to their final destination. Having the right storage equipment can increase efficiency on the production floor and maximize space utilization- two very important factors in any production environment.



**Examples of storage and handling equipment include:**

- **Racks:** such as pallet racks, drive-through or drive-in racks, push-back racks, and sliding racks
- **Stacking frames:** these are interlocking units that enable stacking of a load so crushing doesn't occur
- **Shelves**
- **Bins and drawers**
- **Mezzanines:** elevated floor systems that are installed between the production floor and ceiling in order to provide additional storage space. Most of these structures can be dismantled and moved with ease.

**Engineered Systems**

**This type of material handling equipment** are typically automated units that work together to enable efficient storage and transportation of large materials or large volumes of materials around the production floor. Examples of engineered systems include:

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- **AS/RS:** Automated Storage and Retrieval Systems (abbreviated as AS/RS) are large automated structures that involves racks, aisles and shelves that are accessible by a type of mechanized shuttle system (like a cherry picker) for the quick retrieval of items.
- **Conveyor systems:** Automated conveyor systems carry heavy materials to specified destinations using belts, flexible chain, or live rollers. It is a highly efficient equipment to move large volumes of material quickly.
- **Robotic delivery systems**– These automated systems are ideal for moving products on an assembly line or transporting goods throughout a plant or warehouse.
- **Automatic guided vehicles**– These vehicles are mobile robots that follow specific markers or wires in the floor to move large materials around a manufacturing facility or warehouse. Vision, magnets, or lasers can also be used as methods for AGV navigation.

### **Industrial Trucks**

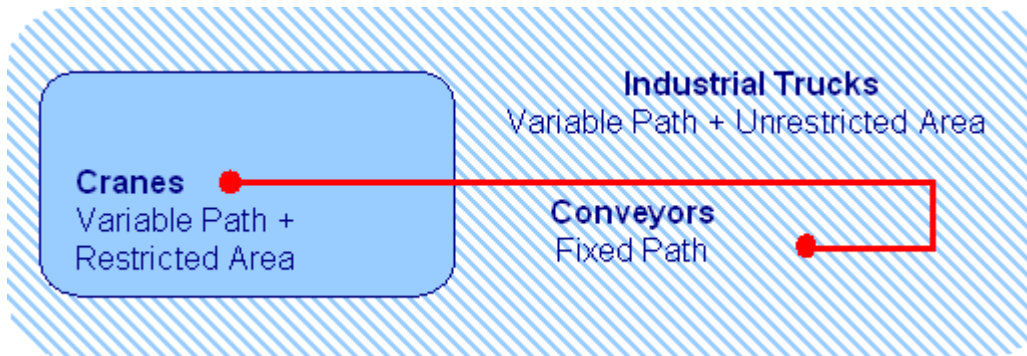
Powered industrial trucks, such as forklifts, are used to move large materials or large quantities of materials around the manufacturing floor. They are also utilized to efficiently load (or unload) heavy objects onto delivery trucks. Industrial trucks are very useful when there is insufficient flow volume to justify the implementation of a conveyor system. Examples of industrial trucks include:

- **Hand trucks**– Also known as a dolly, or box cart. Hand trucks are l-shaped box-moving handcarts with handles at one end, wheels at the base, and a ledge to set objects on.
- **Pallet jacks**– These are tools are the most basic form of a forklift and used to lift and move pallets within a warehouse.
- **Pallet trucks**– Manual operated or powered industrial forklifts.
- **Walkie stackers**– A pedestrian walk-behind stacker with a mast for lifting pallets to heights.
- **Platform trucks**– These are similar to a two wheeled dolly, but with an extended deck.
- **Order picker**– An electric lift truck specifically designed for filling individual customer orders. This requires piece-part picking rather than selecting full pallets or unit loads.
- **Side loader**– Automated tool similar to a fork lift that loads and unloads from the side of the machine rather than the front.
- **Automatic guided vehicles**

### ➤ **Transport Equipment**

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Transport equipment is used to move material from one location to another (e.g., between workplaces, between a loading dock and a storage area, etc.) within a facility or at a site.



The major subcategories of transport equipment are:

- A. Conveyors. Equipment used to move materials over a fixed path between specific points.
- B. Cranes. Equipment used to move materials over variable paths within a restricted area.
- C. Industrial Trucks. Equipment used to move materials over variable paths, with no restrictions on the area covered by the movement (i.e., unrestricted area).
- D. No Equipment. Material can also be transported manually using no equipment.

<b>Self-Check 1</b>	<b>Written Test</b>
---------------------	---------------------

Name: \_\_\_\_\_

Date: \_\_\_\_\_

*Directions:* Answer all the questions listed below. Illustrations may be necessary to aid some explanations/answers.

1. Mention top tips for materials storage on smaller projects. (5 points)
2. What shall we do for Safe and efficient materials storage? (5 points)
3. Explain top tips for waste management on smaller projects (5points)
4. What is the important of compost? (7 points)

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5. Mention common items suitable for composting. (6 points)

**Note: Satisfactory rating - 14 points and above      Unsatisfactory - below 14 points**  
You can ask you teacher for the copy of the correct answers.

<b>LAP Test</b>	<b>Practical Demonstration</b>
-----------------	--------------------------------

Name: \_\_\_\_\_ Date: \_\_\_\_\_

Time started: \_\_\_\_\_ Time finished: \_\_\_\_\_

**Instructions:**

1. You are required to perform any of the following:

1.1 Request your teacher to arrange for you to a team. Then, go to practical site in the college or nearby area undertake conservation work as you have learned. Submit your outputs to your teacher for evaluation.

1.2 Request a set of conservation equipment, then perform the following tasks in front of your teacher in demonstration site

- Prepare compost and

2. Request your teacher for evaluation and feedback

<b>Information Sheet-4</b>	<b>Clean upon completion of conservation and a forestation work</b>
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**4.1 Storing plants and materials in a designated area**

Correct storage makes stock control and materials management easier and reduces damage and wastage. Improving your storage and handling of materials will result in reduced costs and improved management, quality and safety.

Benefits will arise from:

- easier recovery of stored materials and components
- a tidy site - which can help in achieving a safer and more efficient site
- reduced waste disposal costs (as fewer material and components will be wasted)
- Avoidance of reordering delayed materials.

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- reducing the risk of pollution/ spillages

***Protecting materials and components***

- Materials or components that are valuable or attractive to thieves or vandals should be stored in a secure area, out of sight of passersby.
- Would some form of mobile storage hut or container be useful, such as steel shipping containers?
- Does each trade have a use of a lockable storage box or lock-up?
- Always store materials well away from waste storage containers and from areas where vehicle movements could cause accidental damage.
- Secure lightweight materials to protect them from wind damage.
- Locate material stacks away from the edge of excavations.
- Always protect materials and components that are vulnerable to frost.
- Keep materials and components clean. If mud is a problem place materials and components on top of plastic sheeting and turn the edges of the sheeting up to protect the sides.

**Pollution Prevention**

- Store all materials inside. If this is not feasible, covered with a roof and enclosed to prevent storm water contact.
- Keep liquids in a designated area on a paved impervious surface within a secondary containment.
- Design paved areas to be sloped in a manner that minimizes the pooling of water

Identifying raw materials that can be contaminate, regular controlling of the storage area, training of employees, construction of storage shade, and space limitation for storage areas are the key pollution prevention methods.

**4.2 Cleaning, maintaining and storing tools and equipment**

**Clean tools last longer**

If nothing else, tools should be cleaned after each use. Doing so keeps diseases, fungi, insect eggs, and weed seeds from being unwittingly spread around the garden. Cleaning also extends

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the life of a tool by removing moisture-laden, rust enhancing soil from steel surfaces. For tools with a keen edge, a good cleaning keeps rust from eating the edge away.

Spades, rakes, hoes, trowels, and any other tools that come into contact with soil should be hosed off with water after each use. With the garden hose nozzle adjusted for maximum pressure, average garden soil washes away easily. To remove heavy clay soil, some scrubbing with a hard bristle brush also may be necessary. After washing any tool, dry it with a cotton rag before putting it away.

Tools that don't come in contact with soil, particularly those with sharpened edges like axes, pruning shears, and knives, should be wiped down with a thick, rough cotton cloth to remove any gums and saps from their blades. When working on pitch-producing plants like conifers, dampen the cloth with a little paint thinner before wiping. In all cases, once dirt and residue are removed, dry the tool with a clean cotton rag.



Fig.1 After every use, wash soil and grime from tools with a steady spray of water from the Garden hose

### **Apply oil to prevent rust**

Even after washing and drying, steel tool heads are still susceptible to rust when exposed to oxygen. In fact, as a general rule, the better the grade of steel used, the more vulnerable it is to rusting. So, considering the high cost of quality gardening tools, it just makes sense to keep rusting to a minimum.

Motor oil is inexpensive and effective rust preventer. When applied to steel surfaces, the oil insulates the steel and prevents it from oxidizing. To thin the oil out and make it easier to work with and to better coat both porous and smooth steel surfaces, mix one quart of non-detergent 30W motor oil (any brand will do) with a pint of kerosene or lamp oil. This 2:1 ratio of oil to

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kerosene can either then be wiped onto the steel surface with a clean cotton rag or sprayed on to metal surfaces—a recycled household-cleaner spray bottle works for me. Store the mixture away from heat sources and dispose of it as you would any motor oil.

Whichever way the oil is applied, keep the coating thin so it won't drip off the tool head and onto the floor. Because oil is organically based and breaks down rapidly in soil, you don't have to worry about this small amount of oil adversely affecting your soils.



Fig.2 Oil steel tool heads to prevent them from oxidizing.

The oil creates a barrier between the air and the steel.

**Remove rust with a wire brush**

Extremely rusty tools require special attention. Use a sheet of 80-grit sandpaper to remove light coatings of rust. For a slightly heavier coat, a stiff wire brush can be effective. But, when rust has turned a steel surface rough, like the texture of medium-grit sandpaper, a heavy-handed approach is needed.

On badly pitted steel surfaces like those on tools you find at yard sales, the quickest and most sensible option is an electric drill with a wire-brush attachment.



Fig.4 Use a wire brush to remove a layer of rust.

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Once you've removed as much rust as possible, you then apply a coat of my oil mixture to the newly exposed steel to stop the oxidation process in its tracks and keep in check the almost-invisible residual rust that you couldn't remove.

### **Sharpen tools for peak efficiency**

Sharpening tools is a slightly more complicated procedure than removing rust. Some tools like shovels, axes, hoes, and trowels are best sharpened with a hand file, while other tools like pruning shears and knives call for a honing stone. Depending on how dull an edge is, some tools may require a session with a high-speed grinding stone.

The tools needed for basic sharpening are neither expensive nor complicated. The most basic sharpening tool is an 8-inch-long mill file with a bastard cut (photo below, left), which you can purchase at any hardware store for about \$8. When sharpening a tool with a mill file, work by drawing the cutting teeth in one direction over the edge being sharpened. For best results, hold the tool steady in a clamp, vise, or other bracing system, keeping the file at an angle from the plane of the tool's working surface as you push it along the edge you are sharpening. And since sharpening edges with a mill file requires two hands, get one that has a handle on one end. This makes it easier to maneuver and get a good edge.

For pruning shears and knives, it's possible to get good results with any of the diamond, ceramic, or high-carbon steel honing devices that are on the market. However, my experience with honing knives and pruning shears is confined to oil stones, which I find easy to use. When sharpening a blade on a stone, simply slide the blade over the flat surface of the stone in one direction until you reach the desired sharpness.

No matter which device you choose to sharpen your cutting blades, it should come with directions for use.

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Fig.6 Use a hand-held mill file to sharpen hoes and shovels. The key to successful sharpening is Keeping the tool steady and the file at the proper angle.



Fig.7 Sharpen pruning blades and knives by sliding an oiled honing stone in one direction across the tool's beveled edge.

### **Grind battered tools into shape**

Since the grinding process removes metal quickly, only the most battered tools are candidates for regular grinding. Tools like lawn-mower blades and grub axes usually merit an annual trip to my grinder. An electric bench grinder is the best way to retrieve a keen edge because it has an adjustable tool-rest platform that allows for more exacting edges.

With a grinding wheel turning at several thousand rpm, the chances of overheating the steel are high. Overheated steel will lose its temper, which means its hardness becomes compromised and the tool will never be able to hold a sharpened edge for very long. So during grinding it's very important to keep the tool from getting too hot, preferably keeping the surface cool enough to touch. Periodically immersing it in water is the standard cooling procedure.

High-speed grinding should be done with caution. Even with the extra eye shields provided on some machines, you should always wear safety glasses when grinding tools. A bench

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grinder/buffer can be purchased for around \$40. You can also do some basic touch-up grinding with a small grinding wheel (less than \$10) made to fit an electric drill.



Fig.8 Grinding sharpens tools quickly.

Lawn-mower blades and axes that take a lot of abuse deserve an annual trip to a grinder

High-speed grinding should be done with caution. Even with the extra eye shields provided on some machines, you should always wear safety glasses when grinding tools. A bench grinder/buffer can be purchased for around \$40. You can also do some basic touch-up grinding with a small grinding wheel (less than \$10) made to fit an electric drill.

**NB.** Selecting the proper tool for the job and using the tool properly will increase efficiency and reduce maintenance problems.

**Power tools:**

1. Read and follow the maintenance schedule in the owner’s manual for each piece of power equipment.
2. Change the oil.
3. Clean the air filter.
4. Lubricate moving parts.
5. Sharpen dull blades or replace worn blades according to the owner’s manual.
6. Replace spark plugs.
7. Drain oil and gasoline before long-term storage.
8. Check electric cords and connections on electric-powered tools.
9. Store tools in a clean dry storage area.

**Equipment:**

1. Store equipment in a clean dry storage area.
2. Rinse and clean spray equipment after each use.

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3. Clean spreaders and check wheel-driven gears.
4. Clean carts and wheelbarrows after use.

### 4.3 Reporting work outcomes to the supervisor

We should report the work out come to supervisor. On-site supervision to insure high quality work and provide are important.

There are number of activities you should do for area conservation work. These works should record for further reporting.

### Inspection reports

The inspection report can draw attention to possible hazards. Inspection report is essential to determine whether previous recommendations implemented or not.

### Types of inspection reports:

1. Ongoing
2. Pre-operation
3. Periodic

#### 1. Ongoing inspections

Supervisors and workers continually conduct ongoing inspections as part of their job responsibilities. Such inspections identify hazardous conditions and either correct them immediately or report them for corrective action.

#### 2. Pre-operation

Pre-operation checks involve inspections of new or modified equipment or processes. Often checks are done after workplace shutdowns.

#### 3. Periodic inspections

Qualified persons periodically inspect some types of equipment, such as elevators, boilers, pressure vessels, and fire extinguishers, at regular intervals.

### What should the final report have in it?

To make a report, first copy all unfinished items from the previous report on the new report. Assign a priority level to the hazards observed to indicate the urgency of the corrective action required. For example:

- Major (requires immediate action)
- Serious (requires short-term action)

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- Minor (requires long-term action)

<b>Self-Check 1</b>	<b>Written Test</b>
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1. What is the importance of storing plant and material debris in the designated area? (5 points)
2. List down pollution prevention activities.(5 points)
3. Why maintenance and storage of tools and equipment is very important? (4 points)
4. Some equipment's/tools required oil or lubricants. Why? (give some example) (5 points)
5. Mention some ways of hand tools handling? (4 points)
6. What kind of storage is appropriate for storing equipment's/tools? (4 points)
7. How Selecting the proper tool for the job and using the tool properly will increase the efficiency and reduce maintenance problems? (3 points)
8. Discuss the following: (5 points each)
  - Ongoing
  - Pre-operation
  - Periodic

**Note: Satisfactory rating - 25 points and above      Unsatisfactory - below 25 points**  
**You can ask you teacher for the copy of the correct answers**

<b>LAP Test</b>	<b>Practical Demonstration</b>
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Name: \_\_\_\_\_ Date: \_\_\_\_\_

Time started: \_\_\_\_\_ Time finished: \_\_\_\_\_

***Instructions:***

1. You are required to perform any of the following:
  - 1.1 Request your teacher to arrange for you to visit field demonstration area. Then, assess whether the conservation field area is clean and all materials and equipment's are properly handled.
  - 1.2 Request a set of survey instruments and auxiliary equipment, then perform the following tasks in front of your teacher –
    - How to clean conservation field equipment and
    - Prepare a report and submit what kind of problem you faced while you implemented natural area conservation work.
2. Request your teacher for evaluation and feedback.

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## REFERENCE

- Design guide line on drainage system, July,2002
- J. Nyssen et al. / Soil & Tillage Research 94 (2007) 151–163; Interdisciplinary on-site evaluation of stone bunds to control soil erosion on cropland in Northern Ethiopia

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