Natural Resources Conservation and Development Level III
Based on March 2018, Version 3 Occupational standards

Module Title: Applying Appropriate Natural Resources Extension Packages

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East Africa Skills for Transformation and Regional Integration Project (EASTRIP)

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LG #24	LO #1 Assess the biophysical and socio-economic situation of the area

Instruction sheet

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

- identifying and following OHS requirements
- Identifying source of information
- Assessing major site constraints
- Identifying solutions for constraints

This guide will also assist you to attain the learning outcomes stated in the cover page. Specifically, upon completion of this learning guide, you will be able to:

- Identify and use relevant sources of information for the purpose for the purpose
- Assesse and document major constraints related to site (edaphic and topographic), social and economic factors
- Identify and prioritize relevant solutions set
- Identify and follow appropriate OHS requirements for the work to be carried out throughout work processes

Learning Instructions:

1. Read the specific objectives of this Learning Guide.
2. Follow the instructions described below.
3. Read the information written in the “Information Sheets”. Try to understand what are being discussed. Ask your trainer for assistance if you have hard time understanding them.
4. Accomplish the “Self-checks” which are placed following all information sheets.
5. Ask from your trainer the key to correction (key answers) or you can request your trainer to correct your work. (You are to get the key answer only after you finished answering the Self-checks).
6. If you earned a satisfactory evaluation proceed to “Operation sheets

1.1. Introduction

Agriculture is the major economic activity and the well being of the peoples in Ethiopia. Though it is the major activity however, its ability to satisfy the need of the population has shown either stagnation or a very slow growth rate during the last three decade.

The countries chronic food insecurity problem is the result of cumulative effects of varies factors that have been increasing in magnitude over many years**.** Some of the major factors contributing to the current food insecurity include:

- Widening gap between the level of food production and the rapid population growth.
- Degradation of the natural resource base.
- Dominance of farming system that highly depends on rain.
- Erratic and unreliable nature of the rainfall.

Degradation of land is caused by biotic and abiotic pressures. An ever increasing population places enormous demands on land resources. These pressures have led to drastic changes in the proportion of land utilized for agricultural activities, urbanization and industrial development.

Land degradation has a direct bearing on the productivity of soil, its vulnerability to rainfall variations, scarcity of drinking water, fodder and fuel wood. Given the interlink ages of crop production, livestock economy and environment, land degradation has a major impact on the livelihoods of the people, especially in rural areas.

Some of the most degraded lands in the country are the common property resources (CPRs). CPRs are resources on which people have an equal right of use. These resources include community pastures, community forests, wastelands and common dumping and threshing grounds.

In participation of rehabilitation of degraded areas there may be different hazards will occur. One way to classify the hazard is to think about how likely it is that an injury may occur. People often use the terms hazard and risk interchangeably, but they are not the same. **Hazard** means a thing or condition that may expose a person to a risk of injury or occupational disease. **Risk** means a likelihood of injury or occupational disease.

Occupational Health and Safety (OHS): Any occurrence which results in personal injury, disease or death, or property damage. OHS is a discipline dealing with the prevention of workrelated injuries and diseases as well as the protection and promotion of the health of workers.

A hazard: A hazard is anything that has the potential to harm the health or Safety of a person.

Risk: Risk is the significance of the hazard in terms of likelihood and severity of any possible injury.

Safety: The provision and control of work environment systems and human behaviour which together give relative freedom from those conditions and circumstances which can cause personal injury, disease or death, or property damage. Hazardous Substances Any substance that has the potential to harm the health of persons in the workplace and includes chemicals scheduled under the Poisons Act, chemicals classified under the Dangerous Goods Act (1975) or Hazardous Wastes.

Forest fire incidence: Forest fires prediction combines weather factors, terrain, dryness of flammable items, factors to derive forest fire incident in a logistical regression model, and built a forest fire ignition probability model.

Factors that influence the degree of risk include:

- The type of exposure, and
- The length of time of exposure to the hazard.

The benefits of assessing and managing risks

The effective systematic management of *risks* improves worker health and safety, as well as productivity.

Eliminating and controlling *risks* in the workplace helps to:

- prevent and reduce the number and severity of workplace injuries, illnesses and associated costs
- promote and improve worker health, wellbeing and capacity to work, and
- helps to foster innovation and improve quality and productivity of work.

In conclusion, it is necessary to tie loose ends together and to differentiate hazards, damage, risk and risk management:

(1) **Hazards** are defined as "naturally occurring or human-induced process(es) or event(s) with the potential to create loss, i.e. a general resource of danger". (Smith, 1996:5)

(2) Environmental and socio-political processes may result in detrimental changes in an individual's and household's assets. While these changes do not result in easily noticeable losses they result in vulnerability increasing the chance that future hazards have a disastrous impact.

(3) Damage results from hazards and is defined as any negative impact on assets and/or the well-being of individuals and groups. Damage is often unevenly spread within one population. The extent of damage is not only dependent on the severity of the hazard but also on the vulnerability of the household.

(4) Hazards and the related damage are unpredictable. The culturally and socially embedded perception of this unpredictability is called uncertainty.

(5) Risk relates to an unpredictable or hardly predictable event which has consequences that are perceived negatively. Risks are the culturally and socially embedded perceptions of future possible damage. Risks are neither directly observable nor are they directly measurable.

(5) Risk minimization is always based on the culturally and socially embedded assessments and perceptions of past and future damage. The analysis of prior personal experiences or consensus based models is always a necessary first step for developing risk minimizing strategies. Risk minimization may be based on conscious decisions or may be embedded in custom and refers to (a) attempts at eliminating the occurrence of negatively evaluated events and (b) to strategies to decrease vulnerability and (c) to limiting the impact of damage once it has occurred.

In order to prioritize ecosystem services for conservation or restoration, it is necessary to know in which areas natural habitats have more potential to decrease exposure to flooding and erosion from sea-level rise (SLR) and storm surges. This can provide place-based information of where the natural habitats shield susceptible populations from streams and flooding.

A hazard is anything that has the potential to harm the health or safety of a person and in the case of dangerous goods, includes damage to property. OHS hazard in rehabilitation of degraded area work place include heavy materials and equipment, slippery or uneven surfaces, moving machinery and vehicles, solar radiation, and potential dangers from handling potting media, fertilizers, watering systems, and spider and insect bites.

The workplace needs to be free from these hazards, therefore all persons on a daily basis when walking and working around the property, need to be on the look out for potential hazards and report it.

Self-Check -1	**Written Test**

Directions: Answer all the questions listed below. Use the Answer sheet provided in the next page: 2 pts each choice question

Part I choice the best answer

1. Eliminating and controlling *risks* in the workplace helps to:
   a. prevent and reduce the number and severity of workplace injuries, illnesses and associated costs
   b. promote and improve worker health, wellbeing and capacity to work, and
   c. helps to foster innovation and improve quality and productivity of work.
   d. All
2. Degradation of land is caused by
   a. biotic pressures b. abiotic pressures c. agricultural activities d. all
3. Risk minimization may be
   a. Attempts at eliminating the occurrence of negatively evaluated events and
   b. Strategies to decrease vulnerability and
   c. Limiting the impact of damage once it has occurred. D. All

part II Give short answer

4. Write the differences between risk and hazards.(**6 points**)
5. List Factors that influence the degree of risk (**5 points**)

Note: **Satisfactory rating - 10 points** **Unsatisfactory - below 10 points**

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

Answer Sheet

Score = _____

Rating: _____

2.1. Introduction

Extension in **natural resource** management has moved from a single focus on soil and water conservation to tackle a wider range of environmental problems associated with agriculture, urban development, forestry and fisheries, vegetation, wildlife, biodiversity, water quality, wetlands, old growth forests etc).

Natural resources are substances that occur naturally. They can be sorted into **two** categories: biotic and abiotic. Biotic **resources** are gathered from the biosphere or may be grown. Abiotic **resources** are non-living, like minerals and metals.

The **four natural resources** are renewable, living, non renewable, and fossil fuels. They are very important to our life and existance. Renewable resorces is something that can be renewed.

2.2. **Gathering baseline information**

Baseline information is refers to collection of **baseline information** on biophysical. It refers to collection of **baseline information** on biophysical, social and economic aspects of a natural resource extension package.

Degradation of land is caused by biotic and abiotic pressures. An ever increasing population places enormous demands on land resources. These pressures have led to drastic changes in the proportion of land utilized for agricultural activities, urbanization and industrial development.

Land degradation has a direct bearing on the productivity of soil, its vulnerability to rainfall variations, scarcity of drinking water, fodder and fuel wood. Given the interlinkages of crop production, livestock economy and environment, land degradation has a major impact on the livelihoods of the people, especially in rural areas.

A key issue is deciding how much intervention is needed beyond simply protecting the site from further disturbances; that is, how many species must be deliberately brought to the site and how many can be relied upon to colonize unaided?

These biophysical changes have both social and economic impacts, with the most immediate effects being felt by communities that depend on forests for part or all of their livelihood. Forest resources provide food, medicines and firewood, resources that now have to be obtained from more distant forests. And as forest areas are reduced pressure on the remaining forests increases even more.

Baseline studies are fundamental tools for measuring success or failure (for monitoring flora and fauna changes over time and the impact of rehabilitation on the livelihoods of people). Therefore, ensuring the collection of baseline data on the biophysical and socio economical conditions is necessary to rehabilitate the degraded area.

2.3. Sources of Information

A source of information is one of the basic concepts of communication and information processing. Sources are objects which encode message data and transmit the information, via a channel, to one or more receivers.

In the strictest sense of the word, particularly in information theory, a *source* is a process that generates message data that one would like to communicate, or reproduce as exactly as possible somewhere else in space or time.

In general it is possible to group sources in to two, i.e primary source and secondary sources.

Appropriate sources in the organization context include the following

- Team members
- Suppliers
- Trade personnel
- Local government
- Industry bodies

For a better communication it is very important to identify specific needs and relevant information. It is also very important to find and accessed appropriate *sources of information.*

2.4. Communication Skills

Communication is a process of transferring information from one entity to another. Communication processes are sign-mediated interactions between at least two agents which share a *repertoire* of signs and *semiotic* rules. Communication is commonly defined as "the imparting or interchange of thoughts, opinions, or information by speech, writing, or signs".

Although there is such a thing as one-way communication, communication can be perceived better as a two-way process in which there is an exchange and progression of thoughts, feelings or ideas (energy) towards a mutually accepted goal or direction (information).

Communication is a process whereby information is enclosed in a package and is channeled and imparted by a sender to a receiver via some medium. The receiver then decodes the message and gives the sender a feedback. All forms of communication require a sender, a message, and an intended recipient; however the receiver need not be present or aware of the sender's intent to communicate at the time of communication in order for the act of communication to occur.

Communication requires that all parties have an area of communicative commonality. There are auditory means, such as speech, song, and tone of voice, and there are nonverbal means, such as body_language, sign_language, paralanguage, touch, eye_contact, through media, i.e., pictures,

There are numerous definitions of communications ranging from highly technical ones to generalized versions that suggest all human activities as forms of communications. However the following definition offered by William Scott in his organization theory appears comprehensive and especially satisfying the students of business communication since it touches all aspects of the process. Administrative communication is a process which involves the transmission and accurate replication of ideas ensured by feedback for the purpose of eliciting

Self-Check – 2	**Written test**

Name…… ID…… Date…….

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

Test I: Short Answer Questions

1. List the four natural resources (4pts.).

   _____

   _____

2. Degradation of land is caused by _____and _____pressures (2pts.).
3. What is communication (2pts.)?

   _____

Note: **Satisfactory rating - 4 points** **Unsatisfactory - below 4 points**

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

Answer Sheet

Score = _____

Rating: _____

Information Sheet 3 Assessing major site constraints

The specific **constraints** identified recently include declining soil fertility, soil erosion, drought, land shortage, deforestation, soil acidity, lack of adequate knowledge on natural resource managements are prominent among **constraints**.

Design **constraints** could include (among many others): Available technology, skills, plant, materials, labour and so on. **The** budget. Specific performance requirements. **Site** form, boundaries, conditions and neighbouring properties.
When we talk about **resource constraints**, the usual ones come to mind: food, oil and water. However we should also consider metals, phosphorous, gas and land. All are under pressure – some more extreme than others. At current rates of consumption, there are real physical **constraints** on several important materials.

The natural resources base (land, water and forest) is fundamental to the survival and livelihood of the majority of people in rural ethiopia. As indicated in the previous section, these resources are under intense pressure from population growth and in appropriate farming and management practices. Small scale farmers, who depend on these resources, face severe constraints related to intensive cultivation, overgrazing and deforestation, soil erosion and soil fertility decline, water scarcity, livestock feed, and fuelwood crisis. These factors often interact with one another and bring a downward spiral of declining crop and livestock productivity, food insecurity, high population growth rate and environmental degradation, (referred to as the nexus problem, Cleaver and Schriber, 1994).. The net result is that a re-enforcing cycle is set trapping more and more of the rural population in poverty, food insecurity and in the degradation of natural resources

The Ethiopian government is committed to reverse deforestation and forest degradation to support the continued provision of economic and ecosystem services and growth in GDP. Forestry extension is one of the tools that help to achieve the aforementioned forest development goals of the country. Therefore, Natural resources (forestry) extension agents should continuously build their knowledge and skills to: understand

the interrelationships of different land use practices with the local environment; how all these activities contribute to local human well-being, gender equality and ecological resilience; understand the needs and aspirations of women and men in the local settings people; facilitate, plan and communicate and motivate the target groups of both gender; and link between research and development. Increasing the gender sensitivity of trainers and thereafter trainees (DA, EO) involves both increasing access to services for women farmers, and changing the nature of the services offered to ensure that they meet the gender differentiated needs of Women and men farmers, as well as their common needs. These entail building capacity through in-service training, demonstration and fieldwork. Hence, the objective of this training module is to fill the knowledge and skills gaps in forestry extension to effective planning and implementation of forestry project/intervention.

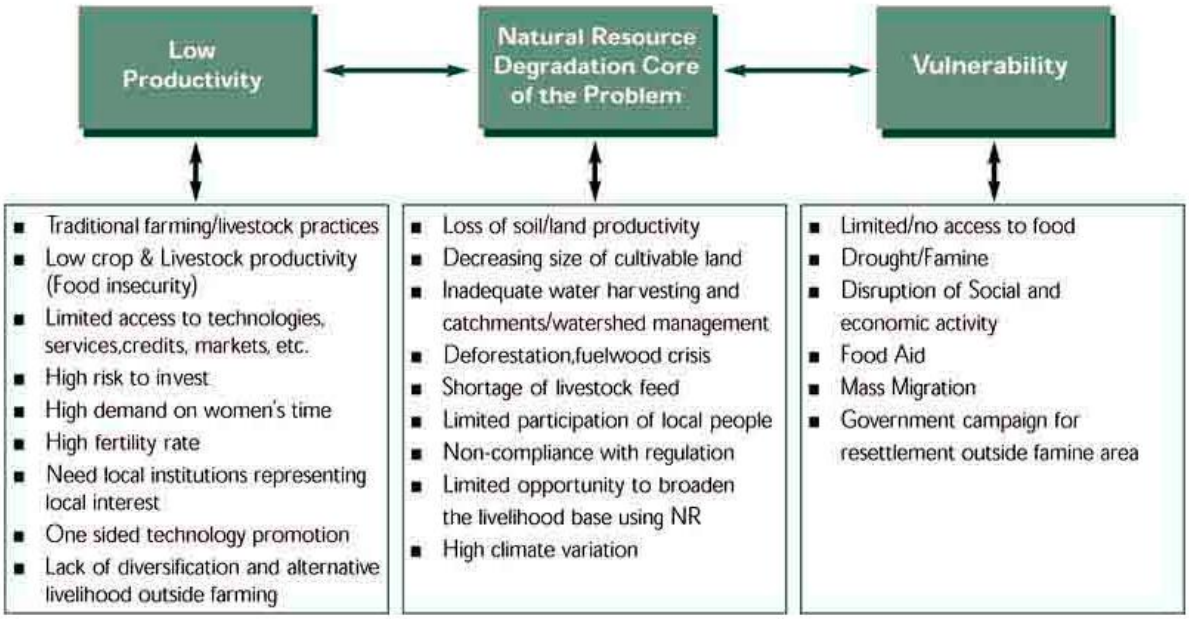

Figure 3.1. **Poverty, Food Insecurity and Natural Resources Degradation**

Key concepts and definitions

Extension communication: refers to a process of sending and receiving messages through channels which establishes common meanings between a source and a receiver and facilitate feedback. It consists of many actors who play different roles at different times. This implies communication in extension more involves a negotiation rather than a transmission.

Forestry extension refers any situation in which local people are directly and willingly involved in forestry activity, from which they will drive recognizable benefit within a reasonable period of time. Where necessary this may include activities by governmental and non-governmental organizations, to promote forestry by individuals or by group of people within a limited area.

Forestry extension methods: implies the techniques used by extension system as a means to address the extension contents and feedback to the audiences individually or in a group.

Partnership and networking: are means of establishing communication, coalition, cooperation and collaboration to solve a problem and facilitate extension message among relevant actors. Linkages help to get fund, material and technical assistance to formulate effective extension program.

Gender mainstreaming: is the process of assessing the implications for women and men of any planned action, policy or programme, in all areas and at all levels before any decisions are made and throughout the whole process. It is a strategy for making women's as well as men's concerns and experiences an integral dimension of the design, implementation, monitoring and evaluation of policies and programmes so that both women and men benefit and inequality is not perpetuated.

Extension in **natural resource** management has moved from a single focus on soil and water conservation to tackle a wider range of environmental problems associated with agriculture, urban development, forestry and fisheries, vegetation, wildlife, biodiversity, water quality, wetlands, old growth forests etc).

The government should consider mechanisms for expanding irrigation in the country through the construction of small dams and the use of other water harvesting mechanisms for use by small holder farmers as well as through private sector participation in larger scale commercial farming. The challenge is to help farmers increase production while maintaining the traditional diversity found on their farms in order to ensure food security. Getting farmers to change the management practices for their domestic animals is a major challenge. They need to restrict grazing and use more cut and carry for stall feeding in order to make better use of the feed resources available as well as conserve the energy of the animals.

Agricultural/rural consumers' and producers' cooperatives can do a lot to protect rural producers from seasonal price fluctuations that are a source of complaint in rural Ethiopia. The government, donors and agencies promoting improved production must link this production to the development of markets. Without markets, farmers will forever avoid investment for improved production.

Ethiopia has an extensive extension service, encompassing all areas of agricultural endeavour and reaching all of the major smallholder agricultural systems in the country. Ethiopian farmers have accumulated agriculturally related indigenous knowledge over generations that needs to be built into the agricultural education, research and extension systems.

Some of the major constraints are: inadequacy of national coverage of meteorological and climatological stations for effective atmospheric monitoring; weak data generation, gathering, archiving and analysing capacity; inadequacy of training and technical expertise in the areas of climate change and ozone depletion; low level of awareness about climate change and ozone depletion among policy makers, professionals and the general public; weakness of research in the area of atmospheric sciences, climate change and ozone depletion; lack of access to environmentally friendly technologies, etc.

Ethiopia is highly vulnerable to climate variability. Climate change has adverse impacts on various socio-economic activities, particularly agriculture, water resources, forestry, human health, biodiversity and wildlife. Ironically, rural Ethiopia's impact on the atmosphere is insignificant, and Ethiopia is basically rural.

Self-Check – 3	**Written test**

Name…… ID…… Date…….

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

Test I: choice best answer

1. Which one of the following are not specific constraints?

   A. soil erosion B. drought, C. deforestation D. Food secured

2. **The** natural resources base

   A. Land B. water C. forest D. all

3. : _____is the process of assessing the implications for women and men of any planned action, policy or programme

   A. Forestry extension methods C. Gender mainstreaming
   B. Partnership and networking D. All

4. Climate change has adverse impacts on

   A. Water resources B. forestry C human health D. biodiversity and wildlife E. All

Note: **Satisfactory rating - 4 points** **Unsatisfactory - below 4 points**

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

Answer Sheet

Score = _____

Rating: _____

4.1. Recommended solutions

Improving the natural resources base is central to any effort to arrest this “vicious cycle” and improve the productivity of small-scale farmers, who constitute the largest group of people below the poverty line. The current extension programme, however, relies on the “intensified package approach” and is primarily focused on accelerating production, using fertilizer and improved seed (mainly hybrid maize), irrespective of farmers capacity and agro-ecological zones. This has been unprofitable to farmers and inadequate to address the core of the problems faced by most resource-poor farmers. In order to address this, it is vital to go beyond narrow technical treatment of specific sectoral areas and adopt a broader thematic framework (that cuts across various disciplines) that would bring the integration of key sectors to generate a positive synergy to reverse the downward spiral. Some of the key thematic and intersectoral linkage areas that are fundamental in addressing the “poverty, food insecurity and natural resource degradation trap” are highlighted below.

4.1.2. Community and grassroots organizations

The overlapping and at times conflicting responsibility among the various agencies in the areas of agriculture and rural development, food security, and natural resources management has been the cause of serious constraint for effective coordination and implementation of programmes in these areas. As a result, there is a lack of clear direction on policies and priorities of each agency in contributing to this corporate objective.

One important agency that has many overlapping and complementary activities with the MRD (particularly the MoA) is the Ministry of Water Resources (MWR), which has the overall mandate for development of irrigation and water harvesting schemes for domestic and agriculture use. Although the MWR is to focus on medium and large irrigation schemes, it was observed that MWR staff is involved in small-scale irrigation and rainwater harvesting schemes and often collaborate with the MoA staff at the Woreda level. Most of the extension agents in the MoA do not have specific training on

water-related interventions and would need collaboration in developing water-related packages for extension. Since small-scale water harvesting is one the pillars of the Government strategy to attain accelerated rural development, it would be most appropriate and effective.

One of the major constraints in Ethiopia is **operationalizing** and **translating policies** enunciated at the Federal level into action at the local and community levels, particularly in the areas of natural resources management. This is due to the lack of strong grassroots/ community organization that are established by local people and serving their interest. During the previous military Government, the Peasant Association (PA) and agricultural Service Cooperatives (SC) were introduced in a top-down manner and were mostly used by the Government to extract surplus from the peasantry. Yet, the SC provided credit, inputs, basic goods and mobilized resources to develop rural roads, warehouses, grain mills, and clinics, etc. With the phasing out of all previous organizations (including SC) by the current Government, Government and party-owned agencies dominate the distribution of seeds and fertilizer. They charge an interest rate of 15 percent to 20 percent depending on the region, contributing to the increased price for fertilizer. Service Cooperatives previously provided this service free. If the SC were allowed to develop genuinely by the previous or current Government, they would have been an important vehicle to attain rapid transformation in the rural sector.

Recently, there has been a strong revival of traditional and indigenous institutions to assume a self-help and development role in rural Ethiopia. Ethiopian rural society has many important traditional and indigenous institutions that can be strengthened and transformed to assume various development roles. Realizing the potential of these institutions (such as *idir*, *iquab*, *debo*), several NGOs have used these organizations for various development activities including input supply, water harvesting and land rehabilitation.

Community-based organizations would play a central role not only in participation but also most importantly in the empowerment of local people as a stakeholder and in providing greater incentive to manage and utilize their natural resources in a sustainable way. The key principle here is that community-based and grassroots institutions must

represent and protect local interest. In the past, the emphasis has been on technical fix and even when local institutions existed, they were used to enforce unpopular Government conservation measures (such as community forestry, hillside closure, and labour demanding conservation measures). Strong local and community organizations can empower local people (particularly women and the poor), mobilize labour for conservation, rehabilitation and development of land, water and forest resources (reducing the burden on rural women), build infrastructure, provide fertilizer and improved seeds, assist extension and research experts in incorporating indigenous knowledge and practice into technical messages, bring accountability to extension, research and local government officials, create awareness about family planning, and generate positive synergy to address the “vicious cycle” noted earlier.

4.1.2. Empowerment

The Government’s Sustainable Development and Poverty Reduction Programme (SDPRP) are calls for empowering local community and demand-driven approach to technology generation and dissemination. The Government seems committed to the devolution of authority from Federal to Regional governments. It has recently made Woreda as the center of economic development. Two preconditions are essential if true empowerment is to take hold in rural Ethiopia. The first and most crucial is the emergency and establishment of local and community organizations discussed above. The second one is reducing the work burden of women in key tasks and improving their decision-making ability in natural resources management and overall status in rural society.

Women often face social, cultural and at times legal constraints that limit their decision-making capacity in farming and natural resources management. The traditional role of women puts gender specific constraints in fuelwood and water collection, post-harvest activities, livestock management which increases the pressure on their time and increases the demand for large families reinforcing the nexus problem. Empowering rural women is a multi-faceted task and must include several components such as access land, credit, extension, training in agriculture and natural resources management, low cost technologies and practices that ease their work burden and

income generating activities outside agriculture. Reducing the pressure on women in fuelwood and water collection are the two critical components that would contribute to improving the status of women and efficient management of natural resources.

Empowerment in creating and strengthening community organizations and improving the status of rural women will require institutional reforms that provide incentives and regulatory mechanisms to influence the behaviours of local people and protect their interests. Increasing rural women's access to agricultural extension and training is one vital area in which the Government should make a concerted effort. Empowerment also requires making substantial investment in human resource development through the training of community leaders, women and local para-professionals, the provision of public and external investment to innovations and development initiatives.

The Government Extension programme has now moved in the development of packages to moisture stress areas, livestock, post-harvest technologies and agroforestry, which are positive developments. Greater effort at both the Federal and Regional levels is needed in identifying the constraints, opportunities and comparative advantages in different areas in order to design potential development strategies using the natural resources potential as well as the pursuit of alternative livelihood options.

4.1.3. Capacity-Building in Natural Resources Management (NRM)

Capacity-building is one of the pillars of the Government's Rural Development Policy and Sustainable Development and Poverty Reduction Programme (SDPRP), which is applicable at all levels. It is partly related to the institutional issues discussed above. In this section, however, the focus is on issues that arise in translating some of the policies and plans into actions at local and community level and strengthening the local capacity to address the degradation of the natural resources base and low productivity of smallholders.

The various soil and water conservation activities included under the MoA Five-Year Plan implicitly suggests that soil conservation is seen as complimentary and an integral part of measures to enhance soil fertility, good agronomic practices, and water retention and harvesting. However, previous extension and research programmes have often

pursued these activities separately and this should be clearly stated in the extension manual and training. There is growing recognition among experts and policy-makers in finding an economically viable option of using fertilizer in combination with other organic sources. This includes improved and vegetative soil and water conservation measures, use of local organic sources in combination with fertilizer, good agronomic practices and finding alternative sources of rural energy in order to bring manure back to the soil, and site-specific research involving farmers in the development of soil conservation and nutrient enhancement practices suitable to various agro-ecological zones and socioeconomic conditions.

4.1.4. Incentives, property rights and land-use policy

Lack of proper incentives and clearly defined property rights to land, forest and trees have often led to inefficient utilization of natural resources and degradation. The current Government is adamant in its belief that all land will remain in the public (Government) hand as in the previous regime. There is intense and ongoing debate on issue of land tenure and whether the public or freehold systems will be the best options to unleash the potential of smallholders and bring rural transformation. The challenge to the Government land policy comes not so much from outside, but within the country (opposition parties, intellectuals, civil society organizations, etc.) and cannot be dismissed for long without finding some acceptable solutions. These issues will not be discussed here, as they are a subject of a detailed examination under a separate working paper on Land Tenure. Nevertheless, the issue of land tenure security is at the core of any discussions on incentive and property rights that are directly or indirectly linked to natural resources management.

4.1.5. Population pressure and resettlement

As noted earlier, Ethiopia's population is expected to double to 130 million by 2030. The majority of this population will make their livelihood in lands that are currently classified as moderately to severely degraded areas (mainly in the Ethiopian Highlands). By 2030, most of the moderately degraded land could be severely degraded unless there is significant migration to other areas, less dependency on the agriculture sector and

massive conservation activities, which so far has not happened. Thus, the Government will continue to confront this colossal task in its effort to achieve food security.

4.1.6. Broadening the livelihood base and diversification

Absorbing excess labour in the rural sector is a formidable challenge facing Ethiopia. Policies that go beyond food production and consist in the broadening of the livelihood base and expanding opportunities through employment generation and income diversification in the non-farm sector will be crucial. Such policies will increase access to food, reduce the need for resettlement and the ominous threat of the expanding rural population on the natural resources base. Such an approach could stimulate and stabilize the demand for food (without directly increasing food supply) as would production-oriented agricultural intensification policies. It could also be a significant linkage area to reduce the enormous pressure exerted by the impact of the population structure on the rural economy and natural resources (leading to the “vicious cycle”). The population structure consists of over 20 percent of youth (age 15-24) and is estimated to double from 13 million to 26 million by 2030. Similarly, the total number of women of childbearing age is also expected to double to 35 million by 2030, of which 75 percent will be rural women. (CSA, 1999).

Key Intersectoral Linkage Area	Diagnosis of the Problem	Government's Strategy and Actions	Responsible Institutions
1. Community and Grassroots Organization	• Lack of strong community- based organizations to facilitate NRM and self- help activities • Limited involvement of local people and absence of institutions that protect their interest • Limited incorporation of indigenous practice in land, water and forest policies	· Introduce enabling policies and legislation at the Federal and Regional levels · Support, strengthen and up-scale indigenous local organizations to assume cooperative and development roles	· Cooperative promotion Bureau under the PM office · MRD and MoA · Bureau of Agriculture at Regional and Woreda level · Traditional and indigenous institutions, Cooperatives, NGOs and CSO
2. Empowerment	• Lack of active participation in decision- making and technology generation by local people and farming communities • Limited access to women to training, extension, credit and gender-specific innovations that reduce time spent on chores	· Devolution of authority and empowerment of local and community organizations · Focusing on simple and low cost technologies that ease women's work burden (i.e. fuelwood and water collection)	· Bureau of Agriculture at Regional and Woreda level · MRD and MoA · Traditional and indigenous institutions, Cooperatives, NGOs and CSO
3. Natural Resources Endowment and AEZs	• Need for objective criteria and indicator to assess comparative advantage of specific areas before formulating development strategies • Extension approach narrowly focused on increasing crop yields, with increased application of inputs irrespective of their potential	· Introduce and support community-based integrated natural resources management as an extension programme that would broaden the scope of traditional SWC and incorporate technology generation and dissemination in rainwater harvesting, livestock feed improvement, agroforestry development · Ensure that Extension- research programmes develop low input technologies that are affordable to farmers, suitable to various AEZs and incorporates indigenous knowledge and practice · Include farmer in all trials before formulating and disseminating technical packages	· MRD and MoA · Bureau of Agriculture at Regional and Woreda level · Ethiopian Agricultural Research Organization (EARO); · Ministry of Water Resources; · Traditional and indigenous institutions, NGOs and CSO
4. Capacity-building	• Lack of skilled experts in areas of NRM at all levels • Need upgrading extension agents skills in NRM (mainly focused on crops and land) • Shortage of trained women extension agents, particularly at Regional and Woreda levels	· Set realistic and attainable targets adequately reflecting regional and local capacity · Set objective criteria in allocation of Federal funds to Regional and Wereda levels in natural resources conservation and development · Update and provide new guidelines to broaden the scope of traditional SWC measures · Train community leaders, women and local para-professionals in NRM	· MRD and MoA · Bureau of Agriculture at Regional and Woreda level · Ministry of Water Resources · EARO
5. Incentives and Property Rights	• Land tenure insecurity • Lack of clear guidelines and enforcing mechanisms in the management of forest and woodlands • Lack of clear and systematic national land- use policy at the Federal and Regional level	· Take appropriate measures to ensure tenure security at Federal and Regional levels taking into account regional, socio-economic, cultural and NR endowment of particular area/region · Provide clear guidelines and well-defined property rights to tree ownership and forest and woodlands utilization · Dialogue with all stakeholders regarding the current land-use policy and make necessary adjustments that are fully compatible with the poverty reduction · Remove any policy or price distortion and strengthen enforcement mechanism for efficient utilization NR · Introduce clear national land-use policy governing NR and agricultural land at the Federal levels	· Prime Minister's Office · MRD and MOA · Bureau of Agriculture at Regional and Woreda level · Land Use and Administration Authority at Regional level
6. Population Pressure/Resettlement	• Population Expansion • Severe degradation of NR base • Improper farming and livestock practices and limited improvement in technology; • Limited access by rural women to education, health and agricultural technology; • Limited or no opportunity for alternative livelihood outside agriculture	· Improving the status of rural women through the provision of education, health and innovation that would reduce their burden in some difficult and time consuming tasks · Emphasis in stabilizing yields and-integrated approach in NRM in famine and drought- prone areas · Employment generation in non-farm sector · Expanding infrastructure in the sparely populated regions	· MRD and MoA · Regional Administrative Council · Bureau of Agriculture at Regional and Woreda level · Land Use and Administration Authority at Regional level
7. Broadening the Livelihood Base and Diversification	• Excess rural labour force (particularly youth and women) • Limited or no opportunity for alternative livelihood system outside agriculture • Lack of investment by private and informal sector	· Expanding marketing of primary products (based on comparative advantage) to small towns and urban areas (i.e. beekeeping, poultry and fruits) · Promote small-scale and labour intensive enterprise (i.e. grain milling, oil seed and fruit pressing; leather tanning and pottery, etc) · Encourage and support private and informal sector to invest in small-scale ventures in the non-farm sector, particularly in small towns · Provide enabling policies that lead to greater access to markets, all weather roads, and credits.	· Small and medium-scale enterprise development · MRD and MoA · Bureau of Agriculture at Regional and Woreda level · Rural Credit and Development Bank · Cooperative promotion Bureau under the PM office

Farmers' participatory research is one of the research paradigms which promote linkage between the technology generators and technology consumers. This has immense value in improving sense of ownership, helping to address the felt need, providing an opportunity to explore the indigenous knowledge and building confidence between farmers, researchers and extension agents. The combination of these values facilitates better dissemination of knowledge and skills leading to better performance.

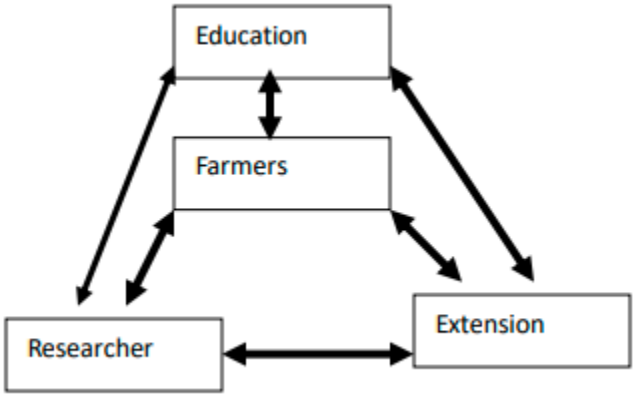

Figure4.1. Agricultural extensions

- Participatory research extension approach has several advantages over conventional approach:
  - ✓ Enhance innovation adoption and diffusion
  - ✓ Promote experience sharing between FRGs and farmers
  - ✓ Encourage the client to forward their need and enhance their empowerment
  - ✓ Shortening the time required for technology generation
  - ✓ Business orientation of farmers
- Some of the challenges:
  - ✓ Expectation of FRG leaders to get side benefits for their contribution
  - ✓ Some members may lag behind
  - ✓ Limitation of technology requested by FRG
  - ✓ Weakness in linking production and market
  - ✓ Weak link among stakeholders

- ✓ Unequal representation of different strata at different level
- ✓ Lack of knowledge and skills to participatory extension approach
- ✓ Lack of appropriate rewarding mechanism for participatory approach
- ✓ Lack of proper follow up and support for FRG

Self-Check – 4	**Written test**

Name…… ID…… Date…….

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

Test I: match column A With Column B

A	**B**
1. Community and grassroots organizations	A. expanding opportunities
2. Empowerment	B. colossal task in its effort to achieve food security
3. Capacity-Building	C. directly or indirectly linked to natural resources management.
4. Incentives and property rights	D. the pillars of the Government's Rural Development Policy
5. Population pressure and resettlement	E. demand-driven approach to technology generation and dissemination.
6. Broadening the livelihood base and diversification	F. institutions must represent and protect local interest.

Note: **Satisfactory rating - 6 points** **Unsatisfactory - below 6 points**

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

Answer Sheet

Score = _____

Rating: _____

LG #25	LO #2 Identify the natural resource technologies packages or practices

Instruction sheet

This learning guide is developed to provide you the necessary information regarding the following **content coverage** and topics:

- Identifying technology
- Analyzing extension packages.
- Natural resource extension approach
- Factor affecting natural resource extension system
- Identifying and preparing tools and equipment

This guide will also assist you to attain the learning outcomes stated in the cover page. Specifically, upon completion of this learning guide, **you will be able to**:

- Identify the various aspects (such as bio-physical, socioeconomic, environmental and cultural) of each technological requirement.
- Identify/analyze natural resources conservation extension packages to determine its suitability for adoption/adaptation in the specified area.
- Identify and prepare materials, tools and equipment relevant to work activities according to organizational guideline
- Identify factor affecting natural resource extension system
- Analyze natural resource extension approach

Learning Instructions:

1. Read the specific objectives of this Learning Guide.
2. Follow the instructions described below.
3. Read the information written in the “Information Sheets”. Try to understand what are being discussed. Ask your trainer for assistance if you have hard time understanding them.
4. Accomplish the “Self-checks” which are placed following all information sheets.
5. Ask from your trainer the key to correction (key answers) or you can request your trainer to correct your work. (You are to get the key answer only after you finished answering the Self-checks).
6. If you earned a satisfactory evaluation proceed to “Operation sheets
7. Perform “the Learning activity performance test” which is placed following “Operation sheets” ,
8. If your performance is satisfactory proceed to the next learning guide,
9. If your performance is unsatisfactory, see your trainer for further instructions or go back to “Operation sheets”.

Information Sheet 1- Identifying various technology aspect

1.1. Biophysical environment

The **biophysical environment** is the biotic and abiotic surrounding of an organism or population, and consequently includes the **factors** that have an influence in their survival, development and evolution. The **biophysical environment** can vary in scale from microscopic to global in extent.

The **biophysical environment** includes living things (bio), such as plants and animals, and non-living things (physical), such as rocks, soils and water. The **biophysical environment** is made up of four parts: the atmosphere, hydrosphere, lithosphere and biosphere. The nature and functioning of the **four components**: the atmosphere, hydrosphere, lithosphere and biosphere in a specific **biophysical environment** including: atmospheric processes, climatic **components**, climatic variation.

1.2. Socioeconomic aspect

Socioeconomic status is the social standing or class of an individual or group. It is often measured as a combination of education, income and occupation. Examinations of **socioeconomic** status often reveal inequities in access to resources, plus issues related to privilege, power and control.

- **Social factors include:**
  - ✓ Population size and rate of growth.
  - ✓ Age distribution.
  - ✓ Wealth and income disparities.
  - ✓ **Social** mobility.
  - ✓ Job market mobility and attitude to work.
  - ✓ Health and education levels.

Social and **economic factors**, such as income, education, employment, community safety, and social supports can significantly affect how well and how long we live. These **factors** affect our ability to make healthy choices, afford medical care and housing, manage stress, and more.

1.3. Environmental aspect

An **environmental aspect** is an element of an organisation's activities, products, and services that can interact with the **environment**. These can include discharges to water, emissions to air, waste and use of natural resources and materials. **Environmental** is the adjective form of **environment**, referring to a surrounding area. The **word** is usually used to refer to our ecology and the forces that act to change it. The **three types of environment** are the physical **environment**, social **environment**, and culture.

- **Environmental Aspect**
  - ✓ air emissions.
  - ✓ effluent discharges.
  - ✓ waste arisings.
  - ✓ land contamination.
  - ✓ use of resources (eg, water, fuel and natural resources and materials).

The identification of **environmental aspects** is an **important** step towards recognizing their impacts on our planet. This proves helpful in setting and formulating objectives, targets, and other programs that may be directed towards solving **environmental** problems.

- **The impacts that these have on the environment have become clear and include:**
  - ✓ Climate change including Global warming.
  - ✓ Acid rain, photochemical smog and other forms of pollution.
  - ✓ Ocean acidification.
  - ✓ Displacement/extinction of wildlife.
  - ✓ Resource depletion - forests, water, food.

1.4. Cultural aspect

Culture includes many societal **aspects**: language, customs, values, norms, mores, rules, tools, technologies, products, organizations, and institutions. This latter term institution refers to clusters of rules and **cultural** meanings associated with specific social activities.

Components of culture

Technology, Symbols, Language, Values, Norms.

Culture – set of patterns of human activity within a community or social group and the symbolic structures that **give** significance to such activity. Customs, laws, dress, architectural style, social standards, religious beliefs, and traditions are all **examples of cultural** elements.

Self-Check – 1	**Written test**

Name…… ID…… Date…….

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

Test I: Give Short answer

1. List the **biophysical environment**

   _____
   _____

2. What are the four components of **biophysical environment**?

   _____
   _____

3. List some social factors.

   _____
   _____

4. Mention components of culture.

   _____

Note: **Satisfactory rating - 3 points** **Unsatisfactory - below 3 points**

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

Answer Sheet

Score = _____

Rating: _____

Information Sheet 2- Analyzing extension packages.

2.1. **Extension**

"Extension is a programme and a process of helping village people to help themselves, increase their production and to raise their general standard of living."

An extension activity is an activity that extends the learning of the lesson. Extension activities can be done in small groups or by a single student. These extension activities are leveled to fit the student.

Principles:

- **extension** work must be based on the needs and interest of the people,
- **extension** work should be based on the knowledge, skills, belief and value of the people,
- **extension** encourages people to take action and work out their own solution to their problem, rather than receiving ready- made solution

If statements such as those above are examined more carefully, and if the current ideas and practice of **extension** are considered, **four** main **elements** can be identified within the process of **extension**: knowledge and skills, technical advice and information, farmers' organization, and motivation and self-confidence.

Successful **extension** agents need several specific **qualities**. You need excellent public speaking skills, and you should be comfortable working with large groups of people. You must understand agricultural education practices, family and consumer science, and have a knack for writing and building presentations.

So, we can define an extension programme as a written statement of situation, objectives, problems and solutions which has been prepared on the basis of an adequate and systematic planning effort and which forms the basis of extension teaching activities in a specific area, for a given period.

The **extension** workers act as guide and educate them how to use new knowledge, skills and attitudes in solving their problems. The **extension** education helps all classes of people men, women and youth to solve their present and future economic, social and cultural problems.

To preserve our natural resources, cover crops **can help** farmers meet a variety of conservation goals, including erosion control, drought management, as well as improved weed, nutrient and pest management.

Farmers are interest to conserve and protect natural resources because of their livelihood and way of living depends on their ability to use the land. Therefore it is in the **farmers' best interest** to help **protect** the land because they rely on it. Also part of being a **good** land steward is to improve the environment, through many different **farming** practices.

Planning can be defined as the process of deciding on what is to be done in order to achieve set goals. A participatory approach to planning should be adopted by groups so that whatever is to be done is derived through collective decision-making. Each member of the group should participate; give his/her ideas so as to achieve complete ownership, accountability and responsibility for the outcomes. The steps involved in planning and what needs to be done under each step.

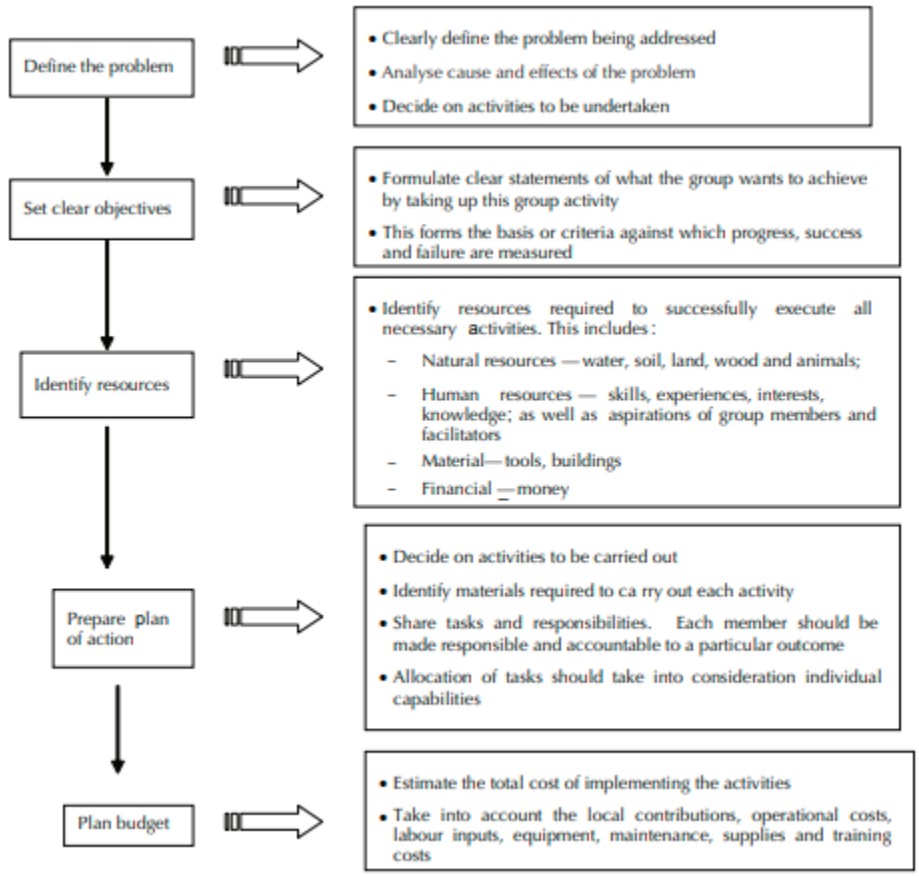

Figure 4.2. *Steps in planning.*

Figure Steps in planning

Self-Check – 2	**Written test**

Name…… ID…… Date…….

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

Test I: Give Short answer

1. Write down the principles of extension (**3 points**

   _____

   _____

2. What are the conservation goals that preserve our natural resources, cover crops can help farmers? **3 points**

   _____

   _____

Note: **Satisfactory rating - 3 points** **Unsatisfactory - below 3 points**

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

Answer Sheet

Score = _____

Rating: _____

Information Sheet 3- Natural resource extention approach

3.1. Extension approach

Extension in natural resource management has moved from a single focus on soil and water conservation to tackle a wider range of environmental problems associated with agriculture, urban development, forestry and fisheries. There are different approach is used to conserve natural resources. The **various approaches** applied to **natural resource** management includes: Top-down (command and control) Community-based **natural resource** management and adaptive management. On the other side three of the most common resource management approaches are maximum sustainable yield, ecosystem-based management, and adaptive management.

Top-down approaches save time by providing establishing program objectives, and providing guidelines, **planning** and funding processes, and information. A bottom-up **approach** will inevitably waste **resources** on re-inventing wheels which could be supplied in an informed and cohesive way by a **top-down** structure."

Community-based natural resource management (CBNRM) is a people-centered approach to the integration of conservation of the **natural resource base** (water, soil, trees and local biodiversity) and development to overcome poverty, hunger and disease.

Community resource management is a process tailored to the needs and traditions of local groups, which aims to create equitable and sustained access to natural **resources**, while minimizing damage to ecosystems on which they depend.

Community-based management (CBM) is a bottom up approach of organization which can be facilitated by an upper government or NGO structure but it aims for local stakeholder participation in the planning, research, development, **management** and policy making for a **community** as a whole.

There are several methods for extension work:

- The individual/household approach.

- The group approach: meetings, field days, demonstrations, support to groups.
- The school approach.
- Mass **extension methods**.

Community Resources

- Individuals.
- Associations.
- Institutions.
- Corporations.
- Cash and in-kind donations.
- Physical space.

The objective of community-based conservation is to actively involve and give some control to members of local communities in conservation efforts which may affect them, and incorporate improvement to the lives of local people while conserving areas through the creation of national parks or wildlife refuges.

Self-Check – 3	**Written test**

Name…… ID…… Date…….

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

Test I: Give Short answer

1. List methods for extension work (3 points)

   _____

   _____

2. What is Extension approach applied to natural resource management? 4 points

   _____

   _____

3. _____ is a bottom up approach of organization which can be facilitated by an upper government or NGO structure but it aims for local stakeholder participation in the planning, research, development, management and policy making for a community as a whole. (3 points)

Note: **Satisfactory rating - 3 points** **Unsatisfactory - below 3 points**

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

Answer Sheet

Score = _____

Rating: _____

Information Sheet 4- Factor affecting natural resource extention system

4.1. **natural resource** factors

In this topic, external **factors affecting** the sustainability of **natural resource** use are broadly categorized as modifiable and non-modifiable. Modifiable **factors** are those within the control of human society, such as poverty, political instability, economic instability and war. The factors that influence the use of natural resources globally are: **income growth, environmental change, advances in technology and price pressures all have a part to play.**

- Economic Growth
- Demographic Growth
- Income Gains
- Environmental Change
- Technological Advancement
- Price Pressures.

Because of population growth and a rising standard of living, the **demand** for **natural resources** is steadily **increasing**. The three most important causes for global environmental problems today are population growth, excessive **resource** consumption, and high levels of pollution.

Some recommended Solutions for Natural Resource Depletion

- Make Electricity Use More Efficient
- Use More Renewable Energy
- Promote Sustainable Fishing Rules
- Avoid Single-Use Plastics
- Recycle More and Improve Recycling System
- Use Sustainable Agriculture Practices
- Reduce Food Waste.

Use alternative forms of energy, including solar power and biodiesel, when possible. Turn off lights when not in **use** and change incandescent bulbs to compact fluorescent bulbs. Wash laundry in cold water to **reduce** the energy required to heat the water.

Self-Check – 4	**Written test**

Name…… ID…… Date…….

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

Test I: Give Short answer

1. **List Some recommended Solutions for Natural Resource Depletion (3 points)**

   _____

   _____

2. What are the factors that influence the use of natural resources globally? **3 points**

   _____

   _____

Note: **Satisfactory rating - 3 points** **Unsatisfactory - below 3 points**

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

Answer Sheet

Score = _____

Rating: _____

Information Sheet 5- Identifying and preparing tools and equipment

5.1. Participatory Rural Appraisal (PRA)

Participatory Rural Appraisal (PRA) is a set of tools and techniques used with households to gather and analyse information on community resources, problems, potential and needs.

Use of PRA

- Analyse the current situation and potential in a Village or Commune
- Analyse problems and their causes ·
- Support households to identify activities that respond to difficulties and opportunities

PRA is conducted with a group of households from a Village or Hamlet that work with 'Facilitators'. Facilitators work with groups of households.

PRA is not teaching or lecturing:

- Households and Facilitators learn together
- Facilitators work with and listen to households

Partnership and networking for innovation Partnership and networks can improve the development and delivery of innovations that directly affect the livelihoods of resource-poor or vulnerable households if structured appropriately. Challenges of today's complex society are such that individual agencies and programs cannot succeed in delivering results on their own any longer. A collaborative effort that reaches across agencies, across levels of government, and across the public, nonprofit and private sectors is needed to achieve results. The key tools for doing this are partnerships and networks. Communities are built on connections and better connections create economic opportunity (Krebs and Holley 2002). Several recent studies illustrate the need for partnerships and networks to support the development and delivery of agricultural innovation. Studies of agro-industrial firms and agro industrial opportunities in the region for instance, suggests that there is high demand for technologies to enhance the quality of valueadded agricultural processing, for new marketable products, and for institutional and in improvement to enhance supply chain efficiency (Hall and Yoganand 2002; Chema et al. 2003). Networking is a process by which two or more

organizations and/or individuals collaborate to achieve common goals (Waring 1997). Theoretically a network consists of two things: nodes and links between those nodes. In social network analysis, the nodes of concern are people, groups and organizations and the links may be social contacts, exchanges of information, political influence, money, joint membership in an organization, joint participation in specific events or many other aspects of human relationships (Davies et al. 2003).

The primary objectives of networks are:

- to jointly address complex issues that cannot be effectively addressed by any one partner/ institution
- to improve the effectiveness and efficiency of resource use and
- to avoid duplication of efforts, exploit complementarities and synergies.

The Green Revolution was a result of introducing improved varieties with technological packages that allowed the yield potential of the crops to be realized more fully and under conditions experienced by medium to large scale farmers of developing countries.

Table 5.1 Participatory Rural Appraisal: Tools

PRA TOOLS	**PURPOSE**
Historical Timelines ·	• Understand the history of the Village and Commune • Identify key events and trends throughout history of the Commune or Village—either positive or negative • Discuss the effect (influences) of key events in history
Village Resource Mapping ·	• Visual map to represent the Village, different resource types and how these are used • Identify resources that are scarce or abundant and propose opportunities to develop
Transect Walks ·	• Facilitates discussion on the status, problems and potential of different land types • Discuss problems and the causes of problems associated with land use
Wealth Ranking	• Identify household perceptions of wealth classes in a Village or Hamlet • Identify the resources and characteristics of each

	wealth class • Wealth class of individual households in a Villag
Seasonal Calendars	• Exercise to identify and discuss seasonal events and activities (cropping, livestock, migration, income/expenditure)
Linkage Diagrams	• Identify and analyse household farming systems, resources and their uses · Identify options and activities to improve household farming systems, resource productivity and income
Matrix Scoring and Ranking	• Analyse preferences of households of different income generating activities and reasons for preferences • Analyse common problems or issues and score or rank these in order of importance (e.g. health or social problems)
Problem-Cause-Effect-Solution Trees	• Highlights the compounding causes and effects of a specific problems faced by households in a Village · Propose activities to overcome some of the causes and effects of problem faced by households in a Village

5.2. Diagnosis and Design (D and D)

This is a tool developed by ICRAF to help researchers and extension workers to prioritize and select suitable agro-forestry interventions for research and extension. There is an enormous range of possible agro-forestry interventions and an even more enormous range of complex cultural environments in which extension activities in agro-forestry are taking place. It helps us to answer the questions of; is agro-forestry a suitable intervention, and if so, what sort of agro-forestry and how should it be implemented?

Diagnosis and Design (D&D), is simply a systematic approach to applying the common-sense medical principle that 'diagnosis should come before treatment'. Or D&D is a methodology for the diagnosis of land management problems and design of agro-forestry solutions.

D & D necessary

- To develop agro-forestry land management systems and technologies with specific capabilities to solve land management problems in areas where agro-forestry is deemed to have a role.

Operation sheet 1 Village Resource Mapping

Objective

To map village resource

Procedures

Step 1: Start the exercise on the ground using local products

- Ask the households to identify key locations in the Village that people are familiar with (e.g. roads, houses, fields, mountains, etc.)

Step 2: Use local products to identify the different resource and land types

- Agree on which local materials represent each resource or location

Step 3: Discuss the current use of the resource and land types:

- Are resources abundant or scarce?
- Does everyone have access to land
- What are current problems associated with each land type or resource
- What are some activities that could be conducted to improve?

Step 4: When the household have prepared the map on the ground—copy the map onto A0 paper with different coloured pens

- Stick some of the items onto the map to visually represent some of the land/crop types
- You can write some of the problems or issues that people discussed on the A0 paper

Step 5: Continue to facilitate discussion between households when finalizing the map on the A0 paper—households can sometimes lose interest

Step 6: The results of the Village Resource Mapping status, problems, potential and solutions can recorded on A4 paper when the exercise is completed

Operation sheet 2 Transect Walks

Objective: To design infrastructure projects—this can be very effective if you encourage a designer to meet with households—remember that households know more about local conditions than a designer (e.g. flood levels, water flow, etc.)

Procedures

Step 1: Introduce the Transect Walk exercise that you are about to conduct

- Review the Village Resource Map and allow the households to choose a transect route that crosses the majority of land types and resources
- Nominate one person to act as the 'Tour Leader'!

Step 2: Before you leave, prepare a folder with some A4 paper to record information

- Prepare a simple Matrix on one of the A4 pieces of paper
- In the first column, write all the different land types/resources that you will visit (e.g. rice, forest, crop, roads, etc),
- In the top row, write the topics that you will discuss (e.g. uses, status, issues, problems, opportunities and activities) - these will guide discussion on the Transect Walk

Step 3: Stop when you reach a land type/ resource—ask questions with the households and begin to fill in the Matrix

- Ask questions about land and resource potential (e.g. why they don't try other crops, etc)

Step 4: You have finished the Transect Walk once you have viewed and discussed each of the land type/resources

Step 5: Review the results of the Transect Walk and the Village Resource Map with the households

- Transfer the Transect Walk results (A4 Matrix) onto A0 paper for all households to discuss

Step 6: The results of the Transect Walk and current use, status, problems, potential and solutions can be recorded

Self-Check – 5	**Written test**

Name…… ID…… Date…….

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

Test I: Give Short answer

1. _____is a set of tools and techniques used with households to gather and analyse information on community resources, problems, potential and needs (**3 points)**
2. What are Use of PRA? **3 points**

   _____

   _____
3. Write down the purpose of transect walks (4pts)

   _____

   _____

Note: **Satisfactory rating - 5 points** **Unsatisfactory - below 5 points**

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

Answer Sheet

Score = _____

Rating: _____

LAP TEST 1	Performance Test

Name……. ID……..
Date…….

Time started: _____ Time finished: _____

Instructions: Given necessary templates, tools and materials you are required to perform the following tasks within **1** hour for each task. The project is expected from each student to do it.

Task-1 Map village resources

Task-2 conduct transect walk

LG #26	LO #3 Implement guidelines for technological packages or manuals

Instruction sheet

This learning guide is developed to provide you the necessary information regarding the following **content coverage** and topics:

- Guidelines for technological package
- Implementing package
- Monitoring and evaluation of dissemination process
- Recording, documenting and reporting variation and difficulties

This guide will also assist you to attain the learning outcomes stated in the cover page. Specifically, upon completion of this learning guide, **you will be able to**:

- Identify and access appropriate guidelines for implementing technological packages
- Implement the package based on the developed manual/guideline
- Monitor and evaluate dissemination processes to check proper allocation and implementation
- Record, documented and reported variation and difficulties of dissemination processes to appropriate personnel

Learning Instructions:

1. Read the specific objectives of this Learning Guide.
2. Follow the instructions described below.
3. Read the information written in the “Information Sheets”. Try to understand what are being discussed. Ask your trainer for assistance if you have hard time understanding them.
4. Accomplish the “Self-checks” which are placed following all information sheets.
5. Ask from your trainer the key to correction (key answers) or you can request your trainer to correct your work. (You are to get the key answer only after you finished answering the Self-checks).
6. If you earned a satisfactory evaluation proceed to “Operation sheets

1.1. Guidelines

Limited energy sources, such as coal, oil, **natural** gas, and nuclear fission (atomic energy), cannot be replaced once they are **used** up. Unlimited energy sources, such as sun, wind, gravitational, tidal, geothermal, and nuclear fusion are those more plentiful than we can ever use.

Measures of Conservation of natural Resources:

- Conservation of energy: a. Switch off lights, fans and other appliances when not in use.
- Conservation of water: a. Use minimum amount of water for all domestic purposes.
- Conservation of soil: advertisements
- Conservation of food **resources**
- Conservation of forest

Technological Resource 1: People: They are involved in every single aspect in **Technology**. People are involved in every aspect of **technology**. People are the **most important resource**. There are mainly three **types of resources** like, natural **resources**, capital **resources** and human **resources**. But **technology resources** are known as intangibles **resources** which include intellectual properties, skills, experience and software license or patent.

1.2.Technology Transfer Guidelines for natural resources

- Raw Materials: The material used for technology on receiving unit should have consistency with the material used at the smoothing unit.
- In-process Materials.
- Finished Products.
- Packing Process.
- Cleaning Process.
- Environmentally friends

To implement the opportunities for the environmentally-sound technologies diffusion, the following preparatory actions should be undertaken at the national level:

- To identify technology needs for main sectors
- To evaluate in-depth the priority mitigation technologies

- To identify the opportunities to promote the technologies diffusion
- To identify barriers to the development and transfer of technologies
- To identify the priority of barriers and practical steps should be undertaken to remove the barriers
- To establish a capacity building and institutional arrangements
- To identify the ways to participate in the bilateral and multilateral mechanisms for technology transfer
- To promote the participation of the private sector in technology transfer

Self-Check – 1	**Written test**

Name…… ID…… Date…….

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

Test I: Give Short answer

1. What are preparatory actions should be undertaken at the national level to implement the opportunities for the environmentally-sound technologies diffusion, **(10points)**
2. _____ are the most important resource(3 points

   _____

   _____

Note: **Satisfactory rating - 3 points** **Unsatisfactory - below 3 points**

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

Answer Sheet

Score = _____

Rating: _____

2.1. Integrated natural resource management

Integrated natural resource management is a conscious process of incorporating multiple aspects of **natural resource** use into a system of sustainable **management** to meet explicit production goals of farmers and other uses (e.g., profitability, risk reduction) as well as goals of the wider community (sustainability).

Following are the reasons why the **management** of **natural resources** is **important**:

- To maintain a balance in the ecosystem.
- To avoid further destruction of the environment.
- To avoid over-consumption of the **natural resources**.

Integrated Natural Resources Management	Land, water, forest, biological resources, agricultural productivity, landscape
Integrated Water Resources Management	Integrated, water, land, economic, social, equitable, basin

Appropriate technology represents the social and cultural diversions of innovation. The essence of appropriate technology is that the usefulness or value of a technology must be consolidated by the social, cultural, economic, and political milieu in which it is to be used. Most of the groups working in the developing countries tend to view appropriate technology as the main tool in meeting the basic needs of hundreds of millions of people who have been largely left out of the development process.

Empowerment and participatory approaches

A number of participatory approaches through formal and informal farmer groups have been tried to enhance the effectiveness and efficiency of the R&D system.

Participatory approaches have positive effects for most of the generic problems of extension.

- With respect to scale and coverage, participatory approaches produce farmer leaders with appropriate local backgrounds, including women, who are able to perform many extension agent roles in a cost effective manner

- Participatory approaches have been found to adjust complementary services more closely to farmer needs (Axinn 1988) as well as farmer dependence on external inputs.
- Farmers' unions in Europe improved the integration of complementary service and raised political support.
- Participatory approaches also have a positive effect in terms of tracing cause and effect through farmer-led experimentation and analysis and farmer feedback .
- A key positive impact of participation is accountability.
- Automatic quality control is achieved through raising farmer awareness and confidence.
- The quality of trust established (Pretty and Simplice 1997) and ownership (Chamla and Shingi 1997) are also emphasized

In order to transfer technologies effectively, it needs long-term investment and comprehensive approaches from its development to extension. It is better if the agents are involved in every step to identify needs of technology development, research and dissemination of new technologies or practices. It also needs enhancing institutional establishment and building capacities of human resources. Project on narurala resources is a program that operates at the research institution of the partner country and by the researchers and extension agents of both ethiopia and the partner country. It aims to develop and transfer new agricultural technologies or appropriate practices and adapt them to the diverse country conditions.

2.2. Agroforestry technolgy

Extension is a term that has long been used to describe a non-formal educational system aimed at *improving the livelihood of farmers* and *their communities*. Sometimes extension efforts aimed at increasing the growing of trees have involved provision of considerable physical or financial resources such as free tree seedlings, cash payments in relation to the number of surviving trees, etc. Although such incentives may be part of an agro-forestry extension system, the core activities in extension are education and training.

2.3. Water harvesting

Usually, there are two basic ways of rainwater harvesting like surface runoff harvesting and rooftop rainwater harvesting. In the first method, rainwater flowing along the surface is collected in an underground tank. In the second method, rainwater is collected from roof catchment and stored in a tank.

2.4. Soil and water conservation

Soil conservation practices are tools the farmer can use to prevent **soil** degradation and build organic matter. These practices include: crop rotation, reduced tillage, mulching, cover cropping and cross-slope farming. farmers to increase **soil** organic matter content, **soil** structure and rooting depth.

Extension has a long history of working with other agencies of government and private organizations to conserve water and soil. Extension workers demonstrated research findings on contouring and terraces to slow runoff, control erosion, and increase infiltration prior to the conservation movement of the 1930s. As the soil conservation movement evolved with legislation creating the Soil Conservation Service, Extension meetings and grassroots education in many cases helped to organize local soil conservation districts.

2.5. Solar energy

Solar power is energy from the sun that is converted into thermal or electrical energy. Solar technologies can harness this energy for a variety of uses, including generating electricity, providing light or a comfortable interior environment, and heating water for domestic, commercial, or industrial use.

Uses of Solar Energy

- Solar Electricity. This is one of the solar energy applications that has gained a lot of momentum in recent years.
- Solar Water Heating. Uses for solar energy extend to water heating systems. ...
- Solar Heating.
- Solar Ventilation.
- Solar Lighting.
- Portable Solar.
- Solar Transportation.

Self-Check – 2	**Written test**

Name…… ID…… Date…….

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

Test I: Give Short answer

1. List some technology that implemented in your local(**10points)**

   _____

   _____

2. Mention Uses of Solar Energy

   _____

   _____

Note: **Satisfactory rating - 3 points** **Unsatisfactory - below 3 points**

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

Answer Sheet

Score = _____

Rating: _____

Evaluating extension's impact involves measuring the relationship between extension activities and changes in:

1. Farmers' awareness, knowledge and adoption of particular technologies or practices;
2. Farm productivity, efficiency and profitability; input demand and output supply.

These same indicators are also influenced by many other factors that have confounding effects. Sophisticated econometric studies are needed to identify the exact contribution. Unavailability of time series data and inability to compare subject and control is another difficulty confronting analysts. Farm level studies are vulnerable to problems of self-selection, grateful testimony and the prevalence of interfarmer communication. When extension indicators are more sophisticated and higher level (related to the development goals), the cost of collecting information is also higher, and it is more difficult to prove causality between the selected extension activity and changes in farm income and welfare.

Decentralization

Decentralization has been described as 'the first step on the long road to privatization'. Because diversity becomes more tangible and different approaches to extension can be explored as the local level becomes accessible (Ameur 1994). Decentralization is expected to make extension services more flexible and relevant to the needs of intended beneficiaries. It is also likely to encourage the establishment of procedures for the formation of farmer associations, cooperatives and other types of groups that can eventually take up the responsibility for the financing or delivery of extension services (Rivera and Schram 1987). Decentralization includes administrative and political-fiscal devolution of program and funding decision and staff accountability to local units.

Three, often overlapping, extension reform strategies currently dominate the agricultural extension systems (Rivera 1996).

1. Decentralize the burden of extension costs through fiscal system redesign. 'Fiscal federalism' is considered central to more efficient and equitable provision of public services such as agricultural extension as well as for greater participation of local government in the processes of financing and managing such services. This involves:
    - direct charging of extension services (OECD countries)
    - voucher system where small farmers are provided with coupons or vouchers, which serve as tender for them to command the services of private agricultural extension consultants.
    - Overall there is a downward trend in the relative share of government support since 1970.
2. Decentralize central government responsibility for extension through structural reform. Here:
    - Responsibilities shifted from central to subgovernment institutions with the idea of improving institutional responsiveness and accountability (Antholt 1994)
    - Strategies include: decentralization, devolution, delegation and transfer of responsibility to the private sector for agricultural extension (Rondinelli 1987).
    - Decentralization is the transfer of effective control by central agencies to their field level offices;
    - Devolution means that effective control is transferred to subnational governments;
    - Delegation takes place when a subnational government or parastatals act as agents of central governments in the implementation of agricultural extension functions;
    - Transfer of authority to the private sector involves selling or shifting services to the private and third sectors such as NGOs, cooperatives and community organization;
    - Another structural strategy is 'deconcentrated dual authority' whereby authority is shared by the governments with farmer associations (used in Taiwan, South Korea, Norway and Sweden).

3. Decentralize the management of programs through farmers' participatory involvement in decisionmaking and, ultimately taking responsibility for extension programs. The participatory involvement is thought to make services more responsive to local conditions, more accountable, more effective and more sustainable (World Bank 1995). The basic rationale for decentralizing the management of extension is the argument for farmers' participation and greater use of local expertise for program development. The advantages of using local expertise are capacity building, cost-effectiveness and greater familiarity with local context (Zijp 1994). By getting closer to the users, a decentralized system may develop superior information channels, foster greater equity, and improve management and resource allocation systems.

The following seven major approaches will provide a sufficient choice for most extension evaluation situations: (1) expert model, (2) goal-free model, (3) attainment of objectives model, (4) management decision model, (5) naturalistic model, (6) experimental model, and (7) participatory evaluation model.

Monitoring and Evaluation (M&E) is used to assess the performance of technology, institutions and programmes set up by governments, international organisations and NGOs. Its goal is to improve current and future management of outputs, outcomes and impact. The **monitoring**, **evaluating, and disseminating** of information from the external and internal environments to key people within the corporation is referred to as a environmental scanning.

Monitoring Steps

Step 1: Designing an Efficient Plan For **Monitoring**.

Step 2: Designing Effective Report Management Mechanism.

Step 3: Recommendations For technology Improvement.

Step 4: Ensuring Guidelines And Recommendations are Followed Accordingly.

Capacity-building in terms of enhancing data collection and monitoring capability, developing and implementing awareness and training programmes/projects on climate change and ozone depletion, establishing and/or strengthening national institutions for technology transfer and the development of local research capability, are indispensable for overcoming these constraints.

Self-Check – 3	**Written test**

Name…… ID…… Date…….

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

Test I: Give Short answer

1. **What are Monitoring Steps (10points) ?**

   _____

   _____

2. List down seven major approaches that provide a sufficient choice for most extension evaluation situations. **(7points)**

   _____

   _____

Note: **Satisfactory rating - 8 points** **Unsatisfactory - below 8 points**

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

Answer Sheet

Score = _____

Rating: _____

4.1. Documenting result of information

- Information which is extracted from different sources should be documented for future use.
- Documentation of extracted information would help in collecting all relevant information together as evidence or as reference material for required purposes which would further help in providing written details or information about land situation.

Successful **documentation** will make **information** easily accessible, provide a limited number of user entry points, help new users learn quickly, simplify the product and help cut support costs.

Preparing report/correspondence

Developing a report/correspondence format, plan and structure

Report is needed to give information about the situation in logical order or to inform relevant personnel in authority about the situation that has happened

Format of the report

To meet the needs of these different users of the report, it has frequently been found useful to divide the plan into the following sections:

- ***Executive summary***: a summary of the land situation, its problems, the opportunities and the recommendations for action, i.e. the focal point. Reasons for decisions taken are given, but only briefly. Clear, concise writing is of the highest importance. This section should include at least one key map, the (master) land-use plan and possibly other maps at small scales.
- ***Main report***: Explains the methods, findings and factual basis of the plan. Written for technical and planning staff who wants to know details, including reasons for decisions taken. Often five to ten times as long as the executive summary.
- ***Maps volume***: An integral part of the main report, presented separately for convenience of binding with Appendixes. Give the technical data that support the

main report. These may run to several volumes. They include the results from original surveys conducted as part of the plan, e.g. soil surveys, forest inventories, records of river flow.

Example of headings for a report

- *Highlight problems, recommendations and the main reasons for these recommendations.*
- *The long-term goals for the planning area and the purpose of the plan*
- *Relationship with other documents. Briefly describe legislation and any higher-level plans as well as local plans that are related to this plan.*
- *Description of the planning area. A brief overview of location, area, population, land resources, current land use and production*

Management problems and opportunities

- *Statement of problems and opportunities.*
- *Rationale for the selected option.*
- *Summary of the changes the plan will bring about, by subject area or geographic area.*

- *Supporting information:.*
  - ✓ physical environment, planning units, agroclimate and soil data;
  - ✓ population, settlement, infrastructure, tenure;
  - ✓ present land use;
  - ✓ land-use types and land requirements;
  - ✓ land suitability;
  - ✓ economic projections.

Public relations material

Relatively few people will read the full planning document, a larger number will read the executive summary, but a lot of people need to be informed about the plan. Equally important is a range of public information documents, posters and press releases which are needed to inform the people about the plan, its relevance, the benefits to the community as a whole and the participation needed from different sections of the

community. This additional material will draw on the main report but should be specially prepared and well illustrated to secure the most effective participation of all parties.

There are many problems or difficulties in completing work such as non-routine process and quality problems, equipment selection, availability and failure of doing tasks, teamwork and work allocation problem, safety and emergency situations and such incidents.

Recording and documenting system should be Manual/hard copy and Digital and soft copy.

Self-Check – 4	**Written test**

Name…… ID…… Date…….

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

Part I give short answer

1. List the contents of a format of the report.(3points)

   _____

2. How does extracted information may be documented ?(2points)

   _____

   _____

3. How does finalizing report/correspondence?(5points)

   _____

   _____

Note: **Satisfactory rating –5 points** **Unsatisfactory - below 5 points**

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

Answer Sheet

Score = _____

Rating: _____

Reference Materials

Book:

1. Author did extensive field research (1987-89) visiting resettlement area in Keffa, Iulbabor, Wellega and Gambella (now under Oromia and Gambella region) and areas in Wollo where many families settled.
2. iscussion with Gizachew Abegaz, Senior Land Use expert in MoA who has done preliminary investigation of land use potential in SNNPS. According to Mr. Gizachew more systematic study based on fieldwork is needed to ascertain land potential in this region since there is limitation to this study which is based on airal map and scale that may not adequately capture the variation on land use
3. Chema S, Gilbert E and Roseboom J. 2003. A review of key issues and recent experiences in reforming agricultural research in Africa. Research report 24. ISNAR (International Service for National Agricultural Research), the Hague, the Netherlands.
4. Davies J, Alistair D and Sure Y. 2003. OntoShare: A knowledge management environment for virtual communities of practice. K-CAP03. Sanibel Island, Florida, USA.
5. Waring B. 1997. HIV/AIDS networking guide. International council of AIDS service organizations.

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The trainers who developed the learning guide

No	Name	Qualification	Educational background	Region	Cell phone	E-mail
1	Abuna Aliberki	B	SWC	Oromia	0917816061	abuyaali459@gmail.com
2	Belay Beyene	B	NRM	Oromia	0911982100	belaybe.bb@gmail.com
3	Dereje Siyoum	B	Agr. Engineering	Oromia	0911776191	derejeseyoum99@yahoo.com
4	Mohamed Kabo	B	NRM	Oromia	0921106616	mohakabo.kabo1@gmail.com
5	Sekata Kenea	A	NRM	Oromia	0913258147	sekata.ken@gmail.com
6	Terefa Adugna	A	NRM	Oromia	0917284145	terefa1234@gmail.com