MINISTRY OF AGRICULTURE and NATURAL RESOURCE (MOANR)
RURAL LAND ADMINISTRATION AND USE DIRECTORATE
(RLAUD)

Integrated Local Level Participatory Land Use Planning Manual

(Final)

Table of Contents

List of Tables

List of Figures

List of Annexes

Acronyms

ACZ	Agro Climatic Zone
AEZ	Agro-Ecological Zone
ALES	Automated Land Evaluation System
AP	Aerial Photograph
BCR	Benefit Cost Ration
BoA	Bureau of Agriculture
CAP	Community Action Plan
CBPWDG	Community Based Participatory Watershed Development Guideline
CBO	Community Based Organizations
CSA	Central Statistical Authority
CSI	Credit and Saving Institution
DAs	Development Agents
DEM	Digital Elevation Model
DM	Dry Matter
DSM	Digital Surface Model
DTM	Digital Terrain Model
EMA	Ethiopian Mapping Agency
ESIF	Ethiopian Sustainable Investment Framework
FAO	Food and Agricultural Organization
FDRE	Federal Democratic Republic of Ethiopia
FSS	Food Security Strategy
GIS	Geographical Information System
GPS	Global Positioning System
ILWIS	Integrated Land and Water Information System
IRR	Internal Rate of Return
KA	Kebele Administration
LAU	Land Administration and Use
LCC	Land Capability Classification /Class
LCU	Land Capability Unit
LFA	Logical Framework Analysis
LGP	Length of Growing Period
ILLPLUP	Integrated Local Level Participatory Land Use Planning
ILLPLUPM	Local Level Participatory Land Use Planning Manual
LLLUP	Local Level Land Use Plan /Planning
LLPP	Local Level Participatory Planning
LLPPA	Local Level Participatory Planning Approaches
LU	Land Unit
LUP	Land Use Planning

LUPO	GTZ supported Land Use Planning and Resource Management Project in Oromia Region
LUT	Land Utilization Types
MARF	Mean Annual Rainfall
MERET	Managing Environment Resources to Enable Transition to More Sustainable Livelihoods
MMPET	Mean Monthly Potential Evapo-transpiration
MMRF	Mean Monthly Rainfall
MoANR	Ministry of Agriculture and Natural Resource
MoV	Means of Verification
MoWR	Ministry of Water Resources
MW	Micro-watershed
NPV	Net Present Value
NGOs	Non-governmental Organizations
NMA	National Meteorological Agency
NRD	Natural Resource Development
OOPP	Objective Oriented Project Planning
OVI	Objectively Verifiable Indicators
PASDEP	Plan for Accelerated and Sustained Development to End poverty
PET	Potential Evapo-transpiration
PLUP	Participatory Land Use Planning
PLUPI	Participatory Land Use Planning and Implementation
PRA	Participatory Rural Appraisal
PU	Planning Unit
RF	Rainfall
RLAU	Rural Land Administration and Use
RLAUD	Rural Land Administration and Use Directorate
RRA	Rapid Rural Appraisal
SLM	Sustainable Land Management
SNNP	Southern Nations & Nationalities and Peoples
SNNPR	Southern Nations, Nationalities and Peoples Region
SPSDCMWBR	A STRATEGIC PLAN FOR THE SUSTAINABLE DEVELOPMENT, CONSERVATION, AND MANAGEMENT OF THE WOODY BIOMASS RESOURCES
SWOT	Strength, Weakness, Opportunity, Threat
TLU	Tropical Livestock Unit
ToT	Training of Trainers
UNDP	United Nations Development Program
USAD	United States Department of Agriculture
WFP	World Food Program

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1 Introduction

1.1 Background

There is nothing comparable to land that provides basis for livelihood in Ethiopia. Land therefore is the main stay of the Ethiopian people. At the beginning of the last century land and its resources were abundant to the people who want to use it. However, as the population density increased now and again in the last 5 decades and afterwards, the resources were degrading and shrinking below the demands of the people causing shortage of food, feed, and wood for different uses and land for cultivation and grazing per each household.

To reverse the situation, the Ethiopian government has established a Rural Land Administration and Land Use Directorate (RLAUD) under the then MoA (now under Ministry of Agriculture and Natural Resource) giving special focus to address the problems of land and tenure security and natural resources conservation and development based on integrated local level participatory land use planning (ILLPLUP) activities.

The Directorate is accountable and mandated to land administration and use activities that should result in beneficial outputs in the country. The mandates and responsibilities issued to the Directorate are enforced by Rural Land Administration and Use laws of the federal and regional governments. These laws, proclamations, and regulations put into effect the preparation and implementation of land use plans. Hence, the local level participatory land use plans are meant to serve and advance implementation of provisions given in article 13 of the Federal Proclamation (456/2005).

Subsequently, the Regional States have also established land administration and use organizations down to Kebele level to undertake the responsibility of administrating the land using participatory planning and managing the land resources of the country.

The major intention is to tackle the problems of tenure insecurity and improper utilization of the land resources by offering legal responsibilities and regulations. Land resources degradation through improper management and utilization of land should be regulated by preparing acceptable and implementable land use plans at grass roots level. Thus, the Rural Land Administration and Use Directorate planned to expedite a preparation of Integrated Local Level Participatory Land Use Planning Manual (ILLPLUPM) that should be implemented at national level & assist Regions, Zones, Woredas, Kebeles, and any other rural development actors to approach the planning and implementation programs with similar techniques and speeds allowing insertion of possible adjustments relevant to local situations at grass roots level. Moreover, the manual is envisaged to avoid the use of various methods of local level planning so as to integrate efforts into the legal frameworks of the country.

1.2 Objectives

1.2.1 General Objectives

The general objective of the Manual is to ensure ILLPLUP during the process of studying land as a resource and making decision on the best uses of land and its natural resources, and planning and implementing the plan in an effective and efficient way guarantying social acceptability, economic viability and environmental sustainability.

1.2.2 Specific Objectives

Specific objectives of the Manual are:

- To improve the capacity of land use planners and implementers, mainly at local levels;

- Giving guidance how planners and implementers should go about land use planning and implementation; and
- Ensuring the genuine participation of land use communities and other relevant stakeholders along the process of land use study up to monitoring and evaluation.

2 Basic Concepts and Principles of Land Use Planning

2.1 Concepts of Land Use Planning

Land-use planning has been defined as "the systematic assessment of land and water potential alternative patterns of land use and other physical, social and economic conditions, for the purpose of selecting and adopting land-use options which are most beneficial to land users without degrading the resources or the environment together with the selection of measures most likely to encourage such land uses" (FAO, 1999-b).

It is a process of decision making on the use of the resources of a certain unit of land for options of more productive, environmentally sound and sustainable economic uses. Decisions on options of land uses are always made based on analysis of potentials and constraints of the land resources guided by the needs of the communities, the government development policies and laws of land uses and land resources management and conservation. Land users, other concerned stakeholders, technicians and decision makers engage in the process of Integrated Local Level Participatory Land Use Planning (ILLPLUP) so as to make the decision demand oriented i.e. in terms of infrastructures including market and roads, land users choices and land management, land administration and resource conservation needs and available budget allocation for implementation of the plan.

The processes of land use planning bases on the quality and quantity of the resources and inputs available for improvement of livelihoods and the environment. Thus, decision making processes will take place on the basis of the knowledge of the land resources by all participating bodies and/or stakeholders. Facts on the existing conditions and or prevailing problems and potentials of land resources will be obtained from primary and secondary sources by working together with land users.

According to FAO, 1995, participatory land use planning is “an iterative process based on dialogue among all stakeholders aiming at the negotiation and decision for a sustainable form of land use in rural areas as well as initiating and monitoring its implementation”. Thus, ILLPLUP must be intended to form a comprehensive program of activities to improve, boost, sustain, intensify, and expand the required land use options based on the quality and quantity of the resources and community needs.

2.2 Principles of Land Use Planning

Land use planning should be based on certain guiding principles that guarantee the attainment of land use objectives. Effort should be exerted in order to respect such land use planning principles which otherwise the end results of land use planning will be challenged. The specific elements of principles (GTZ 1995, LUPO 2003a, NID/MLR 2009) by which land use planning should be guided include:

- Aiming at sustainability of balancing social, economic and environmental needs. A land use plan should be socially accepted, economically viable and environmentally sustainable;

- Resulting in a legally binding land use plan and/or legally binding land use rules. Formal recognition of the land use plan or land use rules is crucial for its implementation;
- It is a dialogue. A central part of any land use planning is the initialization of a communication process that allows all stakeholders to express their interests and enables them to agree on future land uses that respect all positions in a fair and adequate way;
- It is an all-inclusive process. This requires that all stakeholder groups are represented.
- It is based on stakeholder differentiation and gender sensitivity. To identify all relevant stakeholders, a gender differentiated analysis of all actors should be done in advance;
- It is realistic and oriented to local conditions**.** Content and methods of a land use planning have to fit the technical, economic and organizational capacities of the local population as well as administration;
- It is based on a "light" methodology avoiding unnecessary data collection;
- It considers and uses local knowledge. Rural societies or groups often possess a complex enormous autochthonous knowledge of their natural environment. They can contribute valuable information and should, therefore, be mobilized during land use planning;
- It takes into account traditional strategies for solving problems and conflicts. Traditional rural societies have their own way of approaching problems and settling conflicts concerning land use;
- It integrates bottom-up aspects with top-down aspects ("vertical integration"). Land use planning needs to combine local needs and interests with provisions made by higher levels;
- It is based on inter-disciplinary cooperation and requires sectoral coordination ("horizontal integration"). This generally requires support in institution building and improving cooperation between different sector ministries/agencies;
- It requires transparency. If there is no transparency, some people could be deprived of their rights and/or that future land use will not be sustainable;
- Land use planning is an iterative process. Land use planning is more than the preparation of a planning document; it is an iterative process. New developments and findings are specifically observed and incorporated into the planning process. It may lead to the revision of decisions and the repetition of steps already taken;
- Land use planning is implementation oriented. It does not end with the land use plan. The implementation of limited measures right at the beginning of the process or parallel to it plays an important role in establishing villagers' confidence in the planning process;
- Land use planning is linked to financial planning. This is crucial for implementation. Unless proportionately budgeted financial resource is earmarked by concerned bodies, land use planning can be halted.

Generally, local level land use planning should follow participatory, integrated, and interactive process.

2.3 Levels of Land Use Planning

The most known levels of land use planning are Federal, Regional, Zonal, Woreda, and Kebele. Under the context of Ethiopian Federal arrangement, land-use planning can be practiced at four levels. Such decisions can be taken at Federal, Regional, Zonal, Woreda, and Grassroots (Kebele) levels. Different kinds of decisions are taken at each level where the methods of planning and kinds of plans also differ. However, at each level there is a need for a defined policy and working system concerning land use planning, implementation, and monitoring and evaluation. This ILLPLUP Manual can be perceived as part of the policy and working system to guide land use planning at local level which is an integral part of the other levels. ILLPLUP can be equated with watershed, community watershed and/or Kebele or village level land use planning.

Table 2 1 Features of Different Land Use Planning Types

Aspects	Conventional LUP	PLUP
Working level	National, Regional, Zonal, Woreda, and Kebele	Local level (village, community, micro-watershed, Kebele)
Main Actors	Regional and district line experts, regional and district administrators	Community, people, local officials, local experts and other stakeholders
Main Focus	Identification of optimal land use areas through land suitability classifications and enforcement of the same by means of incentive or legal directives	Preparation of sustainable land use plans based on the will and interests of the people, implementation of the same by the people and managing the land resources for optimal use and equitable land use
Main Criteria	Technical parameters such as temperature regime, soil depth, soil fertility, slope, socio economic factors etc.	Peoples' needs, priorities, government policies and guideline coupled with quick know-how of the resources
Land Tenure	Not relevant	Considered as crucial issue, need for clear ownership or use right, changes for land tenure right are specified
Implementation	Implemented within a fixed time limit as done for studies	Implemented as process with a sequence of steps according to a village/land users pace and time and resources availability
Main Objective	To make best use of land resources as per the objective criteria	Strengthening local level stakeholders' capacities in managing their resources in a sustainable way

Source – Drafted ILLPLUP Manual by Mengistu, 2012

Table 2. 2 Recommended Scales of Different Levels of Land Use Plans

Level	**Administrative unit**	**Map scale**
National	Country	Large: 1:250,000 Medium: 1:1,000,000 Small: 1:5,000,000
Sub-National	Region, Basin, Watershed, Sub-watershed District/Woreda	Large: 1:100,000 Medium: 1:250,000 Small: 1:1,000,000
Local	Kebele, Village, Micro-watershed /Community	Large : 1:10,000 Medium : 1:25,000 Small : 1:50,000
Farm	Farm, Ranch	Large: 1:1,000 Medium: 1:5,000 Small: 1:10,000

Source – Jenvenema, FAO consultant

The communication that should be made in place needs to be dual allowing information to flow top down and vice versa. The greater the interaction between the four levels of planning, the better the impact of land use planning and natural resource management.

At each successive lower level of land use planning.

- Scale of study increases;
- The degree of detail of information needed increases; and,
- The direct participation of the local people is improved.

This Manual recommends the scale for ILLPLUP to be 1:5,000.

The interrelationship of the different levels of land use planning is given by the Table above and schematically by the figure below.

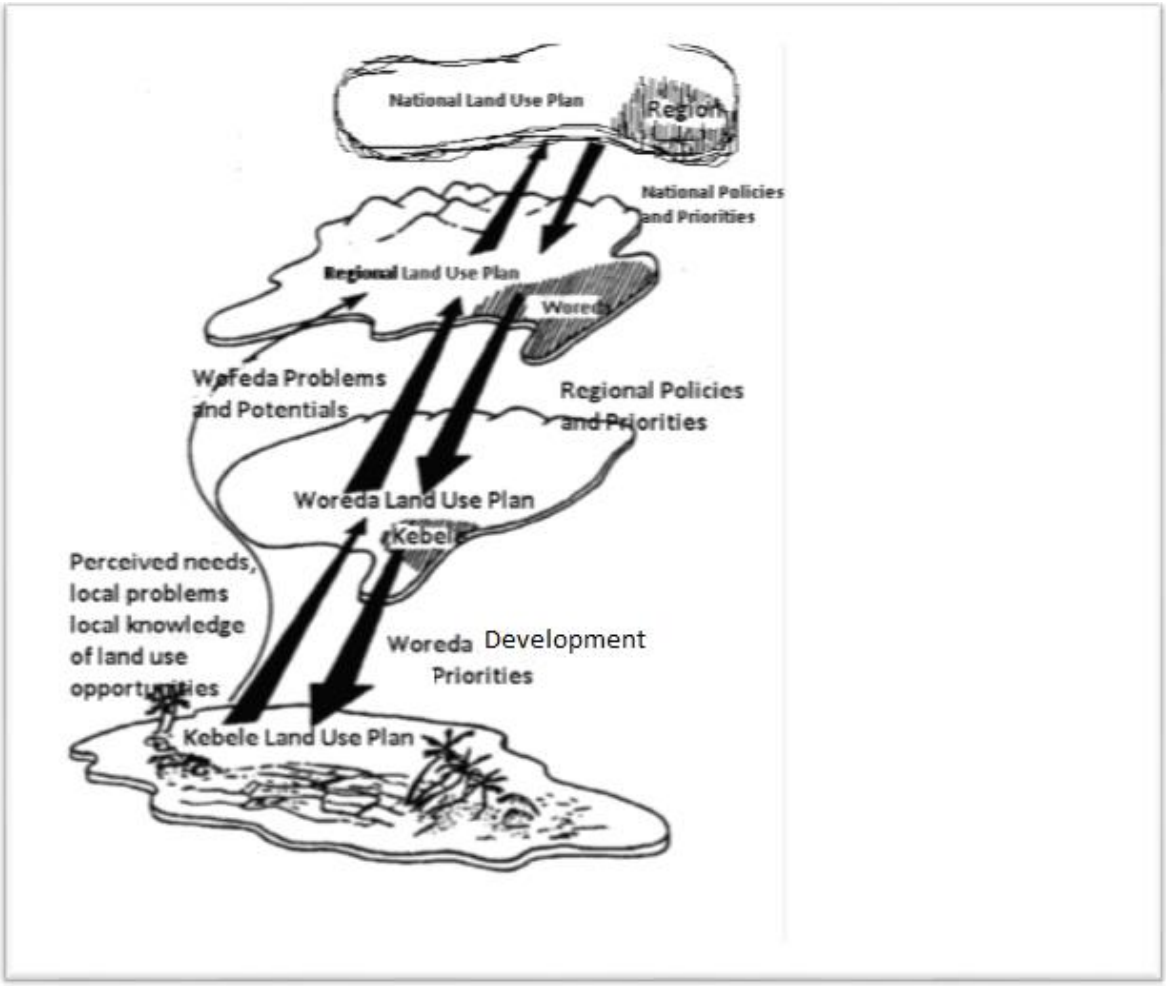


Figure 2 1 Flow Chart of Integration of Different Levels of Land Use Plans and Policies
Source – Adapted from Drafted ILLPLUP Manual by Mengistu, 2012

2.4 Land Evaluation

Land evaluation is formally defined as “the assessment of land performance when used for a specified purpose, involving the execution and interpretation of surveys and studies of land forms, soils, vegetation, climate and other aspects of land in order to identify and make a comparison of promising kinds of land use in terms applicable to the objectives of the evaluation” (FAO, 1976). Land evaluation is the process of estimating the potential of land for alternative kinds of uses. This include productive uses such as arable farming, livestock production and forestry together with the uses that provide services or other benefits, such as water catchment areas, recreation, tourism and wildlife conservation.

Fundamental to the land evaluation procedure is the fact that different kinds of uses have different requirements. It is obvious that crop-production, grazing and browsing by livestock, forestry and recreation call for different qualities of land, but there are also large variations in requirements within each of these major kinds of land use. To match one kind of use with its requirements, land evaluation needs information about biophysical situation and socio-economic conditions.

Two types of Land Evaluations are known: land capability classification and land suitability classification. Land capability evaluation tries to assess major uses while suitability land

evaluation relates each specific land use with its appropriate requirements. The Manual is mainly concerned with the former type.

2.5 Land Capability Classification

Land capability classification is a simplified method of land use planning developed by the United States Department of Agriculture (USDA) in the 1930s which is later adapted to the Ethiopian context. It is simpler and easier to use and less unsophisticated to apply than suitability classification. It is also less expensive. The method focuses on inventory of major characteristics of landforms, land use, soil physical properties, and climate.

The major data required to employ the method are: classes of slope, soil depth, past erosion status or class, soil texture, soil infiltration rate, stoniness, and length of growing period (LGP) of a land unit. To embark on this easy classification method, mapping units can be determined by Global Mapper and DEM or by drawing boundaries following slope brakes on topographic maps, large scale APs and or using GPS or PRA mapping techniques for drawing sketches of land forms.

In this system, land is often classified in eight classes according to its degree of limitation for a number of general land-use categories. These categories could be: annual crops, semi-perennial and perennial crops (banana, enset, coffee, etc.), pasture, forestry, and nature reserve (no significant utilization recommended). As compared to suitability classification its data requirement is less complex to be handled by local level experts and communities.

2.6 Land Suitability Classification

It is the second method of land use planning whereby the fitness of a given tract of land is measured and determined for a defined land use. Biophysical resource surveys provide basic data on land resources, which without interpretations, have limited value to land users, planners and decision makers (Beek, 1981).

This principle recognizes that different kinds of land use have different requirements. It is only meaningful in terms of specific kinds of land use, each with their own requirements. The qualities of each type of land, such as moisture availability or liability to flooding, are compared with the requirements of each use. Thus the land itself and the land use are equally fundamental to land suitability evaluation (FAO Guideline for Land Use Planning in Ethiopia, Technical Report 10). As compared to capability classification its data requirement is more complex to be handled by local level experts and communities.

2.7 Bio-physical Resource

The biophysical resources information and data are important inputs for local level participatory land use planning. These data and information can be collected from recent secondary sources such as archives of Woreda, DAs, and extension workers' offices if they are available or primary data collection process can proceed by means of examining spatial data sources and by doing field visit in the planning unit.

The biophysical data includes climate, vegetation, soils, land form, relief etc. the assessment and inventory of these data helps to determine the potentials and constraints for land use planning purpose.

2.8 Socio-Economic Resources

The socio-economic resources information and data are important inputs for local level participatory land use planning. These data and information can be collected from recent secondary sources such as archives of Woreda, DAs, and extension workers' offices if they are available or primary data collection process can proceed by means of census and random data sampling techniques from primary sources existing in the planning unit or land users of the planning unit.

This information includes demographic, agricultural statistics of crops and livestock productions and land holdings, human and animal diseases, farming systems, culture, religion, etc. In addition, production augmenting inputs and their costs, prices of crops and livestock are essential inputs for land use planning. Such socio-economic data with biophysical eases decision on land use alternatives. Generally, such socio-economic data should be either from secondary sources or primary sources depending on local situations

3 Local Level Participatory Land Use Planning Approach

3.1 Participation and its Objectives

The Manual advises that participation of different stakeholders is crucial for success and empowerment of rural communities on identifying problems, proposing alternative solutions, and plan implementation.

If this principle is violated, the Manual will not be different from past similar manuals /guidelines in essence.

There are different levels of participation as described below in their ascending order. Different stakeholders for land use planning can be drawn into participation at these different levels. However, communities should be allowed to pass through high level participations as they are the ones for whom the Manual advocates for.

The following are the most important objectives of participation. By achieving them, a sustainable land use system that would be transformed from generation to generation can be established.

- To bring development changes as per communities' needs and development potential of the environment;
- To empower the community by direct involvement of both men and women through democratic representation in order to handle the demands of gender;
- To improve the living conditions of the general community and its environment based on the predetermined government goals, purpose, and objectives;
- To provide opportunity to community members who are relatively powerless in decision making to acquire better power.

Passive participation: people participate by being told what is going to happen, or has already happened.

Participation by information giving: people participate by answering questions and then waiting for what will happen.

Participation by consultation: people participate by being consulted, and external people listen to their views without involving them in the decision making.

Functional participation: people participate by forming groups to meet predetermined objectives.

Interactive participation: people participate in joint analysis, which leads to action plans and the formation of new local institutions or the strengthening of existing ones.

Self-mobilization: people participate by taking initiatives independent of external institutions to start processes, or to change their situation.

In relation to participation, different types of land use planning approaches can be raised and discussed. Promotion of sustainable land use through participatory land use by the GTZ supported Land Use Planning and Resource Management Project (LUPO) in Oromia Region is one practical example to be mentioned. Since its start, 1997, LUPO followed a step-wise approach and has recorded remarkable achievements including delivering training on participatory land use planning. LUPO has also used indigenous knowledge from Konso to implement micro-projects. (PARTICIPATORY RURAL APPRAISAL FOR RESOURCE MANAGEMENT IN OROMIA, 1999)

3.2 Bottom-up Land Use Planning

The local level participatory planning unit can be a village, a group of villages or a small water catchment or Kebele. At these levels, it is easy to fit the plan to the land users,

making use of local people's knowledge and contributions. Where planning is initiated at the local level, the program of work to implement land use and management plan has to be carried out locally. This planning allows communities' priorities to be drawn up by the participatory decision making process.

Bottom-up planning is initiated at the local level and involves active participation by the local community. In bottom-up planning, the experience and local knowledge of the land users and local technical staff are mobilized to identify development priorities and to draw up and implement plans. Bottom-up Planning has its own advantages and disadvantages. Some advantages and disadvantages of bottom-up planning are cited below.

Advantages:

- Community needs and priorities are taken into account;
- People will be more enthusiastic about a plan seen as their own and will be more willing to participate in its implementation and monitoring;
- It enables the exploitation of popular awareness and knowledge on land use problems and opportunities;
- It is likely that such plans can pay close attention to local potentials and constraints;
- It enables communities to contribute labor, material, and other resources for the implementation of plans;
- Better information is fed upwards for higher levels of planning

Disadvantages:

- Local interests may not be the same as Regional or Federal interests and priorities;
- It does not properly read the national and international markets;
- Difficulties occur in integrating local plans within a wider framework;
- Limited technical knowledge may lead to poor planning;
- Local efforts may collapse because of lack of expertise, proper guidelines, and higher-level support.

3.3 Top-down Land Use Planning

Top down planning to land use planning is applied by Federal bodies and works towards prioritizing national concerns based on national conditions. It has its own advantages and disadvantages.

Advantages:

- Usually it is the best planning approach to new endeavors;
- Fits in national policies and interests;
- It can properly read national and international markets;
- There is relatively better technical knowledge and expertise and cannot lead to poor planning;

Disadvantages:

- Regional or Federal interests and priorities may not focus on local priorities;
- It does not properly read specific local situations;
- It concentrates power at the top over resources and decision making;
- It is less sensitive than bottom up approach to local needs, resources and capacities.

3.4 Integrated Land Use Planning

Any human activity rests on land. It is easy to mention activities or functions of land not related to land than those connected to land; Almost none. So, all doers of activities have stake in land, land use planning and its use. That is why land uses planning needs to be participatory involving different techniques and sectoral interests. When conditions allow,

it is best option to pull all stakeholders together for land use planning to meet their needs from land. Integration guaranties meeting the interests of broad stakeholders in land use planning sustainably.

3.5 Administrative vs. Natural Boundaries as Planning Units

Planning units can be defined taking into account administrative boundaries such as Kebele, Woreda, and Region. For local level planning, however, Kebele Administrative boundaries are best planning units. It gives a clear picture of the responsible bodies, target communities, and officially known spatial boundary dimension.

It is also possible to consider planning units on the basis of watersheds and /or micro watersheds with complementary efforts and involvement of different stakeholders and techniques. For the boundary definition, only natural features are taken into account.

When planning units are defined using micro-watershed boundary, it gives the following advantages:

- The size of a micro-watershed is small and land use planning becomes easily manageable (250-500 ha);
- It follows natural boundaries (water divides) which eases biophysical evaluation;
- Takes care of hydrological principles and gives opportunity to have picture of the resource base;
- Easy to identify and plan management interventions;
- Easy to integrate into Kebele plan;
- Easy to extrapolate /scale up plans with possible modifications; and
- Simple to modify plans as per feedbacks from land users.

Land use plans prepared watershed by watershed in the area of a Kebele would be collated into single Kebele Land Use Plan that accommodates the principle of hydrological management units. However, taking Kebele as a planning unit may have limitations.

Disadvantages of a Kebele Administration Level Land Use Planning are:

- boundaries of rural Kebeles are not static and can change from time to time;
- they are not governed by hydrological principles;
- Heads of watersheds can be cut by adjacent Kebele boundaries thus plan implementation does not control land degradation from top to bottom level; and
- The size of most Kebeles is too large to manage and cover easily.

As per this Manual, the planning unit for Local Level Participatory Land Use Planning is Kebele. If decision is made to take micro-watersheds as planning units, they can be added up to cover the whole Kebele other than taking the entire Kebele once as the smallest planning unit. With the above disadvantages, administrative level land use planning has significant advantages.

Advantages of a Kebele Administration Level Land Use Planning are:

- In a situation where most of the support to land use planning comes from the public sector, it is a wise decision to use administrative boundaries for ILLPLUP;
- Public sectors, stakeholders, and development partners work within the framework of administrative boundaries and make it easier to establish integration and resources mobilization;
- It also encourages administrative levels since their performance results in better recognition by their respective higher levels;

- Administrative planning unit ensures who is taking the responsibility for land use studying, planning, implementation, and monitoring and evaluation etc.;
- It eases allocation of financial and other resources;
- Administrative units of different levels have defined official mandates for development and they can easily coordinate different stakeholders and development partners.

3.6 Experiences of Land Use Planning in Ethiopia

3.6.1 Past Experiences

3.6.1.1 Land Use Planning Introduction to Ethiopia

Late in the 1970s and beginning from early 1980s, a Land Use Planning and Regulatory Department was established under the then Ministry of Agriculture to monitor and follow up the land use planning project activities launched at national level with agreement entered between the Ministry and the World Bank.

The executing institution of the project was FAO with national counterpart staff from the Department. In its first phase, the project carried out a national level natural resource and socio economic inventory, problem identification and analysis, land evaluation and preparation of indicative land use plan at 1:1,000,000 scales. Then the department with the Second Phase of the project, selected 3 representative Agro-ecological Zones in the country i.e. low cereal potential area in Borkena, high cereal potential area in Bichena and a mixture of perennial and cereal potential area in Hosanna and conducted natural resource and socio economic inventory, problem identification and analysis, land evaluation and preparation of indicative land use plan at 1:50,000 scale. Each planning unit covered about 300,000 hectares of land.

In the Third Phase of, the exercise was carried out at 1: 250,000 scale in the previous Haykoch and Butajira, Yerer and Kereyu, and Menagesha Awrajas with the objective of covering the country and implementation of the plan. Following the Third Phase, the department extended its capacity building to two “Ketanas” /Zones in the country i.e. North Western and Western by establishing offices under the Ketana Agriculture and Natural Resources sector to operate at local and project levels with provision of technical and material support from the head office. Additionally the MoWR began land use activities at river basins (12) and watershed levels since the early 1990s for the purpose of river basins and watershed development master plans preparation.

3.6.1.2 Manuals and Guidelines for Local Level Planning

To support land use planning, international and national organizations and individuals developed various participatory land use planning methods and procedures since the mid-1980s. They were made to ensure participation of land users, stakeholders and decision makers. The methods used various titles though they were more or less similar in objectives, contents and elements in participatory approach.

But most had short comings that they gave more emphasis to technical matters and less to stakeholders’ participation and community empowerment. Some of these Manuals /Guidelines are characterized below.

a) Participatory Land Use Planning and Implementation (PLUPI) of SoS Sahel: PLUPI approach was developed around 1996 for *Meket Woreda Development Project* to promote more decentralized and participatory resources management (Tarekegn, 2001). Ginjo (2001) mentioned that SOS-Sahel has been following participatory land use planning from 1992 to 1995, later shifted to *“Farmer’s-Led Integrated Watershed*

Management Approach" with intent to minimize the sediment load from upper streams to middle and lower streams.

The PLUPI approach focused at the village ***(""Got"")*** level, which is considered as core unit for resource governance, as well as for undertaking community-based NRM.

b) Local Level Participatory Planning Approach (LLPPA) of the MoA and WFP: The Ministry of Agriculture (MoA) in collaboration with the World Food Program (WFP) developed the LLPPA in 1991 and later modified a number of times, where the latest modification is made in 1997(MNRDEP, 1993;MoA, 1997). The manual produced in 1997 was aimed to address both soil conservation and agricultural production incorporating 'participatory", "holistic", "conservation-based development", "disaster prevention and preparedness" and "monitoring and evaluation" elements as compared to the past manuals. Since 1993/94 up to around 1997, a total of about *900 plans covering 500,000 ha* of land have been prepared, of which two-third of the plans have started to be implemented (MOA,1997).

c) Grass Root Level Land Use planning of the MoA: The ex-Land Use Planning and Regulatory Department (LUPRD) of the MoA developed a draft manual on Grass root Level Land Use Planning (GRLLUP) in 1989, which is in line with a recommendation made by master land use plan study (FAO, 1998). The rationale behind was to enable the widespread implementation of land use planning at grass root level in order to achieve improved and sustainable agricultural production.

d) Community-Based Participatory Watershed Development (CBPWD) of the MoA: The CBPWD approach was developed in 2005 by the MoA with intent to "standardize" and evolve a common "methodology" at local level (MoA, 2005). The overall objective of the CBPWD Guideline is to improve the livelihood of the community and/or households in rural Ethiopia through comprehensive and integrated natural resources management through provision of a workable and adaptable planning tool and guides to select correct and appropriate technologies under different conditions (MoA, 2005) (for additional information refer to Annex 1).

3.6.2 Existing Participatory Methods

These participatory methods had been in use since the 1980s till 2005 by government and non-governmental organizations by choosing the method they believed was good for their goals and objectives. However, in 2005, MoARD developed and issued the Community Based Participatory Watershed Development Guideline (CBPWDG) as an official micro-watershed development tool. The guideline mainly focuses on soil and water conservation techniques giving less focus to participatory land use planning though it is believed to take care of land use, natural resources management, and on farm and off farm activities at micro-watershed level. Plans had been also prepared by natural resource development sectors of BoA and NGOs working in different regions.

CBPWDG developed and issued since all the aforementioned participatory land use planning methods were not applied all over the country since any one of them was given official recognition to be used as a single and preferable tool for the country's rural development. Moreover, any one of them were not evaluated and modified as best tool to be used in the country by the responsible organization (MoARD). The reasons for not using one of them as national Local Level Participatory Land Use Planning tool were:

- Lack of concern and appreciations for participatory planning;

- Lack of awareness for the importance of land use planning-based natural resources management;
- Ignorance of the importance of the contribution of stakeholders and land users;
- Because various NGOs were being guided by their own agenda and preference of planning tools
- Lack of concern for communities empowerment; and
- Believing and accepting that top down planning is the best solution for development.

On the other hand, the CBPWD guideline didn't give adequate focus and attention to participatory land use planning which takes care of resource management and conservation. Thus MoA as per the RLAU proclamation decided to develop an ILLPLUP Manual which takes care of the issues of land administration, land use planning, and resource management at grass roots level. The main aim is that land should be used and managed with the plan agreed by the community and be administered and regulated by Federal, Regional, local, and bylaws of the community which must emanate from the root laws of the Federal government originated based on Federal Democratic Republic of Ethiopia (FDRE) constitution. In line with this, the manual will allow and enforce full participation of all stakeholders directly and by means of consultation and oversight follow-up.

4 Institutional Arrangement

The ILLPLUP approach is a bottom up planning method where land users and relevant stakeholders participate in the process of identifying and prioritizing problems and potentials of a specified land unit for a better use. The approach is based on simple and quick methods of natural resources and socioeconomic data inventory, analysis, evaluation, and decision making on types of land use and management options preferred mainly by rural household land users with technical assistance from Woreda land use planning team. The approach involves:

- Establishment of different level Integrated Local Level Participatory Land Use Planning Teams;
- Provision of a cascading adequate training from Federal to Kebele and or micro-watershed planning teams;
- Provision of the required technical and material resources;
- Standardizing scale to be used, and selection and determination of technologies such as topographic maps, aerial photos, ortho-photos, Global Mapper, Google Earth, and GPS, and the corresponding computer software when it is required depending on the capacity of Woreda and higher planning levels.
- Identification of a planning unit area and developing a plan based on the socio-economic and biophysical findings;
- Enforcing the plan by enacting a land use standard and bylaw by the community; and
- Participation of different stakeholders.

4.1 Different Levels of Institutional Arrangement and Responsibility

Experiences and results achieved from planning and implementation of land use plans need to be monitored, evaluated and documented to improve the process and to use the feedback for sectoral planning, strategy development, legal framework consideration, and policy planning. It is inevitable that different sectors at different levels will benefit if they team up and form different organs responsible for issues related to their sectors. For example, urban planning, road development, investment, health, education etc. have strong link with the plan and use of land. It is not only local organs who have interest in land use planning.

Different level government organizations responsible for Land Use Planning play the core role to bring different stakeholders together to form the planning teams at Woreda and Kebele levels for the development of land use plans.

4.1.1 Federal

The Federal responsible body for land use planning will be the coordinating institution of the ILLPLUP. This ministerial organ is responsible for:

- Provide policy & strategic guidelines in relation to land use;
- Gathering national LLPLUP data, analyzing, and dissemination of information;
- Resource mobilization to support regions;
- Coordinating matters related to land use planning such as informing and distributing availability of latest spatial data sets (e.g. air photos, satellite imageries, ortho photo, topo maps, etc.) to Regions;
- Delivering training of trainers (ToT) to Regions to be cascaded down to Kebele level;
- Organizing workshops to create experience sharing forums for Regions;

- Assist Regions while executing purchase of required technologies for land use planning;
- Doing action-research on FLOSS (Free/Libre and Open Source Software) and assisting Regions to apply them (to emphasize the aspect of freedom sometimes the word “Libre“ is included as an “L” to form the acronym FLOSS);
- Give direction and emphasis to Regions when international and national situations change;
- Support Regions in the areas of identified gaps or when it is requested; and
- Follow up land use planning and implementation of plans, and update Manual.

4.1.2 Regional

The Regional responsible body for land use planning technically reporting to Federal Land Use Planning body will be the Regional coordinating organ of ILLPLUP process. This Regional body for land use planning is responsible for:

- Provide policy & strategic guidelines in relation to land use;
- Gathering regional LLPLUP data, analyzing, and dissemination of information;
- Coordinating matters related to land use planning such as informing and distributing availability of latest spatial data sets (e.g. air photos, satellite imageries, ortho photo, topo maps, etc.) and preparing specific technical procedures;
- Delivering ToT to Zones and Woredas to be cascaded down to Kebele level;
- Organizing workshops to create experience sharing forums for Woredas;
- Assist Woredas in the formation of Land Use Planning Teams;
- Assist Woredas while executing purchase of required technologies for land use planning;
- Assist in the allocation of budget for Woredas when necessary;
- Support Woredas in the areas of identified gaps or when they request;
- Give direction and emphasis to Woredas when national interest changes; and
- Follow up land use planning and implementation of plans, and update Manual.

Though regions can have variations in their institutional arrangements, there is one responsible body for land use planning.

4.1.3 Zonal

In Regions where Zonal arrangements are mandated for land use planning roles, rooms should be opened for them so that they can add value for land use planning and implementation. At least, they can assist building the capacity of Woreda responsible bodies for land use planning and establish a linkage bond between Regions and Woredas. Here it is emphasized that flexibility is very important for issues related to ILLPLUP and, therefore, Regions can make use of their relevant Zonal structure potential.

4.1.4 Woreda

The Woreda responsible body for land use planning will be the coordinating organ of Woreda Integrated Local Level Participatory Land Use Planning Team. This Woreda body for land use planning is responsible for:

- Identifying Woreda stakeholders for land use planning;
- Rendering overall facilitation to Kebele Land Use Planning Teams along the process of land use planning;
- Developing selection criteria to prioritize Kebeles and micro-watersheds;
- Organizing ToT to Kebeles to be cascaded down to micro-watershed levels;

- Organizing workshops to create experience sharing forums for Kebeles;
- Assisting Kebeles in the formation of Land Use Planning Teams;
- Facilitating Objective Oriented Land Use Planning (OOPP) and SWOT (Strength, Weakness, Opportunity, and Threat) Analysis workshop and assist the preliminary identification of land use problems and objective setting;
- Allocating budget for Kebeles for planning and implementation;
- Overseeing and solving any problems that arise between two or more Kebeles /micro-watersheds;
- Reviewing and commenting Kebele land use plans and giving technical cosmetics;
- Merging Kebele land use plans and develop consolidated Woreda land development plan;
- Supporting Kebeles in the areas of identified gaps or when they are requested;
- Following up implementation of plans and give feedback to the Region for the update of the manual; and

Generally they are part of the Kebele ILLPLUP Team. The Woreda ILLPLUP Team members shall be flexibly drawn from Woreda Public Sectors responsible for:

a) Water
b) Rural road
c) Health
d) Education
e) Energy
f) Urban Development
g) Crop
h) Forestry
i) Livestock
j) Mining
k) Women /Gender
l) Others; and
m) NGOs

Other Woreda ILLPLUP Team members shall participate in the activities listed above. Members will have the possibility to ensure taking care of their sectoral interests. From expertise point of view, the team can include as much as possible from the following professions:

a) Land Use planning expert (Team Leader)
b) Soil Conservation / Soil Survey Expert
c) Forestry Expert
d) Agronomist
e) Livestock Expert
f) Agriculturalist
g) Water Harvesting /Irrigation Expert
h) Land Evaluator
i) Economist/Socio-economist/Agro-economist
j) Cooperative/Marketing and Inputs Expert
k) Rural Road Construction Expert / Infrastructure expert
l) Environmentalist
m) Ecologist
n) GIS and Remote Sensing /Surveyor, and
o) Woreda Level Rural Kebele center-related expert

4.1.5 Kebele

The Kebele responsible body for land use planning will be the coordinating organ of Kebele ILLPLUP Team. Kebele ILLPLUP Team is responsible for:

- Identifying Kebele stakeholders for land use planning;
- Mobilizing communities to participate in the prioritization of localities for land use planning;
- Training delivery to participating Kebele or micro-watershed communities;

- Organizing workshops to create experience sharing forums for different locality communities;
- Supporting Micro-watershed Teams, if there are any, in the areas of identified gaps or when they are requested; and
- Develop land use plans with community or assist locality communities in the study and planning.

The Kebele ILLPLUP Team members shall be flexibly drawn from:

a) Kebele Manager
b) Religious heads of the Kebele
c) One male and female representatives from each micro-watershed
d) Representative of the youth
e) Chairperson of the Land Administration Committee
f) Chairman of cooperative
g) Chairman of water management /users committee
h) Chairman of forest management committee
i) Chairperson of women's association
j) One community elder
k) Principal of school
l) Head of health post
m) Rural road representative, and
n) DA coordinator

To ensure that the plan is meant for rural household communities and land users, ILLPLUP Team at Kebele level is found essential. Members of Kebele ILLPLUP Team should be drawn in a flexible manner depending on local situations. Pulling a large number of stakeholders eases the achievement of integrated land use plan but does not make simple the coordination task. If the Woreda and Kebele level teams decide to use micro-watershed as a planning frame for land use planning, they can form Micro-watershed ILLPLUP Teams to support the Kebele ILLPLUP Team.

The planning team members primarily include representatives of communities of the micro-watershed who are educated, willing, energetic, capable, enthusiastic, committed, influential, focused, physically fit, exemplary, etc. They should be well accepted and trusted by their constituencies. Additionally, it is important to consider members from gender, wealth, and their relative locations perspective within the watershed. Sector representatives whose role is related to land use planning shall play coordination role of the team.

If Kebele ILLPLUP Teams decide to cover the Kebele at once without considering watershed approaches, the micro-watershed approach can be ignored. It is up to the decision of the Kebele and/or Woreda.

The Kebele team shall at least consist of the Manager, Kebele sector representatives (health, education etc.), DA coordinator, and 5 farmers who are elected by the general assembly. One or more Woreda experts give backup and facilitation for the field work. At least two of the elected farmers should be women.

5 Local Level Participatory Land Use Planning Steps

5.1 Preparatory Phase

5.1.1 Step 1 Initiation and Organizing of the Task

5.1.1.1 Organizing Woreda ILLPLUP Team

At this point in time, it is likely that Woreda concerned bodies have made different communications with Region and became acquainted with their responsibilities. Depending on specific situations of the Woreda, the establishment of ILLPLUP is the first action to continue with local level land use planning.

5.1.1.2 Agree on Criteria for Prioritization of Kebeles and Select Kebele

The following criteria for prioritizing and selecting Kebeles and micro-watersheds for land use planning can be employed flexibly by Woreda:

- Degree of encroachment of communal and state lands;
- The existence of high land use conflicts;
- Level and trend of land degradation problems;
- Level of chronic food insecurity;
- Need for protection of high value lands and potentially sensitive areas;
- Specific objectives (water harvesting, flood protection, major land reclamation, and others)
- Accessibility;
- Manpower and resources availability;
- The potential of land resources for development;
- Existence of strong Kebele leadership; and
- Demand by community for land use improvement, etc.

These are not static and exhaustive criteria and need to be further worked out, added or excluded depending on local policy and situation.

5.1.1.3 Defining Planning Area

Once criteria for prioritizing and selection of Kebeles is developed by Woreda, it will be easy to define the planning area whether the planning unit is natural boundary or administrative. Knowing the planning area puts you on a position to conduct awareness creation program since it is automatic to specify appropriate stakeholders.

5.1.1.4 Community Awareness Creation

It is necessary to conduct at least two-level awareness creation programs: Woreda and Kebele levels. Regional level awareness creation to Woreda subject matter specialists helps to better support the process. Then Woreda and Kebele levels awareness programs can continue.

At Woreda level: -

Woreda Level Land Use Planning Team shall coordinate the organization of the awareness raising program. It calls the Kebele representative for land (DA) and Kebele leaders (at least the Chairmen and Managers) to let them participate in the workshop. These Kebele level participants will go back to their Kebele and summon general assembly so that communities can elect members of the Kebele Level Land Use Planning Team. Prior to the election, general assembly participants shall be told the significance of local level land use planning and community participation. The Planning Team shall consist of community representatives, Kebele Sector Offices' representatives, Religious Leaders, Civil Society representatives, etc.

At Kebele level: -

- The DA together with Kebele leaders arrange a meeting with communities in the selected Kebeles coached by Woreda Expert(s);
- Participants are Kebele level sector office representatives, elected community representatives, religious leaders, civil society representatives, etc.;
- Together with the Kebele leaders, the DA explains about the need for participatory land use planning and its possible positive impacts, and the intention to carry out land use plan study and to implement the final plan;
- Discuss about land degradation, loss of soil productivity, reduction of production etc. and possible remedial measures that could solve these problems;
- The discussion should lead towards the importance of land use planning and management in an integrated approach to improve their livelihoods. In this process
    - ✓ As much as possible try to create interest without raising any expectations;
    - ✓ Be humble and show good manners and do not show superior attitudes. The farmers have their own way of perception. Try to build on their interest;
    - ✓ Explain to them that they are the final decision makers and selection of measures which will be done together with them.
- Participants can give names of stakeholders who might participate in the upcoming Objective Oriented Project Planning (OOPP) and SWOT analysis workshop.

5.1.1.5 Calling General Assembly and Organizing Kebele ILLPLUP Team

Kebele ILLPLUP Team participants can come from Manager, Kebele level sector office representatives, elected community representatives, religious leaders, civil society representatives, etc. The general assembly can be made aware of the importance of local level land use planning before it elects its representatives. It is wise to be sure of the acceptance of planning and implementation of land use by the general assembly.

Once agreement is reached on the need for land use planning, Kebele team members are elected.

5.1.1.6 Base Map Preparation

Base map is a general purpose map upon which specific-purpose maps are created. A map drawn to show boundary of an area, rivers, roads, social structures and water bodies if available for putting or transferring thematic biophysical and planning units. It shows existing resource realities of the physical land on which we are going to do planning exercise.

Base maps can be developed from different data sources such as topo maps, physical and cultural features GPS-based delineation, cadastral survey maps, and other sources.

It is advisable that the source data or map for base map preparation should be discussed and agreed between Regions and Woredas in advance. If gap in mapping is observed at any level, the next higher level should organize training.

This should be prepared by Woreda ILLPLUP Team using the available data base sources and technology. Global Mapper and DEM are possibilities since these technologies and the skills to manipulate them are not lacking at each Woreda nowadays. It is helpful to start with slope map to be used to associate and visualize the problems that will be raised during the workshop. Downloading Global Mapper, the base map can be classified into slope classes. Kebele or CSA map can be overlaid on the classified slope map and clip the boundary of the study area. Watersheds can be automatically

demarcated. They can be also delineated by sketching, interpretation of topographic maps, aerial photographs, etc.

Classifying the land by slope gradient classes or soil units/types provides land mapping units of relatively homogenous properties. Mapping units are different for different themes such as soils, land forms, vegetation, land cover, and current land use.

Homogenous land unit map can be prepared from:

- Already existing thematic maps;
- Enlarged aerial photographs mosaic map;
- Large scale aerial photographs and or ortho-photos;
- Large scale topographic maps;
- Sketch maps of PRA, using GPS and large scale imagery maps; and
- By overlaying different land resource thematic maps.

5.1.1.7 Identify Stakeholders, Land Use Problems and Objective Setting

Stakeholder identification has been already started during awareness creation at Woreda and Kebele Levels. So the Kebele Land Use Planning Team assisted by a Woreda expert, organizes OOPP and SWOT analysis Workshop.

OOPP is a participatory planning technique in which all parties involved identify and analyze the problems to be addressed in the effort, and prepare a concrete and realistic plan together. OOPP brings together representatives of all stakeholders and can be particularly effective in a community setting.

Once base map preparation is completed, Kebele ILLPLUP Team shall call general assembly and conduct OOPP and SWOT analysis workshop. The procedure to be followed to complete workshop the steps include:

- Invited stakeholders including rural households attend the workshop;
- Kebele ILLPLUP Team members assisted by the Woreda, facilitate the workshop to analyze Kebele land use problems (here neutral facilitator is crucial);
- Agree on the land use problems and identify the core problem;
- List the chain of causes and effects of the core problem;
- Construct problem tree and convert it into objective tree;
- Select strategies considering local capacities and other supports;
- Put the selected strategy into logical framework format;
- Do a sort of stakeholder analysis and invite the absentee ones to participate in the coming land use planning steps if you manage to identify new ones;
- Try to build the information you get during the process on your preliminary base map prepared and submitted by the Woreda; and
- Identify also the strategic factors from SWOT analysis;

The workshop can be organized at the top of the highest point in the surrounding area, may be under a tree shade, and become easy to associate problem identification with the objective reality on the ground.

During the OOPP workshop session, local specific problems such as the following might be raised:

- Shortage of cultivable land;
- Lack of water both for human and livestock;
- Lack of knowhow how to manage and develop communal lands;
- Overgrazing;

- Student drop outs;
- Cutting trees for sale;
- Expansion of crop land;
- Lack of marketing links;
- Poor animal health service;
- Poor human health service;
- HIV/AIDS spread;
- Increased broken marriages;
- Limited crop varieties;
- Encroaching communal lands;
- Encroaching state lands;
- Severe sheet, rill and gulley erosion;
- Fuel wood shortage;
- Deforestation;
- Fuel wood selling;
- Charcoal making and selling;
- Rural-urban migration
- Poor fertility of soils;
- Land degradation;
- Declining productivity;
- Diseases, insects and pest infestation;
- Lack of improved cattle breeds;
- Food self-insufficiency;
- Drying up of streams;
- Inaccessibility;
- Illegal hunting;
- Theft;
- Absence of good governance;
- Child early marriage etc.

Outputs of the workshop will shine light for data collection and enables to identify what information will be relevant and needed since problems are identified and objectives are set. It gives strategic thinking towards land use planning problems.

5.1.2 Step 2 Office Work

5.1.2.1 Provision of Training

Concerning land use planning, a cascaded ToT shall be organized by each institutional level to its lower level. Finally, Kebele ILLPLUP Teams trained by Woreda Teams do the job with communities. It should be clear that this manual concentrates on processes and steps and synchronization of efforts.

5.1.2.2 Budgeting /Financial Planning

As stated above under “Principles of Land Use Planning”, one of the important principles of land use planning is its linkage to financial planning. All steps of the land use planning process use resources. These resources shall be calculated and converted into financial terms. On behalf of Woreda responsible body for land use planning, Woreda team should work out and submit financial proposal to Woreda cabinet for approval. Unless proportionately budgeted financial resource is earmarked by concerned bodies, land use planning efforts can be halted.

Cost items may include the following:

- CSA Maps;
- Topographic maps;
- Aerial photographs;
- Global positioning system (GPS);
- Clinometers;
- Ortho-photo;
- Augur;
- Internet connection;
- PH Kit;
- Computers with appropriate software (e.g. ARC-GIS, Quantum GIS);
- Fuel and lubricant;
- Per Diems;
- 4 Wheel Drive Vehicles; and
- Motor cycles.

5.1.2.3 Preparation of Preliminary Mapping Units

1) Mapping Techniques

Before executing land use planning, capacity gap analysis in relation to mapping techniques should be made followed by training delivery to enhance skills. Then source materials for

base map are determined to produce the following maps at different phases of the land use planning process.

As indicated above, base map is a map drawn to show boundary of an area, rivers, roads, social structures, and water bodies (if available) for putting or transferring thematic biophysical and planning units, and it is the first task on which other land use planning studies and maps are based. It shows existing resource realities of the physical land on which we are going to do planning exercise.

Following the base map, and using different mapping techniques, maps like Land Unit Map, different Thematic Maps, Land Capability Map, Land Use Plan Map, and Management Plan Map will be prepared (for additional information refer to Annex 2).

Thematic map include maps of slope, soil landscape unit (consists of Soil Depth, Past Erosion, Water logging, Infiltration, Texture, Stoniness, Slope) and LGP. Soil landscape unit can be one map, or different maps for the different soil features can be prepared. When soil landscape unit map is overlaid on LGP map, land capability map is produced.

Land Capability Map is the map which shows the capacity of land mapping units for major land uses.

Land capability map merged with land use land cover yields the land use planning unit. This is the map that we critically consider each mapping unit whether the current land use is suitable or not. If it is not suitable for the current use, we will be tempted to look for other land use options.

When the land use planning units are analyzed and final land use is decided to be implemented that will become a land development map and each mapped unit of land is land development unit. We always incorporate land management intervention measures for each land development map (land use plan map) unit which we call them together land management plan.

2) Scale and Scale Enlargement

Maps (e.g. topo maps) can be enlarged when we want to include more information onto the map. It should be known however that enlarging a map will not add additional information which has been excluded due to scale unless we add to it. Enlargement can be achieved by copying the map 2, 3, 4, etc. times as required. If we enlarge 1: 50,000 topo map 4 times, for example, the enlarged map will be at a scale of 1:12,500. It is also possible to enlarge a map by scanning and geo-referencing topographic map.

3) Mapping Units

Land mapping unit is a unit of land on a map that has relatively homogeneous property in terms of soil physical and chemical properties, slope, land form and climatic conditions or any other feature. The purpose of this activity is to improve further the preliminary base map roughly started for OOPP workshop. The map used during the workshop covering the KA /micro-watershed base map at a scale of 1:5,000 is partitioned into preliminary mapping units which will be verified at field visit later. Slope classes classified by DEM can be taken as mapping units. The information on available sources such as Central Statistical Authority (CSA) Map, ortho-photo, aerial photo, topo map, GIS-based digital data, etc. can be used to identify more temporary mapping units.

Location map taking Kebele as Mapping Unit is shown in the Figure below.

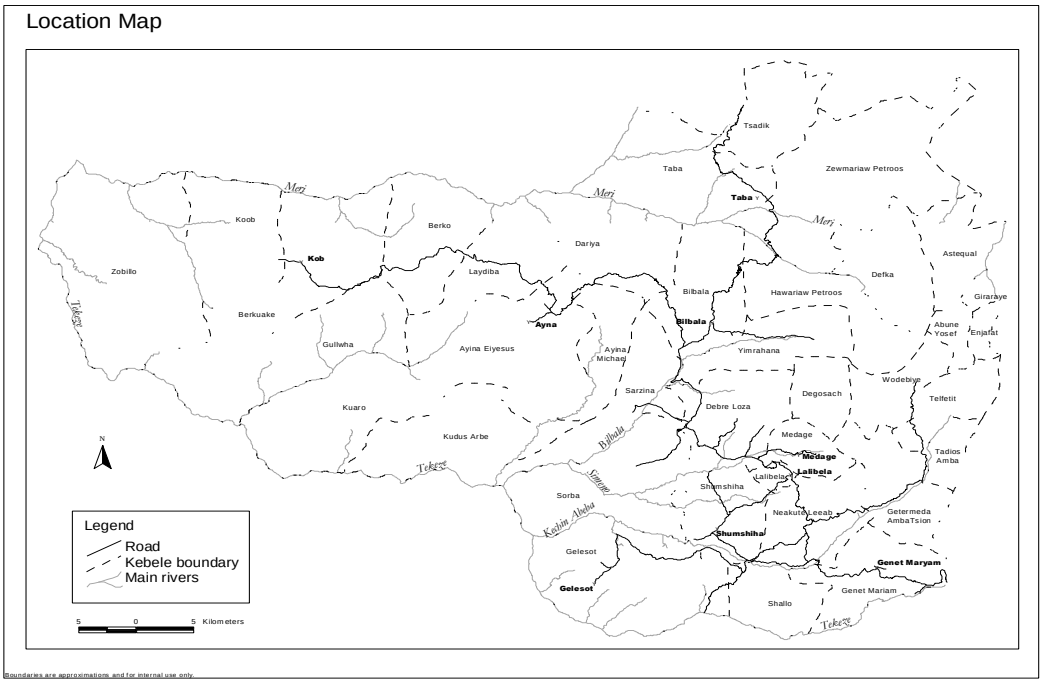


Figure 5. 1 Kebeles in Bugina Woreda, Environmental Support Project, 2002

Micro-watershed map is shown in the Figure below.

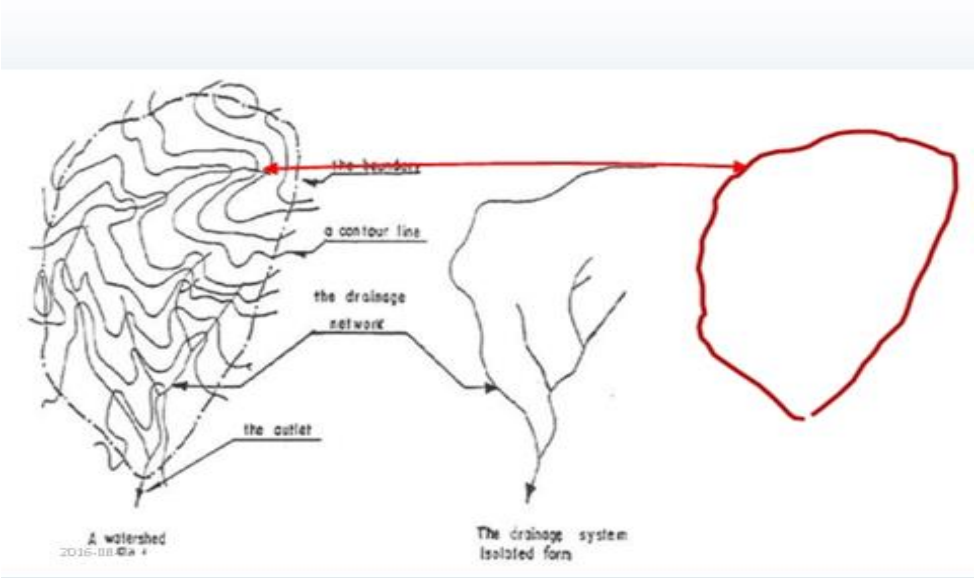


Figure 5. 2 Watershed Boundary Mapping
Source - Operational Local Level Participatory Land Use Planning Manual by LU Experts, 2012

5.1.2.4 Action Plan Preparation

Planning is a tool to frame activities in such a way that they are done at the right time using specified resources by a responsible body. The action plan for land use planning should include at least the following points:

- The time required until OOPP workshop and SWOT analysis is conducted, and problems and objectives agreed;
- When preparation of base map shall be completed;
- The time and schedule for data collection process;
- When the land will be classified as per its potential and limitations for production;

- When the land development plan is completed and presented to public consultation; and
- When the approved plan by KA is to be sent to Woreda.

The action plan preparation can use the format annexed (Annex 3).

5.1.2.5 Preparation of Field Data Collection Sheets/ Formats

During OOPP workshop, problem identification and objective setting are accomplished on the selected Kebele. That means the problem analysis has given clear picture of the Kebele and objectives to be achieved which may be modified of course during and after data collection when additional insights are observed.

The data collection then should focus on data that enable to give solutions to those identified problems thereby assisting the achievement of objectives agreed. In the first place, it is necessary to know what types of biophysical and socio-economic data are required as input for land use planning which is linked to problems and objectives.

This is the most important stage where biophysical and socio-economic data and information for the land use planning is made available. Care should be taken not to waste time and other resources by collecting unnecessary bulk of data. Land use problems and objectives should determine the type and volume of data. Data collection is not a onetime process. When practical need arises, it is possible to collect and use it.

Data collection processes entail costs. In Kebeles /micro-watersheds where there are similar study reports, it is advisable to review such studies and make use of adapting to time, local situation, scale, and land use planning objective.

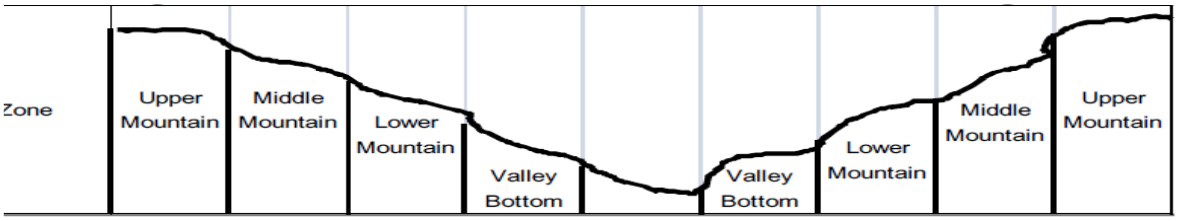
In general, follow the following steps to prepare data collection formats:

- Take inventory of information /data what you know to date and try to take judgment of the gap (if the Kebele/ micro-watershed has been covered by other studies, try to capitalize those studies);
- List and agree the missing data entries;
- Think of the biophysical data and the required related socio-economic data;
- Select and agree on the appropriate specific data collection formats and data collection methods;
- Collect the required biophysical and socio-economic data; and
- Analyze the collected data and try to evaluate land uses.

a) Bio-physical Data Collection Formats

In the first place, it is necessary to know what types of biophysical data are required as input for land use planning. The most important land features to be collected using the transect line format are:

- Land slope
- Soil depth
- Past erosion
- Top soil texture
- Water logging
- Infiltration, and
- Surface stoniness or rockiness
- Length of growing period (LGP)



Land Slope									
Soil Depth									
Past Erosion									
Top Soil Texture									
Water Logging									
Infiltration									
Surface Stoniness or Rockiness									
LGP									
Settlement									
Water resources									

Figure 5. 3 Transect Line as Data Collection Format

Source - Survey on Soils and Land Classification Guideline, Javier Escobedo, October 1988

Alternative biophysical Data Collection Format during transect walk is annexed (Refer to Annex 4).

b) Socio-economic Data Collection Format

The general socio-economic conditions shall be collected at the KA level. Most of these data sets could be obtained from the Kebele Office. However, data on the marketing and development extension systems, family demography, and household economy shall be compiled from multiple discussions held during the different PRA processes, and by conducting questionnaire-supported socio-economic survey.

Seeing land use problems and study objectives, data collection formats can be built from data elements listed below.

1) Human population: The detail data types to be collected include:

- Total HHs (male-headed and female headed) and family size;
- Household characteristics like family size by sex, age and educational status;
- Household energy demand and supply focusing on sources;
- House hold material requirement for construction and farm implements;
- Early marriage status and migration;
- Household food self-sufficiency;
- Land holding: landholding per HH [i.e. Max, min, and average], No. of parcels [i.e. max, min and average], average parcel area size;
- Other off-farm sources of income; and
- Ethnic group and religion proportions, etc.

2) Farming system

a. Cropping pattern: The major crops that cover dominantly the cropped area of land should be known. Also include area cultivated, production, and yield.
b. Livestock pattern and population: The detail data types to be collected include:
   - Livestock types and their population;
   - Average livestock possession by type per HH;
   - Uses of livestock (why livestock is required by HHs);
   - Grazing practices and availability of livestock feed resources over time in a year (surplus and deficit months); and,
   - Encroachment and disputes related to the community pasture/forest lands, and state lands;

3) Wealth Status: Communities classify themselves in terms of wealth using their own criteria. Examples are land holding size, number of oxen owned, and others. Stakes in land use planning can be different related to wealth status.

4) Household Income and Expenditure

The household income and expenditure collected during household survey should be processed to see the financial status of households. Statistics should be generated from the data collected from sampled households. Data of different issues can be collected and processed in a similar manner to quantify statistics or parameters. Format household income and expenditure is annexed (Refer to Annex 5).

5) Market system: The different market hierarchy where agricultural and non-agricultural commodities are exchanged including local markets, [i.e. often at KA level], primary markets [i.e. mostly located in the Woreda capital] and secondary market [i.e. mostly located in the zonal capital] shall be assessed and recorded. Product sold and exchanged, prices fluctuation and other detail of the market system/chain shall be collected. Here emphasis is given to the problems /gaps existing as perceived by rural communities.

6) Infrastructure: Both physical and social infrastructures facilities have a strong influence on the livelihood strategies of rural people and influences land use. Important data to be collected include:

- Road network and accessibility: Existing road linkage to the Woreda and the KA shall be described including standards of the roads;
- Education: Existing formal education including the number of enrolled students at various levels [i.e. elementary school, junior secondary schools and secondary school] and other higher levels shall be recorded;
- Mobile network coverage;
- Potable and livestock water availability; and
- Human and Animal Health: A valuable health institution [i.e. health posts and clinics] at both the Woreda capital town and within the KA, types and occurrences of the top ten diseases will be recorded. The standard for the existence of these institutions in relation to population should be known and recommendations made accordingly during planning.

7) Agricultural Extension Services and Input Supply: Agricultural extension service is an important instrument for dissemination of agricultural technologies. Therefore, it is important to assess the pattern of the extension and dissemination process both at Woreda and in a given KA. Farm inputs like farm implements, fertilizer, improved seeds and herbicide are made available through the cooperative unions, which is institutionalized from the Federal to Woreda level. Procedures and systems to

accessing improved agricultural inputs shall be collected from the Woreda Cooperative Development [WCD] office.

From the WCD office the following data shall be collected:

- The amount and types of improved agricultural inputs accessed and distributed in time series by a given KA.
- Existing systems to deliver improved agricultural inputs;
- Capacities of farmers to pay the loans and history of repayment;
- Differences between farmers in adopting improved agricultural inputs; and
- Problems and opportunities, etc.

The following key topical areas will be collected to assess the efficiency/productivity of the existing extension system:

- Number of DAs and their expertise assigned at Woreda level and in a given KA;
- Average distance from where the DAs are stationed to the remote farm HHs in the KA's;
- Land use problems observed as a result of the existence or absence of certain technologies; and
- Attitude of farming households towards those technologies distributed through extension.

8) Credit Services: Institutions providing cash loan and the system in place shall be assessed and recorded.

9) Household energy sources: Types of energy sources and quantifying each source proportion signify how households manage their land resources;

10) NGOs and others: Existing NGOs operating in the Woreda and in a particular Kebele shall be noted with clarity on their stakes and their potential roles during the land use planning and implementation.

Land use planning teams need to assess the data requirement to prepare the actual data collection format to address identified problems in order to attain objectives set. Resource bases and socio-economic conditions give framework to determine formats.

5.2 Field Work Phase

The main focus of this phase is to collect biophysical and socio-economic data using relevant formats developed. The land use plan should be an integrated one and should be inclusive of every aspect like demographic and economic conditions, infrastructure and social services (education, health, drinking water, road, market etc.), physical characteristics, etc. Biophysical and socio-economic data are primary for land use planning.

5.2.1 Step 3 Biophysical Data Collection

Selected PRA tools including Transect Walk, Focus Group Discussion, Problem Ranking/Pair-Wise Ranking and Scoring methods shall be used to accomplish listing and prioritizing land use problems. Key Informant Interview, Semi-structured Interview, etc. are also tools to be selected. At the same time, members should exploit every opportunity to collect socio-economic data as well.

5.2.1.1 Scope of Data Collection

Biophysical data collection covers the physical characteristics at the detail level of the study and land use plan objectives. These physical characteristics include relief and topographic features like land cover (e.g. forest, trees, grazing lands, and water bodies), soil physical characteristics, climatic conditions, etc.

Soils at different slope positions and land forms exhibit different physical properties even at close distances. These properties can be measured at field. For quick local level participatory land use planning, soil characteristics and qualities measurement can be done with the help of auger to take depths of different layers or from road and gully cuts of relatively homogenous unit of land. Samples of different units of soil characteristics can be measured by feeling, observation and color differentiation at field level of investigations and recorded on a format prepared by the planning team.

5.2.1.2 Type and Method of Data Collection

The biophysical data collection is followed by data analysis to produce parameters for the decision on the land use. Especially the following physical characteristics should be disaggregated into the right ranges of their classes and put as thematic maps. They can be collected at office and field (for additional data collection formats refer to Annex 7).

a) Land Slope (L)

Data from source map using Global Mapper and DEM shall be used in combination to produce the slope map (Office Work).

After the Kebele is classified in the range shown below in the Table 5.3, and a slope map shall be prepared.

Table 5. 3 Land Slope Classes

Slope classes	% range	Code
Flat or almost flat	0-2%	L_1
Gently sloping	2-8%	L2
Sloping	8-15%	L3
Moderately steep	15-30%	L4
Steep	30-50%	L5
Very steep	>50%	L6

Source - Survey on Soils and Land Classification Guideline, Javier Escobedo, October 1988

At field work, the following physical characteristics should be checked against each slope class unit and estimated class range is recorded.

b) Soil Type

Soil types for local level land use planning at field level can be classified by color. Soil colors can be observed from road cuts or profiles taken with auger by wetting the sample with water and comparing colors with color chart. Soil colors define the drainage conditions and textures of soils. Colors can also be correlated with local soil type classification by land users.

The following soil types determined by color are common in Ethiopia.

- Red
- Brown
- Grey
- Black-vertic
- Black-non-vertic

Black vertic soils are heavy clay - they crack during dry seasons and expand in wet seasons. Their workability is poor & difficult. They suffer from drainage problems. Non-vertic black soils are always present on cold areas at higher elevations; they are friable with high organic matter contents.

c) Soil Depth (D)

Dominant soil depths of different land units/ landforms can be recorded by relating with the following soil depth classes shown in Table 5.4. Soil depth can be measured at road cuts, gully cuts and measurements with auger. Finally it is converted into Soil Map.

Table 5. 4 Soil Depth Classes

Soil depth classes	Cm	Code
Very deep	>150	D_1
Deep	100 - 150	D_2
Moderately deep	50 - 100	D_3
Shallow	25 - 50	D_4
Very shallow	< 25	D_5

Source - Survey on Soils and Land Classification Guideline, Javier Escobedo, October 1988

d) Past Erosion (E)

The status on present erosion hazard shall be recorded during field survey while undertaking transect walk by checking exposed tree roots, comparing soil profiles and gully cuts. Additionally, discussion with farmers will provide valuable information on the erosion status both in past and at present. Erosion status shall be recorded based on classes shown in Table 5.5. Maps showing erosion status are prepared.

Table 5. 5 Past Erosion Classes

Erosion classes	Definition	Code
Nil	• No erosion noticeable	E_0
Slight	• Surface wash & small rills • Roots slightly exposed • Slight top soil loss	E_1
Moderate	• Rills cover most or the surface • Roots are well exposed • Much top soil is removed in the upper part	E_2
Severe	• Shallow gullies are frequent • Tree/plant roots are frequent exposed • Most top soils are removed	E_3
Very severe	• Most of the land is dissected by gullies • Small top soil are present • Land consist of rock (parent material) as result of complete removal	E_4

Source - Survey on Soils and Land Classification Guideline, Javier Escobedo, October 1988

e) Soil Texture (T)

Soil texture is defined in terms or the relative proportion of sand, silt, & clay, and can be analyzed and classified as follow. The soil texture should be shown on a map.

Table 5. 6 Soil Texture Classes

Textural group	Textural class	Code
Coarse	• Sand • Sandy Loam • Loam	T_1 T_2 T_3

Textural group	Textural class	Code
Medium	• Silt Loam • Clay Loam	T_4 T_5
Fine	• Clay, Silt Clay • Heavy Clay	T_6 T_7

Source - Survey on Soils and Land Classification Guideline, Javier Escobedo, October 1988

Soil texture can be determined by feeling wet sample soil between finger tips and rolling the samples and throwing the ball at a hard surface like wooden board or a wall. While feeling between fingers, sticking is a property of heavy clay; slippery is the property of silt; friable is the property of loam; and disintegrating is the property of sand. Soil texture limits water holding capacity in relation to depth and workability. Soil texture varies at different depth and the average is the totals property. If the soil is difficult to mold into a ball and disintegrates before reaching the target, it is sandy. If the ball is fairly cohesive but shatters and partially reaches and adheres to the target surface, it is loamy. If it forms a ball that sticks firmly to the target surface, the texture is clayey.

Soil texture can be also determined by seeing the shape of wet soil ("Ball Method") as shown in the graph below.

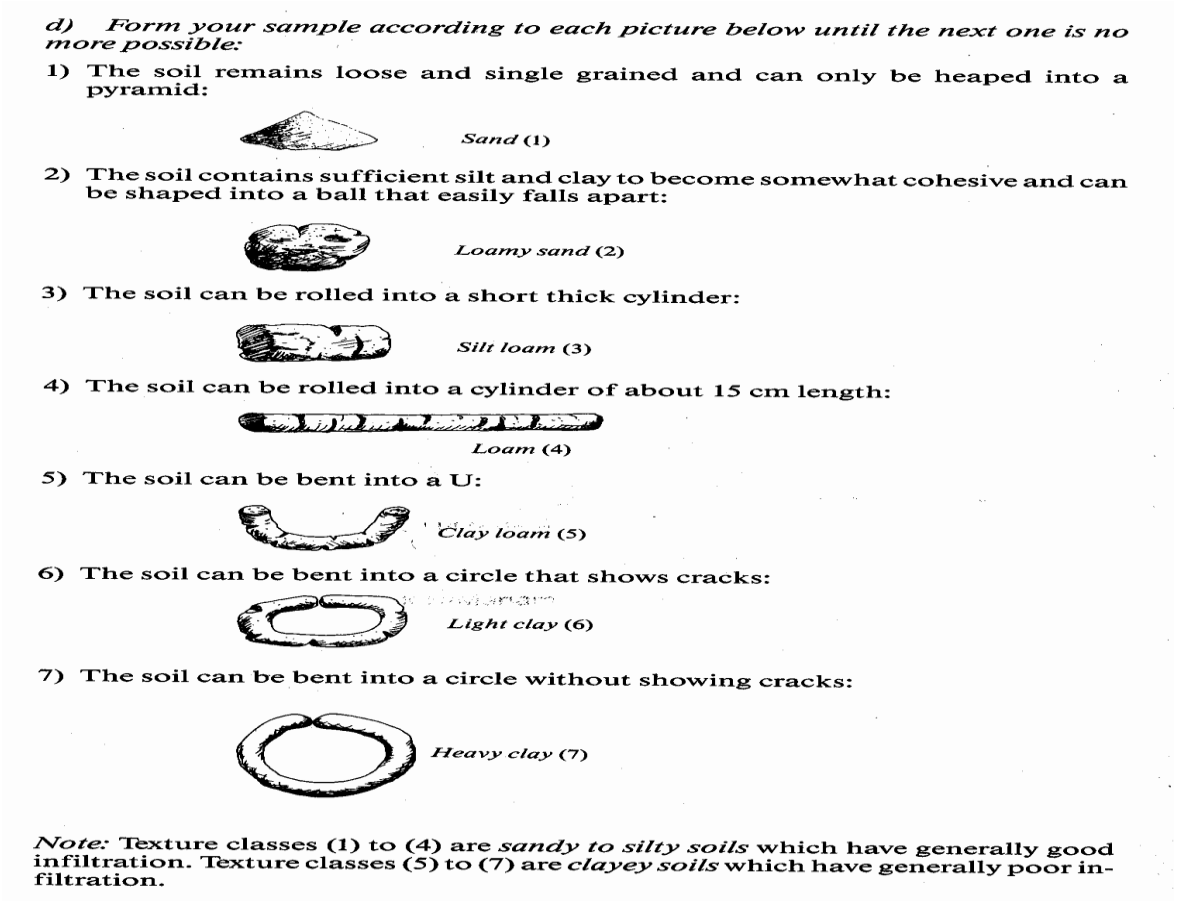


Figure **5. 4** Soil Texture Measurements

Source – Inclusion suggested as comment on The Revised Final Draft Version of LLPLUP Manual, Adama, February 2017

f) Water Logging (W)

Waterlogging is a serious problem affecting many areas of agricultural land. As waterlogging is due to restricted water movement through the soil, we need to understand the behavior of water in the soil profile before we can identify the most appropriate course of action. Water logging classes are shown on a map.

Table 5. 7 Water Logging Classes

Water logging	Definition	Code
No water logging	▪ Well drained soil	W_0
Intermittently water logged	▪ Imperfectly drained areas ▪ Water & logged during heavy rains for a few days in 1 week	W_1
Regularly water logged	▪ Poorly drained areas ▪ Commonly folded during wet season	W_2
Swampy area	▪ Very poor drained areas ▪ Water table at or near the surface during wet season	W_3

Source - Survey on Soils and Land Classification Guideline, Javier Escobedo, October 1988

g) Soil Drainage

Soil drainage condition can partially be determined from colors. Distributions of mottles or streaks of different colors in the soil can exhibit drainage problems. Field observation during wet seasons can show water logging in soils having drainage problems. Each land unit or land form can be assigned to one of the following drainage classes as shown on Table 5.8. Water logging determines aeration problem in a unit of land. It should be mapped.

Table 5. 8 Soil Drainage Classes

Class	Description
Poor	Grey or black vertic soils with mottles and common water-logging in rainy season
Imperfect	Black vertic or mottled brown soils and with possible short period water-logging in rainy seasons
Well	Red, brown or non-vertic black soils without mottles and never water- logged in rainy seasons.

Source - Survey on Soils and Land Classification Guideline, Javier Escobedo, October 1988

h) Surface Infiltration (I)

Infiltration refers to the rate at which water enters (mm/hr) into the soil and it is largely determined by the condition of the soil surface. The main influencing factors are type of soil (textural classes like sand, loam, clay, etc.) and content of moisture. Texture is the relative proportion of soil particles in their makeup. Textural classes can be determined by feel method (rough estimation of the clay content by touching) and mechanical analysis (percentage of particles is determined by disturbing particles and putting them into cylinders). Larger particles settle first followed by silt and clay.

Bulk of soil can be put into two groups – solid soil and porous soil. In sand soils, the porous space (space of air and water) are large (macro-pores) and in clay they are tiny (micro-pores).As soil particle size decreases, there is less distance between soil particles. Hence, as the inter-particle distance gets less, water infiltrates slower. That means water will infiltrate into sand quicker than into clay. Water will also move through sands quicker than clays. In other words, infiltration is high in light soil than in heavy ones.

Table 5. 9 Infiltration Classes

Infiltration classes	Definition	Code
Good	The soil is porous or very permeable. Dry soil breaks into fine clods & grains when plowed dry.	I_0
Moderate	The soil has massive structure to slow permeability. Surface	I_1

Infiltration classes	Definition	Code
	has tendency to compact and seal. Soil breaks into large clods and when plowed.	
Poor	In addition to massive structure, soil has strong tendency to seal on settling to an almost impermeable crust. When dry, soil does not show cracks at the surface.	I_2

Source - Survey on Soils and Land Classification Guideline, Javier Escobedo, October 1988

i) Surface Stoniness or Rockiness (S)

The percentage level of stones and rocks coverage and extent on the surface of a land unit hinders development unless removed by the developer even if other conditions are conducive for cropping and other uses. The following classes of stones and/or rocks coverage shall be recorded based on categories shown in Table 5.10. A separate thematic map is prepared.

Table 5. 10 Surface Stoniness or Rockiness

Stoniness classes	Rockiness Area	Cover (%)	Code
No Stone or few	No rock or few	<15	S0
Moderate Stony	Moderately rocky	15-30	S1
Stony	Rocky	30-50	S2
Very Stony	Very rocky	50-85	S3
Rock out Crops	Rock out crops	>85	S4

Source - Survey on Soils and Land Classification Guideline, Javier Escobedo, October 1988

Stony soils are less liable to erosion but interfere will tillage.

j) Flooding Hazard

The main attributes to be recorded is the frequency of occurrence and magnitude which are often related to topographic position and soil features. Flood hazard can be observed in the field during rainy seasons. Additionally, discussion with farmers shall be undertaken to observe flooding conditions. Flood hazard shall be recorded on classes which are shown in Table 5.11. Hazard classes are shown on a separate map.

Table 5. 11 Flood Hazard Classes

Class	Description
None	Never flooded
Rare	Occasionally flooded for a short periods in years
common	Flooded for short periods in most years
Frequent	Flooded for prolonged periods in most years
permanent	Land normally under water, except in dry years

Source - Survey on Soils and Land Classification Guideline, Javier Escobedo, October 1988

Generally soil properties can be differentiated using simple techniques and farmers local knowledge as described below in the box.

k) Land Use /Land Cover

Land cover is an element or matter that directly appears on the surface of the earth. On the other hand, land use is the output of a function of land resources, inputs, human labor and social demands. The human and other living things utilization of land for meeting their livelihood requirements depend on the quality and quantity of existing land resources. Land use land cover thematic maps are prepared to be overlaid on other thematic maps.

The following steps can be followed to map land cover land use:

Pre-field Work:

- Collect data bases (enlarged AP and Topographic maps);
- Delineate the land cover units on aerial photographs or sketch the units using GPS; or sketch the units using the PRA resource mapping tool;
- Prepare code and legend for the mapping units;
- Transfer the units and legend to a base map;
- Prepare preliminary land cover/land use map.

Field Survey:

- Undertake field survey to verify units and boundaries and legend;
- Collect any relevant land use and land management information from units or representative units as related to slope breaks;
- Collect relevant vegetation and land use data from units or representative units.

Post Field Work:

- Compile, compress and analyze the land cover and land use data;
- Transfer compressed and analyzed field data and boundaries to finalize land cover and land use map and build final legend;
- Prepare land use plan by integrating: land form, soils, socio-economic and environmental information;
- Prepare implementation and action plans and bylaws;
- Submit the plan to the community/land users, and Woreda steering committee for approval;
- Follow- up Implementation of the plan and bylaws.

A hypothetical land use map is given below as example.

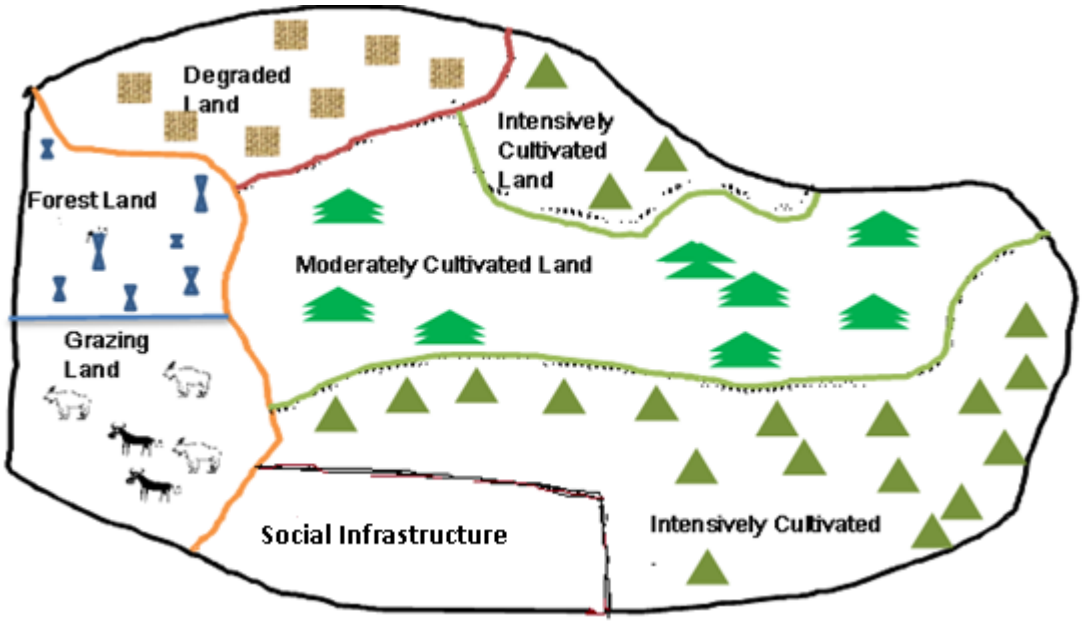


Figure 5. 4 Hypothetical land use map adapted from draft LLLUP Manual by Gizachew

Knowing current land use /land cover is critical to judge whether land use adjustment is necessary and to recommend the type of land managements that should go hand in hand with the agreed major land uses. During transect walk and other survey techniques, notes should be taken and included on the base map to show these uses /cover.
Land Use and Cover Classes can include the following:

- Built-Up/Settlement Areas
- Cultivated Land – can be divided into intensively, moderately, less moderately to sparsely cultivated land
- Woodland/Forest
- Bush Land/Shrub Land
- Grassland/Grazing Land
- Irrigated Land
- Swamp Land /Marsh Areas
- Water Body
- Degraded Land
- Rock out crop
- Others.

Table 5. 12 Vegetation Cover Categories Descriptions

Vegetation and other cover categories	**Description**
Natural dense forest	A plant community with closed deep and complex strata of canopy. The height of the tallest tree may be 50m or more and the lowest > 5m. The crown interlinked and cover > 60 of the ground
Natural open forest	Same as the above but the canopy cover at spots is not interlinked
Riparian forest	Forest along a river bank area with features of dense natural forest. Tall trees are common and evergreen
Disturbed natural forest	Natural forest disturbed by cutting of trees for timber and other purposes
Plantation forest	Dense forest planted on rows for industrial or conservation purpose. Mainly dominated by one or two species at spots. Plantation forest mostly forms a layer of single canopy cover.
Dense woodland	Trees with a height of greater than 5 and less than 20 meters. Branches of tree canopy are not complex, mainly umbrella shape and branched.
Open wood land	Less density of trees and more grasses , herb and shrub cover are common on the ground

Source - Mengistu's Drafted LLPLUP Manual, Dec 2012

l) Length of Growing Periods

The main climatic elements, which directly govern land use types to be considered for a certain area, are the rainfall amount and distribution, and the air temperature level. Thus data on these elements are so important for sustainable local level land use planning processes.

Traditional Agro-climatic zones are given below. The classification can be done also using digital elevation model (DEM-30).

>3700m			High Wurch
3200 to 3700m		Moist Wurch	Wet Wurch
2300 to 3200m		Moist Dega	Wet Dega
1500 to 2300m	Dry Woina Dega	Moist Woina Dega	Wet Woinadega
500 to 1500m	Dry Kolla	Moist Kolla	
< 500m	Bereha		
	< 900mm	900 to 1400mm	>1400 mm

Annual Rainfall (mm)

Figure 5. 5 Traditional Agro-climatic Zonation
Source - Mengistu's Drafted LLPLUP Manual, Dec 2012

The amount of rainfall and its distribution together with influence of air temperature on potential evapo-transpiration determine length of growing periods.

- When rainfall is above ½ evapo-transpiration and below full evapo-transpiration, it is a moist period where moisture is adequate for land preparation and drought tolerant crops.
- When rainfall is above full evapo-transpiration it is a humid period where there is a lot of water and water harvesting is possible.
- When rainfall drops below half evapo-transpiration it is a period of dry period. Counting LGP starts at the point where RF exceeds ½ evapo-transpiration and ends when RF drops below ½ evapo-transpiration.

The lowlands suffering from moisture stress and short length of growing periods require supplementary irrigation or full irrigation to grow crops and nurture livestock. Lengths of growing periods severely govern the production capacity of an area/or a unit of land.

In areas where there is no recorded data, length of growing period can be determined by interviewing elder farmers when the big and small rains begin and terminate in good and bad years. Length of growing period is indicated on a map.

Table 5. 13 Length of Growing Period

S.N	Length of Growing Period		Code
1	<90	G_1	
2	90-120	G_2	
3	120-150	G_3	
4	150-240	G_4	
5	>240	G_4	

Source – Extracted from updated ILLPLUP Manual by RLAUD, Dec 2014

m) Forest

Forest resources are largely dependent on altitude and climate if there is no serious human interference. Their existence or absence can hint the rate of land degradation and land use problems. During transect walk, forest resources inventory is necessary to produce realistic land use plan. The study can include area of forest cover, existing dominant tree species and those which are depleted.

n) Water

For rural communities, water is the basis for everything. Household use, animals drink, and irrigation demand sustainable water supply for communities in a Kebele. Quality of water is also important. Sources may vary: open streams, protected sources, wells, etc. and their supply /discharge may not be the same year round which affects life of rural communities in particular and the biodiversity in general. Types of water sources and deficit months both for household consumption and animals can be determined during discussions with communities.

o) Feed Resources

Feed resources are important inputs for communities who are practicing mixed farming. Sources could be from natural free grazing areas, controlled grazing areas, hay, straw, crop aftermath grazing, and, may be, supplementary feeds from byproducts of agro-processing plants. There could be deficit months to feed all livestock in the Kebele. So the

feed survey should have season perspective when sources are identified and quantified. Water harvesting techniques being practiced incites problems and solutions for existing problems.

p) Seasonal Calendar

Calendars are diagrams that focus on seasonal issues and how things change with time. They help to present large quantities of diverse and complex information in a simple diagram about farming activities, labor allocation, livestock diseases, prices, marketing, human diseases etc. By having seasonal calendar diagrams, we can identify the time (e.g. months) of greatest difficulties and impact on people's lives. The following steps can be followed to develop seasonal calendars:

- To capture the gender dimensions, group discussions should consist of separate groups of men and women;
- Draw up a 12 month calendar as appropriate, on flipchart or on the ground;
- Community members who are knowledgeable discuss different events and use beans or small stones to quantify information and indicate their relative magnitudes; and
- Make the appropriate labeling of diagram/curves.

Calendars can be prepared for different seasonal issues:

1) Crop Calendar: They are used to collect data on the intensity of cropping activities/practices along a time series. The seasonal crop calendar show the time when the crop is planted, weeded, harvested, and threshed, and if any inputs are used [i.e. improved seed, fertilizer, herbicide, etc.] when they are used for the major crops.
2) Grazing Calendar: It should indicate the different major forage sources for the livestock possessed by the majority of farm households at different seasons of the year.
3) Labor Calendar: The key purpose is to collect information on availability of labor for different farming activity/operation throughout the year.

5.2.2 Step 4 Socio-economic Survey

5.2.2.1 Scope of Data Collection

Scope of socio-economic data collection depends on the problems to be solved and the objectives to achieve. The data collection types may include human population, farming system (cropping, livestock), demography, wealth status, market system, infrastructure, agricultural input supply, credit services, agricultural extension services, household energy sources, NGOs, and others.

It is recommended that determining the depth of each data type at the required level is necessary to address the land use problems. The data content coverage and depth of each content should enable to give baseline data, facilitate decision on alternative land use options, and assist recommending corresponding land management alternatives.

5.2.2.2 Type and Method of Data Collection

A mixture of the following data collection methods and tools can be used.

a) Review of Secondary Data

Both biophysical and socio-economic data needs can be met by reviewing already organized data and information. Especially, the Woreda land use planning team is responsible for this to collect written materials, available data, and information. This can be about the Woreda, Kebele and micro-watershed biophysical and socio-economic situation. Reviewing depends on the availability of secondary sources. Especially similar study reports help to minimize cost and time.

Household survey shall be undertaken based on Purposive Sampling Technique fixing the sample size for each category.

b) Direct Observation

Team and committee members have the opportunity to observe and associate many issues while they are communicating with different stakeholders. The land, crops grown and their statuses, mix and conditions of livestock, soil and water conservation practices, peoples clothing, household utensil, land use land cover, water resource, environmental issues, etc. can be observed and supportive data generated.

c) Semi - Structured Interviews (SSI)

This can be conducted guided by a questionnaire which is used flexibly and, hence, there is no need to design structured /pre-coded questionnaire.

d) Focus Group Discussions

Focus group discussions concentrate on predetermined topics, with specific interest groups, stakeholders or individuals who share characteristics such as gender, profession, age, challenges, etc.

e) Individual Interview

The purpose of this interview is to obtain representative information from various purposely selected respondents (Farmer leaders, water users associations, Kebele cabinet members etc.).

f) Key Informant Interview

We use this interview when we are interested to obtain information from special knowledgeable persons about a particular topic of interest to the survey. Unlike regular survey, the key informant interviewee does not answer questions about the interviewee himself/herself but about the subject of which he has a good knowledge.

g) Formal Household Survey

Household survey shall be undertaken based on Purposive Sampling Technique fixing the sample size for each category.

h) Sampling

There are several approaches to determining the sample size. Despite these several approaches, most of the time sample size is roughly estimated based on the variability of the population under consideration, time, and cost. It is, however, clear that as the sample size increases, the representativeness of the survey improves and becomes closer to population parameters if sampling proportionately takes into account variability.

In addition to the purpose of the study and population size, three other criteria usually need to be specified to determine the appropriate sample size: the level of precision, the level of confidence or risk, and the degree of variability in the attributes being measured (Miaoulis and Michener, 1976).

The Level of Precision (sampling error)

The level of precision is the closeness with which the sample predicts where the true values in the population lie. The difference between the sample and the real population is called the sampling error. If the sampling error is ±3%, this means we add or subtract 3 percentage points from the value in the survey (statistics) to find out the actual value in the population (parameter).

The level of precision you accept depends on balancing accuracy and resources. High levels of precision require larger sample sizes and higher costs to achieve those samples.

The Confidence Level (Risk Level)

The confidence or risk level is based on ideas encompassed under the Central Limit Theorem. The key idea encompassed in the Central Limit Theorem is that when a population is repeatedly sampled, the average value of the attribute obtained by those samples is equal to the true population value. Furthermore, the values obtained by these samples are distributed normally about the true value, with some samples having a higher value and some obtaining a lower score than the true population value. In a normal distribution, approximately 95% of the sample values are within two standard deviations of the true population value (e.g., mean).

In other words, if a 95% confidence level is selected, 95 out of 100 samples will have the true population value within the range of precision. There is always a chance that the sample you obtain does not represent the true population value when samples taken are extreme values from the population.

Degree of Variability

Degree of variability refers to the distribution of attributes in the population. The more heterogeneous a population, the larger the sample size required to obtain a given level of precision; the lesser the variable (more homogeneous) a population, the smaller the sample size.

Yamane (1967:886) provides a simplified formula to calculate sample sizes. The formula uses confidence interval and precision.

$$n = N/(1 + N\,(e)^2)$$

Where **n** is the sample size, **N** is the population size, and **e** is the level of precision. As "e" decreases, n approaches N.

Different formats for socio-economic data collection are annexed, Annex 6.

5.2.3 Step 5 Data Analysis

Data diagnosis and analysis is the core step in the whole planning exercises. Principal issues to be analysed include the types of problems and their nature of severity. Ultimately, the causes to these problems must be analysed. Land use problems and constraints can be analyzed by drawing a problem tree. The tree can articulate the cause and effect of problems. It also determines the core problem resulted from the interconnected problems. Solving a cause of a single problem or symptom does not overcome the core problem. However, focusing on solving the core problem will overcome all the problems appearing in the problem tree as causes and effects (Refer to Annex I0, Figures 4_b & 4_c).

Land use plans are prepared based on natural resource bases. Homogeneous resource units show similar physical characteristics and this homogeneity is seen in relation to major land uses of capability for major uses. This capacity potential only may not be a final decision criterion due to various reasons.

A suitable land for a specific major use may not be accepted by communities ascribed to many reasons. This can be due to attitude or cultural differences. There could be other staple food items or its agricultural practice may not be practiced. There is also a

possibility that the output could be viable both financially and economically or the opposite can happen. Or appropriate in all other parameters, it might not be environmentally sound.

Knowing only the biophysical information is short of a half way. To arrive at a feasible decision, each homogeneous physical land unit needs to be evaluated using socio-economic and environmental parameters known about that specific land unit.

The following flow chart shows the integration of biophysical information with socio-economic information in the ILLPLUP planning process.

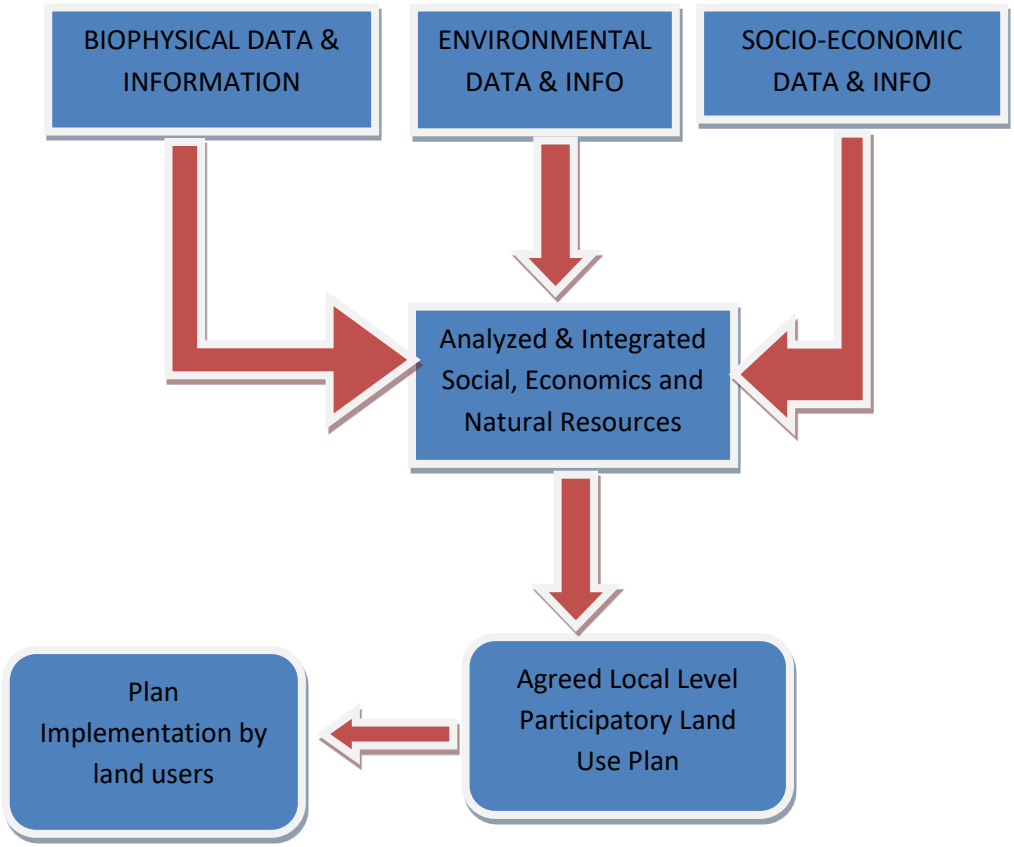


Figure 5. 6 Integration of Biophysical Information with Socio-economic Information
Source – Mengistu's Drafted LLPLUP Manual, Dec 2012

5.2.3.1 Biophysical Data Analysis

The physical features data collected is analyzed and systematically classified to show potentials and limitations of a specific land unit.

Land Capability units are determined by overlaying different thematic maps of physical characteristics. The major data required to employ the method are: classes of slope, soil depth, past erosion status or class, infiltration, soil texture, waterlogging, and stoniness of a land unit. When maps showing these features are overlaid together, it is likely to get the eight capability classes.

In general the following steps can be followed:

- After collection of biophysical data, physical characteristics are classified into their respective classes of land (slope – basis for base map, soil depth, past erosion, top soil texture, water logging, infiltration, and surface stoniness /rockiness);
- Overlay the classes of physical characteristics and develop Land Capability Map;
- Produce Current Land Use Land Cover Map;
- Superimpose Land Capability Map on existing Land Use /Land Cover Map;
- Set land use alternatives (relate land uses with land capability if matching is acceptable);
- Socio-economic evaluation based on proposed land use alternatives;
- Environmental evaluation and appraisal vis-à-vis the proposed bio-physical and socio-economic evaluation for each proposed land unit;
- Prepare land management options for each land unit (relate land uses with land capability if matching is acceptable and consider land management options for each proposed use /cover);
- Produce final land use plan.

5.2.3.2 Socio-economic Data Analysis

The data collected employing different methods can be organized into different data sets in order to facilitate decision making during considering land use alternative options. The data sets can take different forms depending on the issue to be overviewed.

1) Patterns

Cropping and livestock patterns can be generated to understand the most important crops and livestock types in the farming system.

2) Parameters and Statistics

Figurative values describing populations and samples of variables covered by study should be generated when appropriate.

3) Ranking Methods

These are techniques that can help community to identify the main developmental problems and potentials that affect most individual community members. Decision is reached by voting, or by weighted scores or by eliminating the less important constraints/problems.

a) Pair-wise Ranking

Pair wise ranking is one of the techniques that gives chance to see how many times one of the issues is selected by the community representatives and its order of rank. Farmers can prioritize and rank their own problems if they are given chance to do so.

Table 5. 14 Land Use Problem Ranking

Problems	1	2	3	4	5	6	Score	Rank
Erratic Rainfall		1	1	1	5	6	3	2
Food Shortage			3	2	5	2	2	3
Low Household Income				3	5	3	3	2
Soil Erosion					5	4	1	4
Land Shortage						5	5	1
Lack of Fuel Wood							0	5

Source – Adapted from adapted from draft LLLUP Manual by Gizachew

However it does not show the cause and effect relationship of issues.

b) Preference Ranking

It is one of the techniques that can help community to identify the main developmental problems that affect most individual community members and decision is reached by voting, or by weighted scores or by eliminating the less important constraints/problems.

Community members list major development problems and rearrange them in their order of severity based on agreed criteria. The criteria could be:

- Category of population being affected (affected groups);
- The size (number of individuals) of the affected groups;
- The weight of the problem with respect to other or subsequent problems caused by it, etc.

c) Direct Ranking

Communities show their priority towards a certain issue. Example is given below.

Table 5. 15 Direct Ranking

Type of Infrastructure	**Rank**	**Description of the Situation**
Potable water	2	Community uses river water for household use and, hence, women and girls walk a 5 km one way distance to fetch water.
School	5	There is no second cycle elementary school in the village.
Human Health Care Centers	4	There is only a health post.
Road	3	The micro-watershed has no feeder road to Kebele center though its seriousness is less water and potable water.
Fuel wood	1	Almost degraded area and no fuel wood collection. No fuel gas.

Source – Second drafted ILLPLUP Manual by Gizachew

4) Stakeholder and Problem Analysis – OOPP

OOPP is one of the tools to design activities in a participatory manner. By discussing the problems and possible solutions, the participants can come to a mutual understanding of each other's points of view. Once some form of consensus is reached, these problems are organized into a logical sequence.

5) Seasonal Calendar

Calendars are diagrams that focus on seasonal issues and how things change with time. They help to present large quantities of diverse and complex information in a simple diagram about farming activities, labor allocation, livestock diseases, prices, marketing, human diseases etc. By having seasonal calendar diagrams, we can identify the time (e.g. months) of greatest difficulties and impact on people's lives. The following steps can be followed to develop seasonal calendars:

- To capture the gender dimensions, group discussions should consist of separate groups of men and women;
- Draw up a 12 month calendar as appropriate, on flipchart or on the ground;
- Community members who are knowledgeable discuss different events and use beans or small stones to quantify information and indicate their relative magnitudes; and
- Make the appropriate labeling of diagram/curves.

Calendars can be prepared for different seasonal issues:

- Crop Calendar: They are used to collect data on the intensity of cropping activities/practices along a time series. The seasonal crop calendar show the time when the crop is planted, weeded, harvested, and threshed, and if any inputs are used [i.e. improved seed, fertilizer, herbicide, etc.] when they are used for the major crops.
- Grazing Calendar: It should indicate the different major forage sources for the livestock possessed by the majority of farm households at different seasons of the year.
- Labor Calendar: The key purpose is to collect information on availability of labor for different farming activity/operation throughout the year.

5.3 Planning Phase

5.3.1 Step 6 Conduct Land Capability Classification

5.3.1.1 Conduct Physical Evaluation and Determine Land Capability Classes

Using the data collected showing classes of the limiting factors (slope, soil depth, past erosion, water logging, infiltration, texture, and stoniness or rockiness, LGP), ranges of values, and coding for each separate limiting factor, we can use Land Capability Classification Conversion Table given below to identify the land capability classes from Class I to Class VIII with a relative decrease of potentials or increase of limitations with the exception of Class V.

LCCs can be determined as follows:

- Start at the top left hand corner of the Table 5.19 (slope row) and move from left to right until you find the first occurrence of the slope category you recorded in the field; and then,
- Proceed down to the next feature (i.e. soil depth) and do the same until you find the soil depth category; and then,
- Complete the other land features data you have collected in the same manner by moving from left to right until you find the categories without going back.

When this is completed, now you are in a position to assign your map units from class I to class VIII. Note that you may not find all the eight land capability classes.

Table 5. 16 Land Capability Classification Conversion Table

Land capability limiting factors	**Land Capability Classes Determining Factors of Land Mapping Units**								
Slope	1	2	3	4	1-4	5	6	1-6	1-6
Soil depth	1	1-2	1-2	1-3	1-3	1-4	1-4	1-5	1-5
Past Erosion	0	0	0-1	0-2	0-2		0-3	0-4	0-4
Texture	3-5	3-6	3-7	2-7	2-7		2-7	1-7	1-7
Water logging	0	0	0-1	0-2	0-2		0-2	0-2	0-3
Infiltration rate	0	0	0-1	0-2	0-2		0-2	0-2	0-2
LGP	G3,G4	G3,G4	G3,G4	G2-G4	>G1		>G1	G1-G5	G1-G5
Stoniness	0	0-1	0-2	0-2	0-3		0-3	0-4	0-4
Capability Class	I	II	III	IV	VI		VII	VIII	V
	Suitable for annual crops				Suitable for perennial crops & grazing		Suitable for Forest development	Not suitable for crop production	Swampy land

Source - Adapted from Survey on Soils and Land Classification Guideline by Javier Escobedo, October 1988

The classifying factors of land capability classification determine 8 classes of land of a planning area. Each land map unit is assigned a capability class of I through VIII, and classes II through VII are assigned a sub-class describing limitations or hazards for agricultural purposes. Class I soils do not have limitations for crop production and has no subclasses.

Lands suited for cultivation are:

Class I lands have few limitations that restrict their uses. They are suited to a wide range of plants and may be used safely for cultivated crops, pasture, range, woodland and wildlife. The soils are nearly level and erosion hazard is low. They are deep and very deep, well drained and easily worked. They hold water well and are either fairly well supplied with plant nutrients or highly responsive to input of fertilizer. The sites are level and climate is favorable.

Class II lands have limitations that reduce the choice of plants or require moderate conservation practices. Soils in this class require careful soil management and conservation practices to prevent deterioration or to improve air and water relations when the soils are cultivated. The limitations are few and easy to apply. The soils may be used for cultivated crops, range, wood and, or wildlife, pasture. Limitations of soils may include, singly or in combinations, the effects of gentle slopes, moderate susceptibility to erosion, less than ideal soil depth, unfavorable structure and workability, and slight climate limitation on soil use or management.

Class III lands have more restrictions than those in class II and can be used for cultivated crops, pasture, woodland, range, or wildlife. Limitations of soils restrict cultivation, time of planting, tillage, harvesting, and choice of crops. The limitation may result from one or more of the following: moderately step slopes, high susceptibility or adverse effect of past erosion, very shallow permeability of sub-soil, shallow depth that limit the rooting zone and water storage, low moisture holding capacity, low fertility that is not easily corrected, and moderate climate limitations.

Class IV lands have very severe limitations that restrict the choice of plants and require very careful management. The restrictions in use for these soils are greater than those in class III and the choice of plants is more limited. When these soils are cultivated, more careful management is required and conservation practices are more difficult to apply and maintain. These soils may be used for crops, pasture, woodland, range, or wildlife. Use for cultivated crops is limited as the result of the effects of one or more of the following features: steep slopes, severe susceptibility to erosion or severe effect of past erosion, shallow soils, low moisture holding capacity, or moderately adverse climate.

1) Lands generally not suited for cultivation:

Class V lands generally have limitations that are impractical to remove and that limit their use largely to pasture, range, woodland, or wildlife. Limitations of soils in this class restrict the kind of plants that can be grown and that prevent normal tillage of cultivated crops. They are nearly level but some are wet, frequently over flooded by streams, stony, and have climatic limitations or have some combinations of these limitations. Because of one or more of these limitations, the cultivation of the common crops is not feasible but pasture can be improved and benefits from proper management can be expected.

From environmental point of view, it is advisable to keep it as biodiversity reserve area than draining the soil by making ditches. Moreover, Federal Land Administration and Land Use Proclamation No 456/2005, Article 13 concerned with land use planning and proper use of sloppy land, gully and wetlands provides that the biodiversity in rural wetlands shall be conserved and utilized as necessary.

Class VI land's physical conditions of soils are such that it is practical to apply range or pasture improvements such as seeding, liming, fertilizing and water control with contour furrows, diversions, or water spreaders. Soils in this class have continuing limitations that cannot be corrected, such as steep slopes, severe erosion hazard, effects of past erosion, stoniness, shallow rooting zone, low moisture capacity, or severe climate. Due to one or more of these limitations, the soils in class VI are not generally suited for cultivated crops but may be used for pasture, range, woodland, wildlife, or some combination of these.

Class VII land's physical conditions of soils are such that it is impractical to apply such as pasture or range improvements as seeding, liming, fertilizing and water control measures such as contour furrows, ditches, diversions, or water spreaders**.** Soil restrictions are more severe than those in class VI. Because one or more of the continuing limitations cannot be corrected, such as very steep slopes, erosion, shallow soils, stones, unfavorable climate, or other limitations that make them unsuited for common cultivated crops. They can, however, be used safely for grazing, woodland, or wildlife or some combination of these under proper management. Some areas in this class may require seeding or planting to protect the soil and prevent damage to adjoining areas.

Class VIII lands have limitations that preclude their use for commercial plant production and restrict their use to recreation, wildlife, water supply, or aesthetic purpose. Gully land, rock out crops, mine tailings and other nearly barren lands are included in class VIII. It may be necessary to give protection and management for plant growth to soil and land forms in class VIII in order to protect other more valuable soils.

Each land class requires different management practices and land use options.

Table 5. 17 Descriptive Characteristics & Possible Management Practices and Land Use Options of Land Capability Classes

Land Capability Class	Characteristics	Required management practice	Possible land uses
I	Very deep, deep, productive, level to nearly level land, no or slight risk of damage while cultivated.	Use of fertilizers, lime, cover crops, crop rotation to maintain fertility and soil structure	Cropping, grazing, forestry; grass cutting, irrigation etc.
II	Gentle slope, productive soils, moderately deep, subjected to occasional overland flow, damage when cultivated.	Crop rotation, drainage ditches, water flow control system, special tillage practices to avoid erosion	Same as above
III	Moderately fertile, moderately steep slope, subject to severe erosion, subject to risk of soil damage.	Maintenance of adequate plant cover; planting hay or; planting row crops	Same as above except irrigation
IV	Good soils; steep slopes; subject to severe erosion; severe risk of damage.	Good grass cover; keep in hay or pasture crop	Occasional cultivation once in five years; systematic grazing; grass cutting;

Land Capability Class	Characteristics	Required management practice	Possible land uses
			forestry
V	Wet land/swampy or sandy; level to nearly level; subject to slight erosion	Intensive drainage systems	Pasture, forestry, regulated dry season grazing to regulate destruction of the ecosystem
VI	Steep slopes, shallow soils.	Physical and biological soil and water conservation practices, area closure to regenerate the soil and indigenous species	Cultivation with physical and biological conservation practice,; forestry and regulated grazing to prevent destruction of species and aggressive species
VII	Steep; uneven surface; eroded; shallow to very shallow soils; swampy and dry lands; severe risk of damage when used for forestry and pasture	Controlled grazing, careful forest management;	Cut and carry, forest products, area closure, wildlife management, recreation
VIII	Very steep slope, rocky and stony	Area closure	Forest and wild life management

Source – Mengistu's Drafted ILLPLUP Manual, Dec 2012

5.3.1.2 Final Mapping Unit Preparation

In the previous steps, the Preliminary Base Map used for OOPP workshop and the preliminary Mapping Units later developed at Office Work further improved by incorporating data from field visit. At this stage, the final mapping units of slope, soil depth, past erosion, water logging, infiltration, texture, stoniness or rockiness, LGP are classified on a separate sheet of map for each. These are thematic maps when overlaid together determine the land capability Map. To a certain extent, the data related to the seven physical features which are mandatory for land capability classification are made ready.

5.3.1.3 Preparing Land Capability Map

It is the product of combined thematic maps. The land capability map consists of Land Capability Unit (LCU) which shows the lowest category of the LCC system with the major limiting factors affecting the use of the land for agricultural purposes. The four kinds of limitations recognized are risks of erosion (e); wetness, drainage, or overflow (w); rooting-zone limitations(s); and climatic limitations(c). The dominant kind of limitation or hazard to the use of the land determines the assignment of capability units to the (e), (w) and (s) sub-classes. Capability units that have no limitation except for climate are assigned to the (c) sub-class. Where two kinds of limitations which can be modified, or corrected are nearly equal, the sub-classes have the following priority: (e), (w), and (s).

Sub-classes are groups of capability units that have the same kinds of dominant limitation for agricultural use.

Sub-class (e) is made up of soils where the susceptibility to erosion or past erosion damage is the dominant hazard or problem in their use.

Sub-class (w) consists of soils where excess water is the dominant limitations in their uses. Poor soil drainage, wetness and high water table are criteria for placing soils in this sub-class.

Sub-class (s) is made up of soils where root zone limitations are the dominant hazards or limitation in their use. Limitations may include but not be limited to: shallow soils, stones, low moisture holding capacity, low fertility difficult to correct, and etc.

Sub-class (c) is made up of soils where climate (temperature and lack of moisture) is the only major limitation in their use.

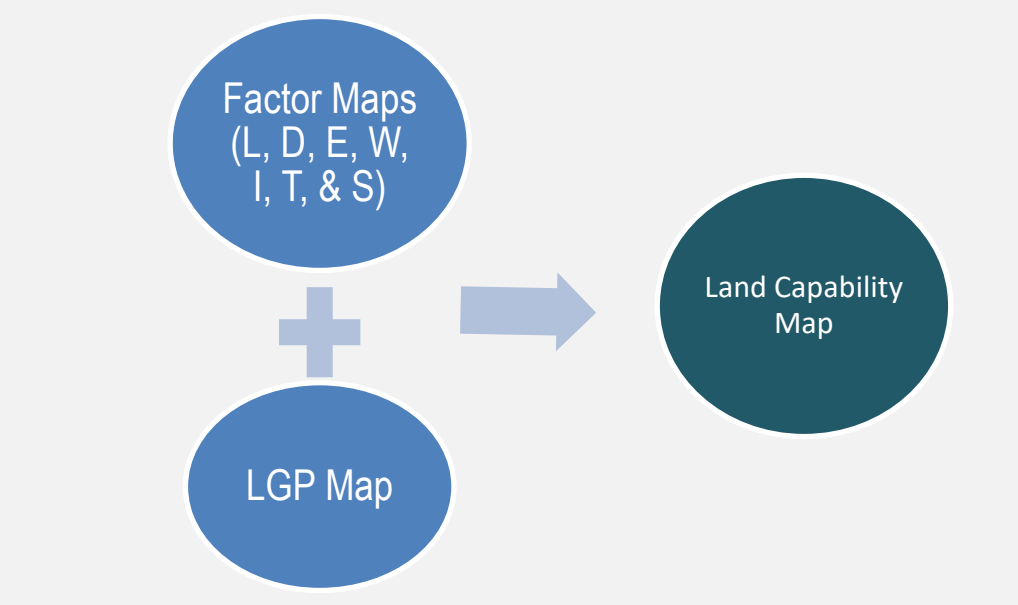


Figure 5. 7 Suggested Overlaying Soil Map over LGP to produce Land Capability Map

Superimposing the land capability sub-class over land use and land cover would provide land development units which will in turn help to identify recommended land uses and management options.

5.3.1.4 Identification of Opportunities for Change

Identification of opportunities for change is not a one-time effort. Rather it should be a continuous effort from the first day of the OOPP and SWOT analysis workshop up to the finalization of the land use plan. Identification and examination of opportunities help to maximize the benefits from land.

To identify opportunities, SWOT analysis can be exercised. Every time land users and other stakeholders are met, opportunities can be collected from such interactions.

Table 5. 18 SWOT Analysis Matrix to Select Strategies

External Factors	**Internal Factors**	
	Strengths (S):	**Weaknesses (W):**
Opportunities (O):	SO Strategies	WO Strategies
Threats (T):	ST Strategies	WT Strategies

Opportunities can be clearly seen with threats, strengths, and weaknesses. Identifying these four factors, called strategic factors, it will be easy to exploit opportunities. Especially, to maximize the benefits from land uses, strengths and weakness should be identified.

- First identify strategic factors;
- Then identify strategies that: -
  - Take advantage of opportunities by utilizing strengths (SO strategies);
  - Take advantage of opportunities by overcoming weakness (WO strategies);
  - Reduce threat by utilizing strengths (ST strategies);
  - Reduce threat by minimizing weaknesses (WT strategies);

SWOT analysis during a work shop and the process of analyzing strategic factors should continue until land use planning is completed.

Examining the superimposition of Land Capability Maps and Land Use Land Cover Map can be used to exploit opportunities.

5.3.1.1 Set Land Use Alternatives /Options

Identification of problems and opportunities is an iterative and dynamic process that continues throughout the planning process. Once the local level participatory land use planning team identified land use problems and development constraints land mapping units by land mapping units, the team can start to analyze and incorporate findings of the socio-economic and natural resources data and information into a planning unit. Options of development or land use solutions for overcoming the problems can be ranked and structured through systematic discussions among the planning team members by giving priority to the land users' interest. Discussions enable the planning team to see alternative solutions and development options that accommodate technical, social and environmental issues in the ILLPLUP.

After discussion the following options may be created in the decreasing order of choices.

- Crops cultivation
- Grazing
- Vegetables production
- Tree planting; and
- Hay farming/ production.

Various land use options can be worked out for the different planning units following problems analysis. The options should also be validated against social acceptability, economic viability and environmentally soundness to assure sustainability of the plan.

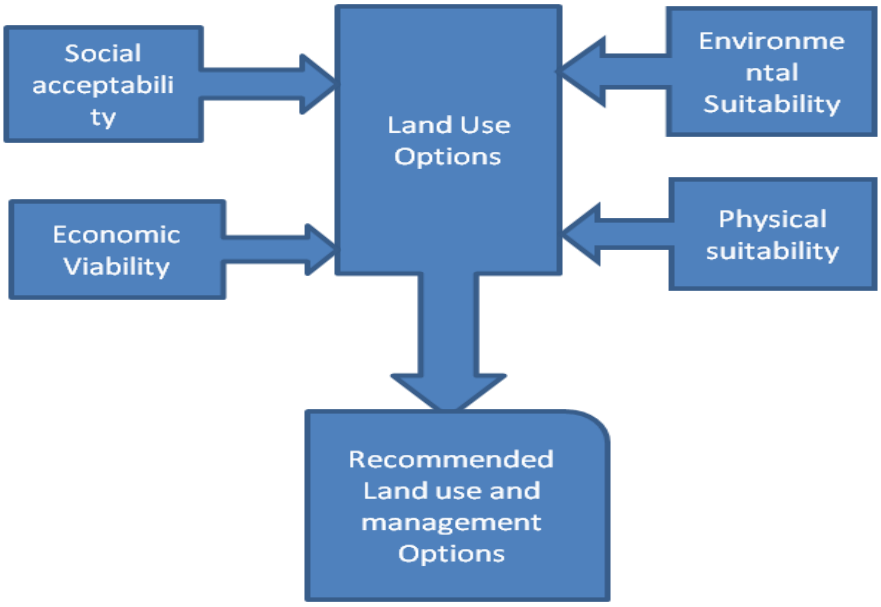


Figure 5. 8 Land Use Planning Options adapted from Mengistu's drafted LLPLUP Manual, Dec 2012

Now to look for land use alternatives, Land Capability Map can be super-imposed on existing land use land cover map to produce map units that show the current land uses /land covers and land capabilities. Considering different options of land use, the option selected for each land unit becomes the type of land use for that specific piece of land, those different types of uses selected for each land unit are shown on the land use map.

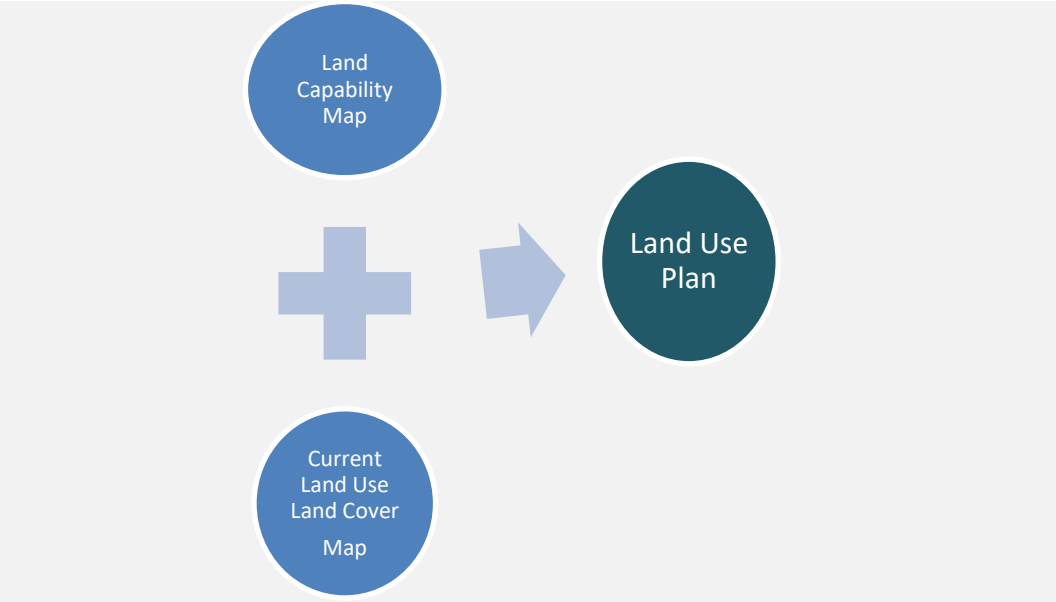


Figure 5. 9 Overlaying Land Capability Map over Current Land Use Land Cover to produce Land Use Plan Map as suggested by Participants

This matching is the start of seeing land use alternatives. To evaluate alternatives, follow the following steps:

- First check whether each land capability unit is suitable for the existing land use /cover;

  - If yes, look for appropriate land management measures (ask also if there are other suitable land use options).
  - If no, what other land uses / covers is suitable for the land unit?
- List options and evaluate them in terms of social acceptability, economic return, and environmental impact;
- Change the land use from the existing land use /cover to the new selected land use /land cover with appropriate land management recommendations, and proceed further with detail evaluation on the option. Potential land management interventions that can be selected and recommended according to the land capability, and present or recommended land use are given in Table 5.17, and Annexes 8 and 9.
- Review also the strategies and opportunities agreed during OOPP and SWOT workshops, apply selected strategies.

At this point, socio-economic findings need to be referred to evaluate each land use plan unit and present or suggested alternative land uses for each. It is also necessary to consider if there are socio-economic potentials and constraints as the land classification is based only on the land natural potential to give output. Considering potentials including market, government policy and constraints such as drought and market competition are examples to consider. Social, economic, and financial study findings can be related to each land use plan.

Depending on the characterization of the land capability, different questions can be raised:

- Are the uses of each land unit superior to other alternative uses in economic and social terms?
  - If not, what other best alternatives can be proposed that fulfill social and economic requirements?
- Does type of existing or proposed land management suitable to the current land use and/ or cover?
- Is the current use of the land unit accepted by the community?
  - If not, what other alternatives do communities suggest?
- Is the use of each land unit environmentally sustainable?
  - If not, what other alternatives are there or what mitigating measures can check identified environmental consequences?
- What economic and /or financial advantages are missed or will be gained?

The socio-economic data collected and analyzed should be used to evaluate each identified land use plan unit.

In the broad sense, loss of biodiversity and soil reduce the economic and financial benefits that the land users are going to enjoy in the future. In this regard, the following table can be employed to evaluate the loss of benefits.

Table 5. 19 Suggested Options Evaluation for Land Dev't Unit …

S.N	Proposed Land Use Options	1.Social Acceptability	2.Financial /Economic Viability	3.Soil Loss	4.Biodiversity	Benefit Value Sum	Rank
1							
2							
3							

Assumptions:

a. Give values from 4 to 0 for Biodiversity, and 5 to 1 (5 = highest benefit, 1 = lowest benefit) for columns 4 & 5.
b. Options are at least two (if option is only one, there is no need for comparison. Look for better management options only).
c. If the proposed use is not accepted, the option should be canceled, and wait until attitude changes if the option is superior in other evaluation criteria.

To check whether the proposed alternative options on each land use plan unit brings about improvement in every aspect sustainably, we can use the above Option Evaluation Format. Give rates from 5 to 1(0) and sum row wise. Give 5 value for the option that has the least soil loss and give value 1 for the option that has the highest soil loss. Give "0" if the option worsens the vegetation cover of the land unit and 4 to 1 if there is relatively significant biodiversity improvement. Social Acceptability should receive two ratings: only accepted or not accepted. Give special attention to social acceptability rating. The option which lacks social acceptability shouldn't be taken as best option. The option with the highest sum of values will be the best option.

For soil loss variable rating, it is possible to calculate current rates of soil erosion by employing the Universal Soil Loss Equation (A) formula. The formula uses rainfall erosivity (R), soil edibility (K), slope length (L), slope gradient (S), land cover (C), and management factor (P). The calculation gives soil loss in tons per hectare per year. The equation is given as Annex 10.

A = R*K*L*S*C*P (Wischmeier and Smith, 1978, as adapted by different writers).

For special socio-economic interests, the collected socio-economic data can be further processed to meet special decision needs. For example, we can do a sort of calculation to watch the balance between livestock (TLU) and feed requirement that can be filled from straw of different crops, and crop residue and aftermath. Six crops and four types of livestock are taken as example.

Table 5. 20 Straw Calculation for Kebele Livestock Feed Supply of a given Year

S. N	**Crop**	**Yield (A)**	**Cultivated Land (Ha) (B)**	**Total production(Tones) C=(A*B)**	**Multiplier (D)**	**Total Straw /Annum (Tones) E= C*D**		**Type of Livestock (F)**	**Population (G)**	**Livestock conversion to TLU (H)**	**Total TLU I=(G*H)**
1	Teff				1.0			Cattle		0.7	
	Barley				0.7			Sheep		0.1	
	Wheat				0.7			Goat		0.1	
	Maize				0.7			Equines		0.65	
	Sorghum				0.7						
	Millet				1.0						
	Column Sum		J	K		L					M
2	Crop Residue and aftermath	1.5 t/ha (dry matter)	Cultivated land total (N)	1.5*N	1	1.5*N					
	Grand Total				**-**	**P=L+1.5*N**		**-**	**-**	**-**	**M**

Source - "Multiplier" taken from FAO, 1984, as quoted by CSA Agricultural Sample Survey, 1997/98.

"Livestock conversion to TLU" taken from Ethiopian Highland Reclamation Study, 1984.

Assumption – all straw is used for livestock feed.

How to do the calculation is simple. You know the type of crops and their respective yield from your socio-economic data. So calculate the total production of each crop. Crop production and straw production is related. For example the production of teff grains equals the quantity of teff's straw from same unit of area.

You know also the livestock population from your socio economic study. This livestock population needs to be converted into TLU.

Table 5. 21 Feed Balance Calculation

Kebele Name	**Total TLU**	**Available Feed DM in Tones /year**	**Feed Requirement for Maintenance (DM in Tones /LTU /year)**	**Total Feed Requirement (DM in Tones /year)**	**Surplus (+) or deficit (-) as % of requirement**
	M	P	2.28	M*2.28	(P/(M*2.28))*100

Source – the Table above

Feed requirement for maintenance of one TLU is about 6.25 kg DM/day. This equals 2.28 Tones DM/annum for one TLU. A simple calculation as shown above gives us some clues how much the DM feed availability is in surplus or deficit of the requirement for existing livestock population.

One more example of socio-economic data application is fuel wood assessment. The bulk of the national energy consumption is met from biomass sources. As in most sub-Saharan countries, a marked feature of Ethiopia's energy sector is highly dependent on biomass (firewood, charcoal, crop residues and animal dung). The average annual per capita rates of domestic fuel wood consumption is 1.19m^3 (SPSDCMWBR, October 2002 (page 101).

Fuel wood assessment of a certain LUP Kebele should take into account the demand and supply sides of fuel wood. Consequently, this assessment will yield whether there is surplus or deficit of fuel wood supply. In general, the following formulas can be employed to have picture about fire wood of a year.

a) FWS = Y1A1 + Y2B2 +Y3C3 …etc.), where FWS = Fuel Wood Supply in m3, Y = Fire Wood Yield (per hectare) in m3, A1 - C3 … etc. = different fuel wood source vegetation covers. Productivity of each fuel wood source vegetation cover can be estimated from household surveys or can be taken from previous study sources as appropriate.

b)FWD = KP*PC, where FWD = Fuel Wood Demand, KP = Kebele Population, PC = Average Annual Per Capita Fuel Wood Consumption in M3 which is equal to 1.19m3 (this is national average which includes urban and rural. It is advisable to take higher rates when we consider rural Kebeles).

These calculations exclude charcoal, crop residues, and animal dung. So it does not match with per capita total fuel requirement.

From the above two Tables and two formulas, we understand that we are obliged to proceed with further calculations using socio-economic data to get the final statistics /parameters required for decision making.

5.3.2 Step 7 Environmental Impact Assessment and Appraisal for the Alternative Land Use Options

5.3.2.1 Impact Identification, Prediction, and Evaluation

Nature preserves itself when left without any human interference. When human interference happens, however, environmental negative impacts are likely to be observed. To avoid or minimize such impacts, each developmental activity on each land development unit should be evaluated what impact it may cause during implementation.

Federal Democratic Republic of Ethiopia Environmental Impact Assessment Guideline document (May 2000) Chapter 5 describes issues for EIA in specific development sectors in Ethiopia. Among the list of sectors Agriculture, Resettlement, Dams and Reservoirs, Irrigation Projects, Mining etc. are included. Under each section, issues for environmental impact assessment and recommendations for environmental management are suggested. There is also Appendix which consists of Schedule of Activities, and lists projects. The list includes:

- Projects which may have adverse and significant environmental impacts, and may, therefore, require full EIA (Schedule 1);
- Projects whose type, scale or other relevant characteristics have potential to cause some significant environmental impacts but not likely to warrant an environmental impact study (Schedule 2); and
- Projects which would have no impact and does not require environmental impact assessment (Schedule 3).

All projects in environmentally sensitive areas should be treated as equivalent to Schedule 1 activities irrespective of the nature of the project. Sensitive areas may include:

- Land prone to erosion;
- Land prone to desertification;
- Areas which harbour protected, threatened or endangered species;
- Areas of particular historic or archaeological interest;
- Wetland of national or international importance; etc.

Land use plan does the following three things: it allocates appropriate land uses to land, and provides appropriate management options for that allocated land with appropriate binding local directive and standards. In this regard, land use plan activities are in favor of sustainable environmental management. However, in light of the above Schedules, there could be unintended environmental and social consequences from the implementation of land use plans. Hence, environmental impact should be mitigated and monitored. To predict impacts that might be caused by certain activities on land development units, the following Table can be used. One example is given.

Table 5. 22 Format for Environmental Impact Prediction

S.N	Land Development Unit	Development Activity on Land Unit	Potential for Adverse Impacts				Sources /Causes of Impact	Predicted Impact
			Yes	Maybe	No	Unknown		
1	LCC 6	Land Use Change	✓				Land Use Conflicts	Migration, social unrest

etc.								

Source – Adapted from Different Sources

The above checklist indicates if there is a potential impact and lists the options as:

Yes: There will be significant impacts.

Maybe: There might be environmental/social impacts, which may be addressed.

No: There are no environmental/social impacts resulting from the activity. So, no need of environmental impact mitigation method.

Unknown: more investigation and follow up is needed.

When an activity falls under "Yes", planners may be forced to look for other options with no or less predicted environmental impact provided that other requirements such as economic viability and social acceptability are satisfied. Or they should come with appropriate environmental mitigation measures.

5.3.2.2 Impact Mitigation and Adaptation

Using the format suggested above, the probable predicted negative impacts are identified. For identified predicted impacts, there should be a plan of mitigation measures which need to be monitored.

Table 5. 23 Environmental and Social Monitoring and Auditing Framework Format

Proposed Mitigation Measures	**Parameters to be Monitored**	**Location (Land Dev't Unit)**	**Measurements (source of information)**	**Frequency**	**Institutional Responsibility**	**Estimated Cost**

Source – Adapted from Federal EIA Guideline

To fulfill the requirement of the Competent Authority and to minimize negative impacts, monitoring during implementation is mandatory.

- Baseline measuring: All monitoring and evaluations should be considered against the baseline. In this case, the Kebele may have forest resource and ongoing events like farm land expansion by surrounding residents, free grazing, and deforestation levels which are important bench marks against which impact monitoring can be exercised. Any gully formation or serious soil erosion due to land use plan implementation can be measured against the baseline data.
- Impact monitoring: Land use plan implementation operations continue year after year and, consequently, their cumulative effects will bring about cumulative change (impact(s)) on the environment and community. Such impacts, either expected or unexpected, will help to generate lesson about the future to guarantee the land use planning objective.
- Compliance monitoring: planners and implementers are required to implement their land use activities guided by and within the environmental legal framework and land administration and land use regulations and standards.

5.3.3 Step 8 Choose the Best Land Use Options

Under "Set Land Use Alternatives /Options (part 5.3.2.5)", land use alternatives were considered and Table 5.22 (Option Evaluation for Land Dev't Unit …) ranked land use options for a given land unit. The likely environmental impacts are predicted in Table 5.25, Format for Environmental Impact Prediction.

To choose the best land use options, the same format used to predict environmental impact with some modifications can be used. Here the decision should be given by rural households.

Table 5. 24 Table for the Selection of Best Land Use Options

S.N	Land Unit	Land Use Options	Environmental Sustainability		Financial /Economic Viability		Social Acceptability		Best Option	Remark
			Yes	No	Yes	No	Yes	No	Yes/No	If all are "Yes", it is best option

Source – Extracted and adapted from different sources

The above checklist is used to indicate if there are potential economic and social impacts of planned land use, and environmental sustainability. The occurrence of social unacceptability overrides other Yes options.

Yes: if all are yes, there will be significant positive impacts and option becomes best of all.

No: There are no positive economic /social impacts and environmental sustainability and is not a best option.

If land use adjustment plans are observed, these new land uses might not be accepted by the community or it may not be economically and financially viable. So planners should test each land development unit by the identified socio-economic characteristic parameters. Finally the major use and the corresponding proposed land management shall be decided.

When a land use change is mandatory but not accepted by the community or land users, the following points need to be considered:

- First know the reason why it is not accepted;
- Then if the reason is economic or financial one, do different simple scenario of economic /financial analyses referring to socio-economic data collected to show them that the land use change is economically /financially feasible; or if the resistance is attitudinal give time and negotiate;
- Later give the community the chance to decide;
- If the resistance continues, keep the existing land use with improved management but continue educating communities.

This is the stage where we can use the socio-economic data collected during data collection and analyzed and organized in a systematic manner. Whenever we want to decide land use options for a given land development unit, we have to refer to the relevant economic and social variable and measure it whether it is optimal option. The land use options selected are followed by land management recommendations which will have economic and social implications.

So socio-economic data is used to decide for:

- Performance evaluation as baseline data;
- Selection of alternative land use options; and
- Appropriateness of proposed land management type.

Examples are given as annex 11.

5.3.4 Step 9 Prepare the Final Land Use Plan

Integrated land use plans have to be based on a complete inventory of the Kebele's physical and socio-economic resources. A multidisciplinary approach has to be followed and the objectives of the plan should not be limited to prevention of land degradation. Increased production from the land on a sustained basis and a general improvement of the standard of living for the people living in the study area must be an integral part. So infrastructure and social services (education, health, drinking water, road, market etc.) should be considered to be embraced by the land use plan.

To finalize the ILLPLUP, the map that clearly shows the land development units is prepared with appropriate legend. At least major features like scale, direction, legend, and title should be clearly designed on the map. Make the plan report simple (Annex 12).

Each land development unit is retested by socio-economic characteristic parameters and environmental assessment criteria.

The following activities are listed as probable land use plan items:

- Crop land
- Forest lands
- Misused lands because of inadequate alternatives
- Wetlands
- Parks
- Kebele center
- Quarry /mining site
- Cemetery
- Religious and cultural places
- Schools
- Health posts
- Heritages
- Residential

Textural narration is given to the whole process of the land use planning with appropriate content and structure. All the data collected is organized and put in the report. Recommendations on the corresponding proposed land management shall be decided for each land development unit.

Interventions to improve the productivity of a definite land unit depends on the problems relating to climate, soils, vegetation cover, land use and wrong measures undertaken in the past. It is believed that by controlling the processes of erosion resulting from de-vegetation, overgrazing, trampling, over cultivation, steep slopes and intensity of rainfall can be controlled by undertaking appropriate measures that overcome the problems and ameliorate the land.

Application of the physical and biological soil and water conservation measures in the agreed units of the participatory land use plan must be based on the techniques and work norms given in the Community Based Participatory Watershed Development Guideline prepared by MoARD in 2005.

Recommended land management interventions that are seen important and should be agreed by the Team in ILLPLUP are given in Annex 8 and 4. More appropriate interventions as related to land use planning and resource management can also be decided by the planning Team giving priority to the community representatives' opinions.

The land use plan map with the incorporation of recommended land management interventions produces the land management plan.

During planning, planners should consider in general terms but flexibly how to improve vegetation cover and reduce land degradation thereby increasing productivity. It is necessary to look for addressing those problems identified and agreed by communities. Fuel wood shortage, the poor supply for construction materials and farm implements, for example, can have rooms to solve them looking at each land development unit. In this regard, plant species that are being depleted or almost becoming extinct can be considered how to plant more of them. If communities are asked what tree species were grown in the watershed some 50 years ago but not growing nowadays, they can share the information they have. Local indigenous species can be planned in association with churches, mosques, schools, health institutions, Kebele Administration, DA office, NGO offices etc. The flexibility here is to look beyond capability and to recommend specific tree species considering the lands suitability and existing problems.

After the completion of the integrated plan, an extended action plan will be written and agreed by all stakeholders.

With this plan, two major issues should be indicated so that communities and other stakeholders can express their views. These are land use issues that need to be supported by land use restrictions and land use standards. Communities should be allowed to set their own restrictions. During planning, stakeholders can come with their sectoral standards and incorporate them in the plan. Generally, planners are expected to identify and list those issues and setting /quantifying the level of standards to be maintained.

The other important issue that should be developed following the finalization of the development plan is a bylaw. When the integrated land use plan implementation proceeds, there will be certain elements which should get the special attention of plan implementers. Those parameters identified as restrictions and standards should constitute the bylaw (Refer to Annex 16).

This Format for Land Use Standards and Restrictions will be part of the bylaw. It is advisable if the bylaw provides restrictions on expansion of settlement without considering it from land use planning point of view.

The whole process is Local Level Participatory Planning. So every step should pass through community consensus. Overseeing the draft land use plan by the community is an important step.

After options evaluation is done the best use option is selected, the final use is shown on a land use plan map.

Land use plan map shows the uses determined for each land unit. Each use requires its own management. When the management is determined and added to the land use plan map, that map is called management plan map.

5.3.5 Step 10 Presentation of the Plan and Technical Report to General Assembly

Now the planning stage is completed. This drafted Integrated Land Use Plan is based on the problems suggested and agreed by land users, mainly rural households. Those agreed land use problems are changed into objectives in order to implement them to

avoid or minimize land use problems and at the same time improving land use. Such actions during implementation are expected to check land degradation, improve land productivity and biodiversity, and thereby improving the livelihood of land users and rural communities.

Though Kebele communities have agreed with the identified problems since they participated in giving information, the drafted plan should be presented to them again.

Before the public consultation is conducted, the following points need to be taken into consideration:

- Community members and other stakeholders should be informed about the probable workshop date and show agreement;
- The map showing the land use plan should be translated into local language and posted at appropriate place some days before the announced workshop date;
- The presence of women in the consultation workshop is important to take care of women's rights;
- The youth should be part of the public consultation;
- Land users whose parcel land use has been changed as the result of the land use plan should receive special invitation to ensure their presence during the workshop.

In case disputes crop up between Kebeles /micro-watersheds, the Woreda Kebele ILLPLUP Team can organize a Kebele level consultation.

The list of public consultation workshop participants should be recorded and allowed to sign whether they have agreed (Refer to Annex 12). The prominent issues raised on the plan and the list of participants shall be annexed and become part of the plan document.

5.3.6 Step 11 Endorsement of the Plan

Within one Kebele Administration, the possibility to have two or more micro-watersheds is easy to anticipate. Hence if the Kebele ILLPLUP Team has decided to use micro-watershed as planning unit, it has a responsibility to bring drafted plans of two or more communities of micro-watersheds into one Kebele level land use plan. Then the consolidated plan will be transferred to the Kebele Administration for approval.

When the Kebele Administration (cabinet) has issues to be addressed in the plan and it is necessary to share them with the Kebele communities, the Kebele Team /Micro-watershed Team should receive the feedback and incorporate them if only communities agree.

The drafted plan being sent to Woreda should be accompanied by a one page agreement assurance (Annex 13) that all land use planning steps are properly completed. This one page agreement assurance should contain names and signatures of members of the Kebele ILLPLUP Team. If micro-watershed ILLPLUP is there, this form should be filled once at each level: at Kebele and micro-watershed levels.

When the plan approval is finalized, the Kebele Administration or the Kebele ILLPLUP team passes it to the Woreda Administration (Cabinet) or Woreda Team for endorsement.

During this step, it is necessary to take into account the following points:

- Woreda is expected to give feedback when the plan is endorsed;

- There should be an agreed number of days for Woreda to review the draft land use plan and give back feedback to Kebele (there should be a Regional level agreement about required number of days);
- Kebele ILLPLUP Team should give feedback to Kebele community through the micro-watershed ILLPLUP Team as soon as it receives the feedback from Woreda;
- After the Kebele receives confirmation on the approval, preparation for implementation shall begin by the Kebele Team; and
- Woreda should also allocate budget.

When the team prepares its action plan, the activities listed from bullet one to four should be included in the action plan with clear time schedule though they have been already completed.

5.3.7 Step 12 Handing Over the Final Plan and Report to Land Users

The endorsement of the plan with budget is the final step of planning. Then implementation is the next phase to continue. Before the implementation process continues, the final plan and report should be officially handed over to land users. The Kebele ILLPLUP Team accepts the plan representing communities who are major land users and distribute specific land unit plans to specific concerned land users (Refer to Annex 14).

5.4 Implementation Phase

At each level, the land use unit assumes the coordination role for land use plan implementation.

5.4.1 Federal

The Federal organ responsible for land use shall:

- Mobilize resources for the implementation of plans;
- Ensure delivery of training of trainers on land use implementation to Regions to be cascaded down to Kebele level;
- Organize workshops to create experience sharing forums on implementation results for Regions;
- Assist Regions while executing purchase of required technologies for land use plan implementation;
- Support Regions in the areas of identified implementation gaps or when it is requested;
- Follow up implementation of plans and give feedback for those responsible for planning, and
- Regularly review feedbacks and, consequently, discuss issues such as planning approach, strategic shifts, legal system revision, and policy revision /formulation etc.

5.4.2 Regional

The Regional responsible body for land use will be the coordinating organ of ILLPLUP implementation. This Regional Land Administration body shall be:

- Mobilizing resources;
- Coordinating matters related to land use plan implementation;
- Organizing delivery of training of trainers to Woredas to be cascaded down to Kebele level;

- Organizing workshops to create implementation experience sharing forums for Woredas;
- Assist Woredas while executing purchase of required technologies for land use plan implementation;
- Assist in the allocation of land use plan implementation budget for Woredas when necessary;
- Support Woredas in the areas of identified gaps or when they are requested; and,
- Follow up implementation of plans and regularly review feedbacks and, consequently, discuss issues such as planning approach, strategic shifts, legal system revision, and policy revision /formulation etc.

5.4.3 Zonal

In Regions where Zonal arrangements are mandated for land use planning roles, rooms should be opened for them so that they can add value for land use planning. In the same manner, in Regions where Zonal arrangements are mandated for land use plan implementation roles, rooms should be also opened for them so that they can add value for land use plan implementation. At least they can assist building the capacity of Woreda responsible bodies for land use plan implementation and can establish a linkage bond between Regions and Woredas. Here it is emphasized that flexibility is very important for issues related to plan Implementation.

5.4.4 Woreda

The Woreda responsible body for land use will be the coordinating organ of Woreda ILLPLUP implementation. This Woreda land use body will be responsible for:

- Integrating Kebele ILLPLUP into Woreda Dev't Plan;
- Identifying Woreda stakeholders for land use plan implementation;
- Coordinating matters related to land use plan implementation;
- Organizing training of trainers to Kebeles to be cascaded down to Kebele level;
- Organizing workshops to create experience sharing forums for Kebeles;
- Ensuring allocation of budget for Kebeles for land use plan implementation;
- Overseeing and solving any problems arising between two or more Kebeles while implementation is going on;
- Reviewing and commenting Kebele land use plan implementation reports and gives feedback to those responsible for land use plan revision; and,
- Supporting Kebeles in the areas of identified land use plan implementation gaps or when it is requested.

Other Implementation Team members shall participate in the activities listed above. Members will have the possibility to ensure taking care of their sectoral interests.

From expertise point of view, the team can include as much as possible from the following professions:

a) Land Administration (Leader)
b) Soil Conservation Expert
c) Forestry Expert
d) Agronomist
e) Water Harvesting /Irrigation Expert
f) Livestock expert
g) Economist/Socio-economist/Agro-economist
h) Cooperative/Marketing and Inputs Expert
i) Rural Road Construction Expert
j) GIS and/or surveyor

5.4.5 Kebele Level

The Kebele organ responsible body for land use will be the coordinating organ of Kebele ILLPLUP Implementation Team. Kebele ILLPLUP Implementation Team is responsible for:

- Identifying and organizing Kebele stakeholders for land use plan implementation;
- Mobilizing communities to participate in the prioritization of micro watersheds for land use plan implementation;
- Training delivery to participating Kebele or micro-watershed plan implementation communities; and
- Organizing Kebele level workshops to create experience sharing forums for communities.

The Kebele ILLPLUP Implementation Team members shall be drawn from:

a) Kebele Manager
b) Religious heads of the Kebele
c) One male and female representatives from each micro-watershed
d) Representative of the youth
e) Chairperson of the Land Administration Committee
f) Chairman of a cooperative
g) DA coordinator
h) Chairman of water management /users committee
i) Chairman of forest management committee
j) Chairperson of women's association
k) One community elder
l) Principal of school
m) Head of health post
n) Rural road representative

Members of Kebele ILLPLUP Implementation Team should be drawn in in a flexible manner depending on local situations.

5.4.6 Responsibility Sharing at Grassroots Level

After the approved plan by the Kebele Administration /Kebele Team is transferred to Woreda and the plan is integrated into Woreda development plan and supported by budget, then preparation for implementation should start by the Kebele Team.

Each activity should be assigned to a responsible implementer. All involved in the planning may not be implementers. Those indicated as responsible party to implement an activity or activities along the last column of the CAP (Refer to Annex 16) shall be called upon for meeting to inform and prepare them for implementation.

The probable implementers are:

- Rural land holding communities;
- Public sector branch structures such as health, education, agriculture, water, etc.;
- Non-governmental organizations within the Kebele;
- Religious institutions such as churches and mosques;
- Private investors; etc.

If there are activities which require inputs from implementers, they should be informed in advance for their preparation to look into such readiness.

5.4.7 Step 13 Enforcement Mechanism for Implementation

5.4.7.1 Participation and Bylaw

When the planning approach alone is taken into account, it is bottom up and ensures implementation enforcement. The whole process is people-centered approach and

demands grassroots community level participation and suits local needs and priorities. Because the problems identified and solutions proposed are by the communities themselves, it builds confidence and ownership of people at grass roots.

The bylaw (Refer to Annex 15) that is to be developed by land use planners and implementers comes out of public consensus and improves the implementation culture. It is also important to give continuous training and conduct awareness raising programs to change attitudes to the positive of planning and implementation.

5.4.7.2 Legal and Binding Rules for Implementation

Land use plans preparation at all levels is supported by the Federal Land Administration and Land Use Proclamation No 456 / 2005 Article 13(1) which states that "a guiding land use master plan should be prepared which takes into account soil type, land form, weather conditions, plant cover and socio-economic conditions and watershed approach shall be developed by the competent authority and implemented". Obligations for implementation of land use and natural resources management plans are sub-articles 1 to 4 stated in Article 10 of Proclamation No 456 /2005. The statements as set in the proclamation subsequently are:

- "A holder of rural land shall be obliged to use and protect his land. When the land gets damaged, the user of the land shall lose his use right. Particulars shall be given in the land administration laws of regions";
- " Where irrigation canals are constructed the holder shall have obligation to allow the construction of irrigation lines and other infrastructures if they cross his land holding";
- " the holder of rural land shall have the obligation to cooperate when requested by the competent authority to measure and survey his land";
- "Any rural land holder shall have the obligation to notify the competent authority when he abandons at will his land use right".

Article 12 states that "where dispute arise over rural land holding right, effort shall be made to resolve the dispute through decision and agreement of the concerned parties. Where the dispute cannot be resolved through agreement, it shall be decided by an arbitral body to be elected by the parties or decided in accordance with the rural land administration of the region".

Moreover, Article 13 concerned with land use planning and proper use of sloppy land; gully and wetlands planted, enshrines the following regulatory guiding laws:

- "In any type of rural land where soil and water conservation works have been undertaken, a system of free grazing shall be prohibited and a system of cut and carry feeding shall be introduced step by step;
- "The management of rural lands whose slope is less than 30% shall follow the strategy of soil conservation and water harvesting. The details will be determined by rural land administration of regions";
- "Development of annual crops that have slopes between 31-60% may be allowed only through making bench terraces";
- " Rural lands whose is more than 60% shall be used for development of trees; perennial plants and forage production";
- "Rural lands of any slope which are highly degraded shall be closed from human and animal interferences for a given period of time to let them recover, and shall be put to use when ascertained that they have recovered";

- "Rural lands that have gullies and are located on hilly areas shall be rehabilitated and developed communally and as appropriate by private individuals"; and,
- "The biodiversity in rural wetlands shall be conserved and utilized as necessary, in accordance with suitable land use strategy".

Article 4 on its part states "a strategy of settlement, villagization, and development of social services that help to bring about a better system of rural land utilization shall be formulated".

The proclamation gives right to regional states to develop regulatory and enforcing rules seeing into their environment and social situations. These create conducive environment for a local level land use planning teams to develop bylaws that fit to local conditions to enforce land use planning and implementation. Generally, there is strong legislative support for land use plan implementation.

5.4.8 Step 14 Participatory Monitoring and Evaluation

Monitoring and evaluation guarantees plan performance and objective attainment. If properly done, it helps to ensure effectiveness and efficiency. It gives room for land use planning and implementation improvement.

5.4.8.1 Monitoring

Plan Implementation management needs continuous flow of information and this need should be met by monitoring. The basis of a monitoring system is to track actual implementation progress against plan continuously. Both the process and impact should be monitored. Process monitoring deals with the use of resources, the achievement of outputs, and progress of activities. It is a means to take timely corrective action. Impact monitoring, on the other hand, considers the changes brought (i.e. economic, organizational, technological, attitudinal, etc.) as a result of the project intervention while the project is still going on. Those changes can be intended or unintended.

The two major sources of information for monitoring are reports and field checks. The report format should emanate from the land use plan and indicators need to be smart i.e. specific, measurable, achievable, relevant, and time-bounded. Another way of monitoring is field checking. This helps to observe physical outputs on the ground and hear from grassroots communities towards different aspects of the plan and its implementation. These two ways of monitoring should be done in a complementary way.

Table 5. 25 Suggested Report Format for Monitoring /Reporting

Land Dev't Unit	Activity	Unit	Total Planned Quantity	Monthly Implemented Quantity			
				This Month	Up to this month	This year	Up to this Year

The reporting format shall be designed in such a way that it answers the information requirement of the next higher level. Lower level bodies need detail activity performance report and, as we move up, the focus to major issues will be emphasized. At Federal level, for example, strategic and bigger pictures are needed for strategic decision making. Hence the content of the reporting format should contain the different level objectives as indicated in the logical framework.

Figure 5. 10 Suggested Information Requirement at Different Levels

The details of report content decreases when we move upward. Higher levels require to know major issues where as lower levels need to know every activity performed.

5.4.8.2 Evaluation

Evaluation is the periodic, systematic & objective assessment of an on-going or completed planned activity or before the start of plan implementation. In carrying out evaluation, at least it should be useful to some audience. The evaluation can be done internally (i.e.by the implementing community) and externally (by external body other than local implementers).

It is advisable to use logical framework as a tool for monitoring and evaluation. Any party involved in plan implementation always wants to answer the following questions:

- Where it is now
- Where it wants to be

- What does it have to do to get there
- How will it know when it has arrived it wants to be …

To answer these questions satisfactorily, the logical framework and reporting formats should clearly show project baseline data, objectives, activities, and performance indicators.

The evaluation can be done by different levels starting from the local communities up to Federal depending on the interest of stakeholders. The period can be at mid-term and end of implementation period. During planning, the periodic sequence of evaluation needs to be fixed.

5.4.9 Step 15 Plan Updating and Revision

All monitoring and evaluation activities, including environmental and social monitoring, generate enormous information. The information can tell success and failure stories. These feedbacks should be followed by action which can be either to strengthen the success and/or to derive lessons from failures not to repeat them in the coming future. These lessons should be used as input for plan updating and revision. Some of the actions that can be followed after monitoring and receipt of feedback could be:

- Recognition and incentive for those who performed very well;
- Change in the human resource deployment if members do not deliver well;
- Organizing human resource training if capacity gap is a cause for under performance;
- Listening to communities and other implementers if there is any dissatisfaction; and,
- Finally updating and revision of activities and change in scheduling i.e. revising and planning again.

At a point in time, planners know only limited things about what they are planning. But when time goes on in light of further experience during implementation, it is inevitable to gain additional information for plan improvement. To make use of such gains, plan updating and revision needs to be done regularly.

Glossary

Base map:

Base map is a map drawn to show boundary of an area, rivers, roads, social structures and water bodies if available for putting or transferring thematic biophysical and planning units.

Land:

In the Ethiopian context land is an asset of wealth that provides livelihoods for the peoples using it. It is also a base for construction of houses, cultivation of perennial and annual crops, livestock rearing, source of springs; making of ponds, wells and using river waters; planting of tree crops and minerals mining. The quality of livelihood in the rural areas is dependent on quality and size of the land that a land user possesses. The average land holding in Ethiopian rural farm areas especially in the highland environment is not more than 0.5 ha. This lowers production if used without plan and use of appropriate inputs and management techniques. On the other hand, FAO, 1976 and 1989, and Beek, 1978 defined land as “an area of the earth’s surface. Its characteristics hold all elements of the biosphere, the soil, and the underlying geology, hydrology, the plant and animal populations and the results of past and present human activities. These elements independently and in association exert significant influence on present and future uses of the land. The definition therefore enables us to realize and visualize all the resources that are mutually supporting in the processes of planning practices.

Land Administration:

Land administration it is the process of registration and mapping the land holdings of a land user to be utilized as per the prepared land use plan for the Kebele’s micro-watersheds. It also involves provision of land use certificates and plans with regulatory laws and bylaws for caring of different land use units as per recommendations of plan preparation.

Land Capability Classification (LCC):

Land capability classification is a basic tool for field work to understand the capability of the land in terms of sustained production of major kinds of land such as crop production, grazing and forestry.

Land Capability Map:

Land capability map is a physical map that shows different class of land suitable for optimum production of alternative land uses suited at different levels and requires different management and regulatory activities.

Land Cover:

Land cover is the natural and manmade resources occurring on the surface of the earth as single unit or in mixture of more than one unit.

Land Evaluation (LE):

Land evaluation is the process of estimating the potential of land for alternative major kinds of uses. Land evaluation is only part of the process of land use planning. The basic feature of land evaluation is the comparison of the requirements of land use with the resources offered by the land.

Land Degradation:

Land degradation is a process of reduction of vegetation cover, soil depth and water holding capacity and fertility and loss of production per unit area of land due to wanton cutting, overgrazing and severe erosion.

Land Suitability:

Land suitability is the fitness of a given tract of land for a defined and specific land use. The determination of land suitability is executed in four steps: definition of climatic suitability, definition of soil suitability, combination of climatic and soil suitability to form ecological suitability, and resulting in final land suitability by modifying ecological suitability for workability and erosion hazard.

Length of Growing Period (LGP):

Lengths of growing periods are continuous periods where soil moisture is available for development and maturity of plants/crops due to adequate rainfall where the remaining components of the environment are conducive. It is also a period where water harvesting is possible when rainfall exceeds full evapo-transpiration.

Land Mapping Unit:

Land mapping unit is a unit of land that has homogeneous property in terms of soil physical and chemical properties, slope, land form and climatic conditions.

Land Unit (LU):

Land unit is an area of land which possesses specific and unique land characteristics and land qualities which separates it from adjacent units. It has also similarity with a mapping unit delineated based on homogeneous characteristics and qualities of resources.

Land Use Planning (LUP):
Land Use Planning is the systematic assessment of land and water potential, alternatives for land use and economic and social conditions in order to select and adopt the best land-use options.

Logical Framework /Log Frame:
Log frame is a planning matrix that describes the objectives at different levels, referred to as Overall Objective /Goal, Project Purpose /Objective, Project Outputs and Project Activities.

Objective Orientated Project Planning (OOPP):
OOPP is one of the tools to design a project in a participatory manner. It is a participatory planning technique, in which all parties involved identify and analyze the problems to be addressed in the project, and prepare a concrete and realistic project plan together. OOPP brings together representatives of all project stakeholders and can be particularly effective in a community setting.

Participatory Land Use Planning (PLUP):
The ILLPLUP approach is a bottom up planning method where land users and relevant stakeholders participate in the process of identifying and prioritizing problems and potentials of a land unit for sustainable planning. The approach bases on simple and quick methods of natural resources and socioeconomic data inventory, analysis, evaluation and decision making on types of land preferred by land users with assistance from natural resource experts.

Planning Unit (PU):
A specified area of land, where studies of natural resources and socio-economic conditions are conducted by planners for appropriate and sustainable land use planning and resources management. It can also be defined as homogeneous area of resources delineated for the purposes of planning. Planning units represent areas with relatively similar problems; potentials and development constraints that influence similar development options and/or land use options.

Participatory Rural Appraisal (PRA):
PRA is a methodology of learning rural life and their environment from the rural people. It is intended to enable local communities to conduct their own analysis and to plan and take action. PRA involves project staff learning together with villagers about the village. The aim of PRA is to help strengthen the capacity of villagers to plan, make decisions, and to take action towards improving their own situation.

.**Tropical Livestock Unit:**
Tropical livestock unit is number of livestock units measured in TLUs where one TLU is equivalent to 250 Kg.

Watershed: is an area of land from which flow of water during rains drain to a water channel or stream and make flow to the main river at a confluence.

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Annexes:

Annex 1 Land Use Planning Experience

A-Participatory Land Use Planning and Implementation (PLUPI) of SoS Sahel: PLUPI approach was developed around 1996 for *Meket Woreda Development Project* to promote more decentralized and participatory resources management (Tarekegn, 2001). Ginjo (2001) mentioned that SOS-Sahel has been following participatory land use planning from 1992 to 1995,howver, shifted to *"Farmer's-Led Integrated Watershed Management Approach*" with an intent to minimize the sediment load from upper streams to middle and lower streams.

The PLUPI approach focused at the village ***(""Got"")*** level, which is considered as core unit for resource governance, as well as for undertaking community-based NRM. Dualistic institutional arrangement were in place: "***Kire based"*** NRM, where user right based area closures have been established , where the ***"Kire"*** assumed the management responsibility; and the simultaneous structuring of local institutions within the framework of the government structure, which are responsible for all aspects of land management at the village level***.*** The latter include the establishment of *Village Development Committee (VDC),* which are accountable to the *Kebele Land Use Committee (KLUC),* which in turn is responsible to the *Woreda Rural Development Committee (WRDC)* (Tarekegn, 2001).

Although the PLUPI is acclaimed to be a great success, the legitimacy and authority of ***"Kire"*** institutions is asserted to be unfit for managing the natural resources given the origin and functions of these institutions. In adopting ***"kire"*** institutions as part of the PLUPI for managing natural resources, Tarekegn (2001) underpinned two underlying wrong assumptions. Firstly, the designation of ***"Kire"*** as village level institutions is crafted to integrate it with PLUPI, which saw the village as bounded entity for effective local level management of natural resources. Secondly, the approach either misread or omit attention to the nature of the present day rural governance and administration, where "bottom-tier" government administrative and political structure at the lowest level are in place, which are known as ***"Mengistawi Buden"*** or ***"Government Team".***

***B*-Local Level Participatory Planning Approach (LLPPA) of the MoA and WFP**: The Ministry of Agriculture (MoA) in collaboration with the World Food Program (WFP) developed the LLPPA in 1991 and latter modified a number of times, where the latest modification is made in 1997(MNRDEP, 1993;MoA, 1997). The manual produced in 1997 was aimed to address both soil conservation and agricultural production incorporating 'participatory", "holistic", "conservation-based development", "disaster prevention and preparedness" and "monitoring and evaluation" elements as compared to the past manuals. Since 1993/94 up to around 1997, a total of about *900 plans covering 500,000 ha* of land have been prepared, of which two-third of the plans have started to be implemented (MOA,1997).

Similar to the PLUPI approach, although lacked specificity , the LLPPA promoted the involvement of traditional institutions (i.e. *"mender", ""Got"", Mahber", "Kire", "Eder", "Bayto",* etc) and local communities from planning to monitoring the of plan (MOA,1997). The manual contained description on data requirement, methods on data collection using both PRA and conventional methods and application of Land Capability Classification, if need be. However, the details on how the guiding principles of the planning approach and methodologies are interpreted and implemented on the ground lack rigor and independent evaluation studies.

C-Grass root Level Land Use planning of the MoA: The ex-Land Use Planning and Regulatory Department (LUPRD) of the MoA developed a draft manual on Grass root Level Land Use Planning (GRLLUP) in 1989, which is in line with a recommendation made by master land use plan study (FAO, 1998). The rationale behind is to enable the widespread implementation of land use planning at grass root level in order to achieve improved and sustainable agricultural production.

The draft manual was targeted to the "Awraja" MoA staffs, which are responsible to implement the land use planning activities. Characteristically, draft manual is mainly packed with simple conventional procedures to collect, analyze and prepare the land use plan at Service Cooperative (SC) level with little emphasis on "participation" element and institutional arrangement for implementation of the plan.

Prior to finalizing the draft manual, SCs each with an area of about 20,000 ha of land were selected in each of the then five administrative regions. However, due to the frequent organizational restructuring, the plan to piloting was abandoned leaving the draft manual untested, which latter transpired in vacuum.

D-Community-Based Participatory Watershed Development (CBPWD) of the MoA: The CBPWD approach was developed in 2005 by the MoA with intent to "standardize" and evolve a common "methodology" at local level (MoA, 2005). The overall objective of the CBPWD Guideline is to improve the livelihood of the community and/or households in rural Ethiopia through comprehensive and

integrated natural resources management through provision of a *workable and adaptable planning tool and guides to select correct and appropriate technologies under different conditions* (MoA, 2005).

A watershed size ranging from 200 to 500 ha of land is adopted as appropriate planning unit, which may include the whole community (i.e. ***""Got""****, "Kushet","Genda"* and others), parts of the community or more than one community within a given KA.. The approach is stated to be 'participatory", 'holistic" and 'integrated', which include *soil conservation and harvesting, forestry and agroforestry, crop and livestock production and small scale infrastructure development* (i.e. . water, feeder roads, small scale irrigation, etc.)The approach underpins "participation" as a key element of the approach, where farmers' involvement from planning to monitoring stages are promoted and enhanced, although tacit on the definition of "community".

For preparing the plan, eight sequential steps are elaborated with institutionalization of "three-tier' local level institutions: *Woreda Watershed Team (WWT), Kebele Watershed Team (KWT)* and *Community Watershed Tean (CWT),* the latter comprising of ten farmers represented from different farmer's socio-economic groups in a given community. Both a variety of PRA tools and simple conventional survey methodologies are outlined to collect the necessary biophysical and socio-economic data sets. It states the use of Land Capability Classification, however, only if there is a need to do so. The LCC is based on land use and cover categories, which are further subdivided into sub-units, based on slope, soil depth and past erosion land parameters, to be used as a unit to define the watershed development activities. Though the details are absent, Participatory Monitoring and Evaluation (PM&E) approach is outlined as a tool to monitoring the progress of the CBPWD plan.

E-"Mass Mobilization for NRM" sponsored by the regional government: In early 1990's initiated by Tigray regional state, most regional states launched community "Mass Mobilization for NRM and Development". In this program, every farming household is obliged to take part in NRM activities for a specific number of days in a year (i.e. an average of about 20days/yr) with institutionalization of a bottom-tier government administration and political structure at the lowest level, known as *"Working Group (WG)",* where every household in a given Kebele are organized into WGs. Every household in a given kebele is organized into WG, where members range from 15 to 18. Each WG is accountable to an *Agriculture Cadre (AC),* where three WGs are accountable to one AC. In turn, three ACs will be accountable to the *Coordinator of Agriculture Cadre (CAC),* who are in turn responsible to the *Kebele Natural Resources Conservation Commission (KNRCC),* which the latter is answerable to the *Woreda Natural Resources Conservation Commission* (WNRCC) (MoA, 2014).

In the case of Tigary regional state, with active participation of the WGs and Development Teams (DTs) and Community Planning Team (CPT), a participatory watershed plan will be prepared and thereafter a work plan to mobilizing the community shall takes place. Monitoring of the implementation progress will be undertaken at three levels: at WG and DT level (i.e. every day), meeting at CAC level (i.e. at interval of every three days) and kebele level with the presence of the KNRCC members, CACs and ACs which is undertaken on weekly basis (MoA, 2014).

F-Participatory Forest Management of the Regional Bureau of Agriculture: In late 1990's, Participatory Forest Management (PFM) have been initiated and piloted in eight forest sites located in Oromiya and SNNP regional states with the following beliefs and thoughts (Aklilu, 2013):

- That centralized and expert-led forest management practices have been unsuccessful so far and will not succeed in the future;
- That participation of local communities, which hold the major stake in the forest resources around them, is the most effective strategy to achieve sustainable forest management; and
- That forest offers multiple social, economic and ecological roles to local communities and is capable of generating sufficient and sustainable livelihoods to take them out of poverty.

Evaluation of the five PFM projects from the eight piloted PFM project (i.e. *Bonga Forest*, *Chilimo Forest*, *Adaba Dodola forest*, *Mankubsa forest* and *Yabello forest*) during three time intervals (i.e pre-project, project implementation and after phasing out of the project) in order to sift the best lessons. Among others, the key lessons derived include (Aklilu, 2013),

- The inability of the Forest User's Group (FUG) to assert and exercise their rights obtained only little support on legal, institutional and technical matters from local forest authorities after the phasing out of the projects;
- For PFM to be successful, formal recognition and support of local institutions in charge of forest management , the resources handed over for local management and the rules on the resource use should allow PFM members generate meaningful benefits and principles of benefits distribution should be clearly discussed and agreed upon local communities.

Annex 2 Mapping Techniques and Procedures

It is advisable that the source data or map for base map preparation should be discussed and agreed between Regions and Woredas in advance. If gap in mapping is observed at any level, the next higher level should organize training. If Global Mapper, DEM, and skills are limiting factors, other options can be used. In general, flexibility is important and the preparation of base map on the available sources such as Central Statistical Authority (CSA) Map, ortho photo, aerial photo, topo map, GIS, GPS, compass, sketching etc. are possibilities. During PRA survey, communities can draw a map on the ground using their fingers, sticks and other locally available materials such as leaves, and flowers.

Base Map:

- Global Mapper and DEM can be the starting mapping techniques for base map preparation. Classifying, overlaying, and clipping are some of the techniques before field work started;
- The study area is classified into slope classes.
- On this landform map, different thematic maps can be overlaid to trace features like lines (rivers, streams etc.), polygons, and points (school, market place, Kebele center, church, mosque, cemetery etc.).
- For example, based on topographic features and guided by CSA map, scanning and geo-referencing can be achieved. It is also possible to use GPS to collect points and plot them on the base map.

Thematic Maps:

- Thematic Maps include maps of, at least, the eight physical features used to measure the capacity of land for specific major uses;
- It is possible for example that the land cover can be digitized from downloaded Google Earth satellite image. Since topographic features can be seen on topo sheets, it is possible to delineate KA boundaries or micro-watershed divides by scanning and geo-referencing.
- When the team goes out for field work with slope mapping units, it checks soil physical characteristics of each slope class during transect walk;
- Do same for land use land cover, length of growing period and other necessary features. In some cases, it may be needed to capture coordinate data.
- Then prepare soil map, LGP map, land use land cover map based on the collected field data.

Land Capability Map:

- To prepare the land capability map, the different thematic maps (either in soft or hard copies) are completed;
- Then digitize soil map and LGP map if they are in hard copies;
- Merge the different soil maps with LGP and get land capability map.

Land Use Plan Map:

- With thematic maps, you have prepared land use land cover map;
- Overlay the land use land cover on land capability map to produce land use plan map;
- Check the suitability of each land unit for the current major use;
- If not, look for other options and decide the final use that is socially acceptable, economically viable, and environmentally sustainable;

Management Plan Map:

- Finally recommend appropriate management interventions for each selected land use;
- Prepare legend to clearly show association of use and intervention for each mapped unit.

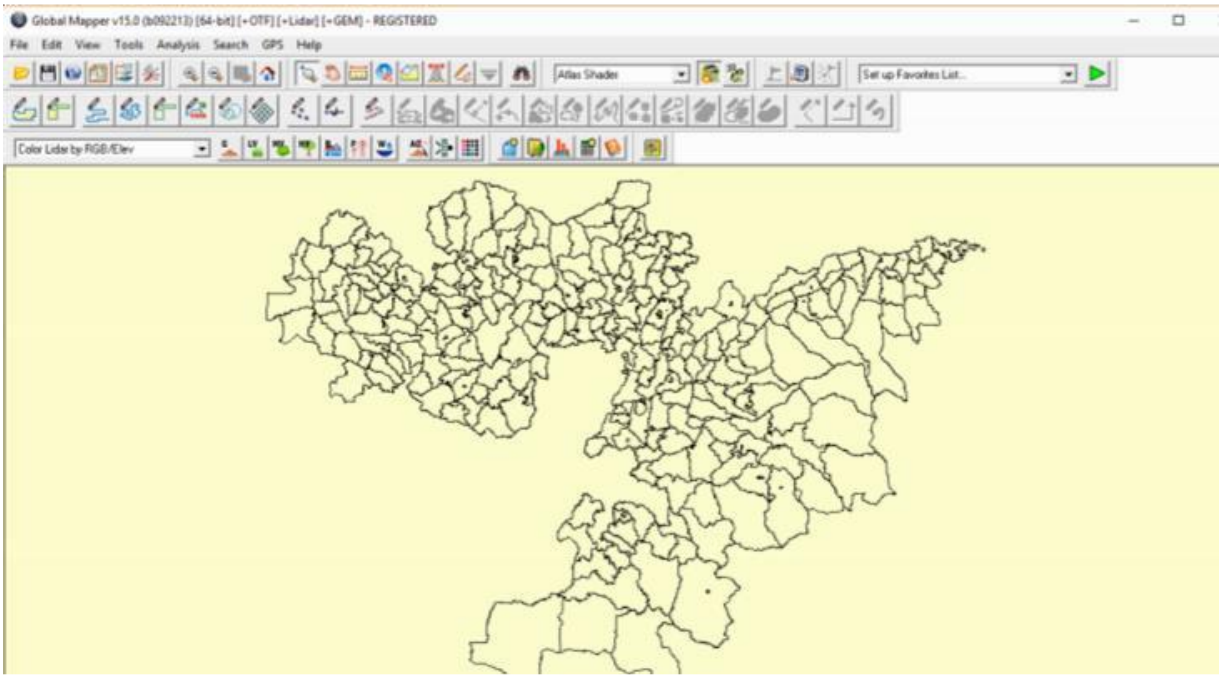
Alternative Steps in Land Units Mapping (extracted from Quick Start GIS Tanning Manual for Land Use Planning, Land Administration and Use Directorate, Ministry of Agriculture**)**

For the Maps to come below, it is assumed for simplicity that Sebeta Hawsa Wereda of Oromia Region is taken as a planning Kebele.

***a)* Working with Global Mapper for Contour Generation**

- **Add Data into Global Mapper window**
- Open Global Mapper

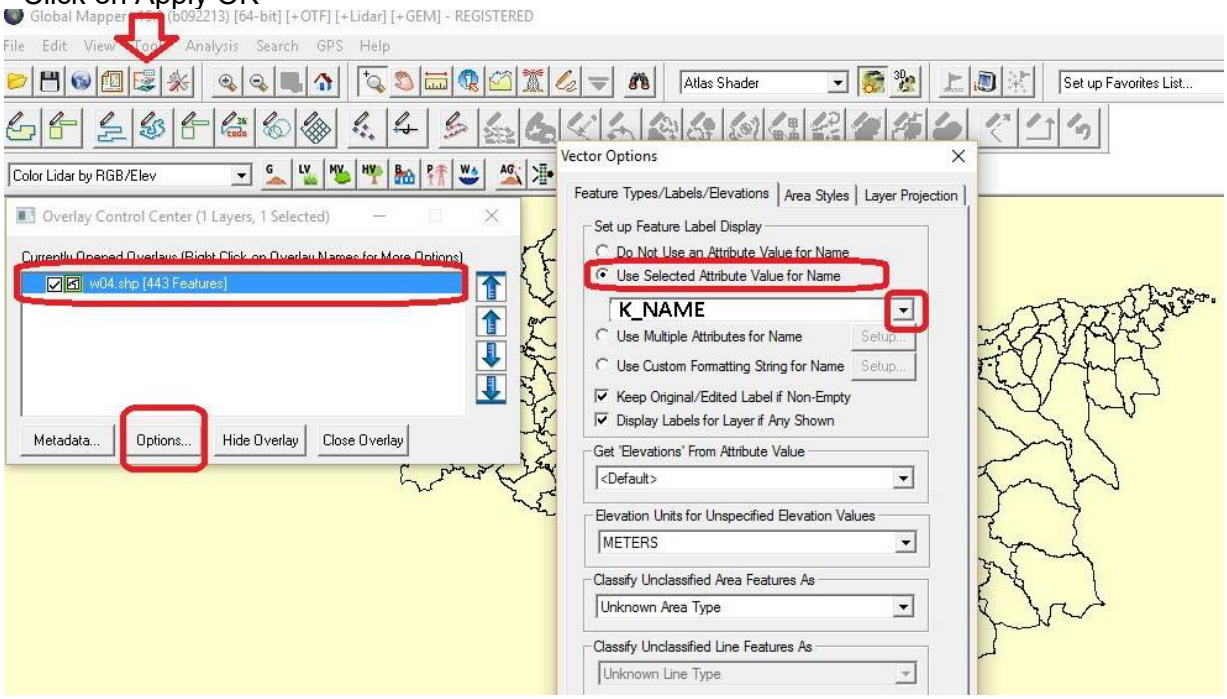
- Click on Open Your Own Data Files
- Browse the Vector Area Data File of your Kebele



Lablling Vector (Kebele)

• Select Open Control Center Tool

- Click on Kebele Vector Data
- Select Options
- In Vector Options window Select Use Selected Attribute Value for Name
- Select K_Name
- Click on Apply OK



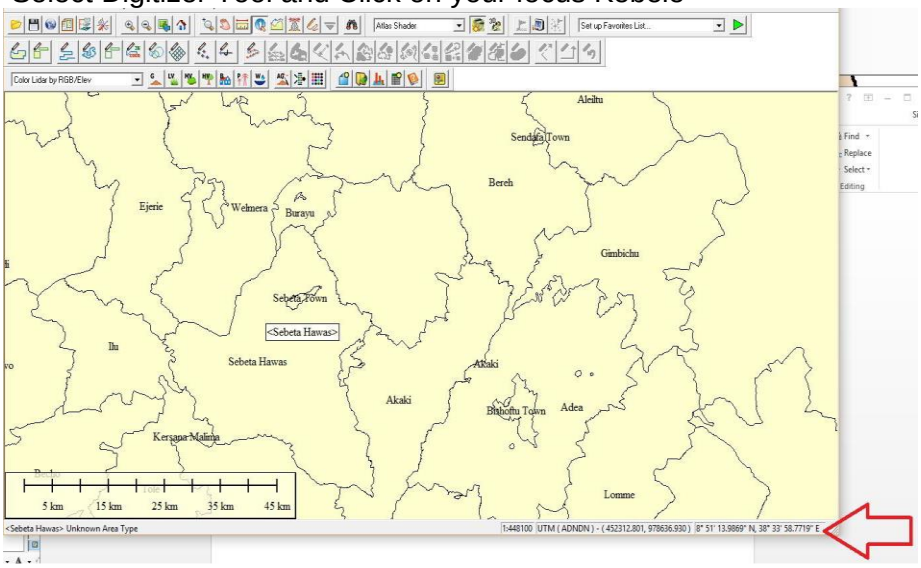
All Kebeles area labeled with Name In the map Window

- Zoom / Pan To See Your interest Kebele

Add DEM and Generate Contour

- To select Coordinates of DEM data Move around to Kebele Boundary Extent and See at **Right bottom of Taskbar** (Longitude and latitude degrees).

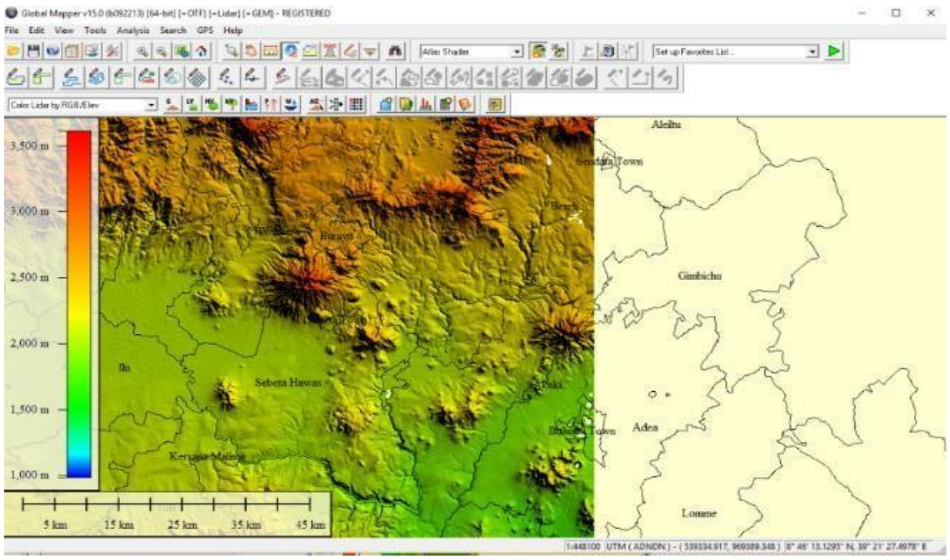
- Select Digitizer Tool and Click on your focus Kebele



Now you Can Browse and select DEM data of your Kebele

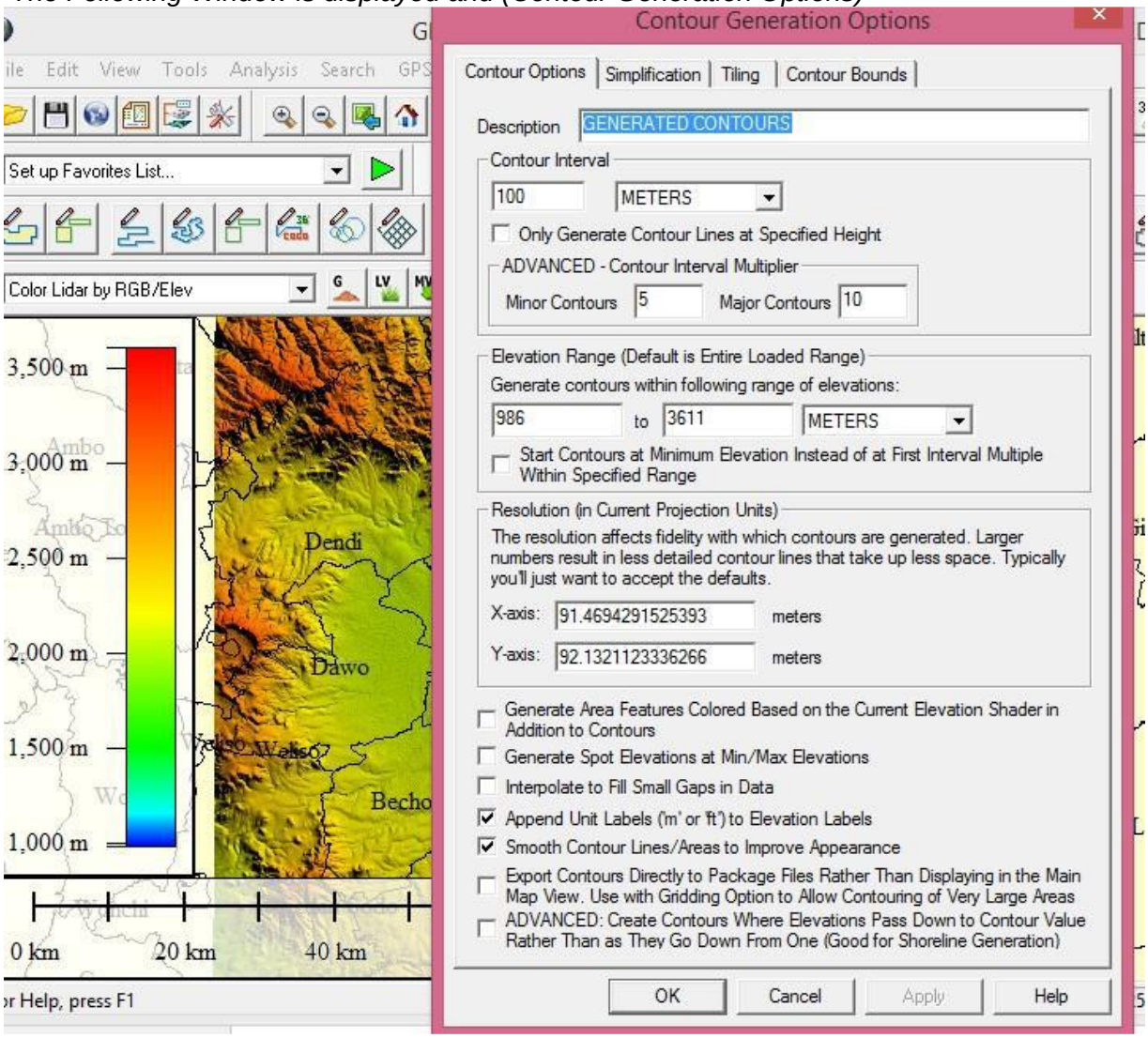
- Add the remaining DEM Data which covers the Kebele by Reading at **Taskbar**

Your Window should look like as below



• Select Digitizer Tool to Select your Kebele

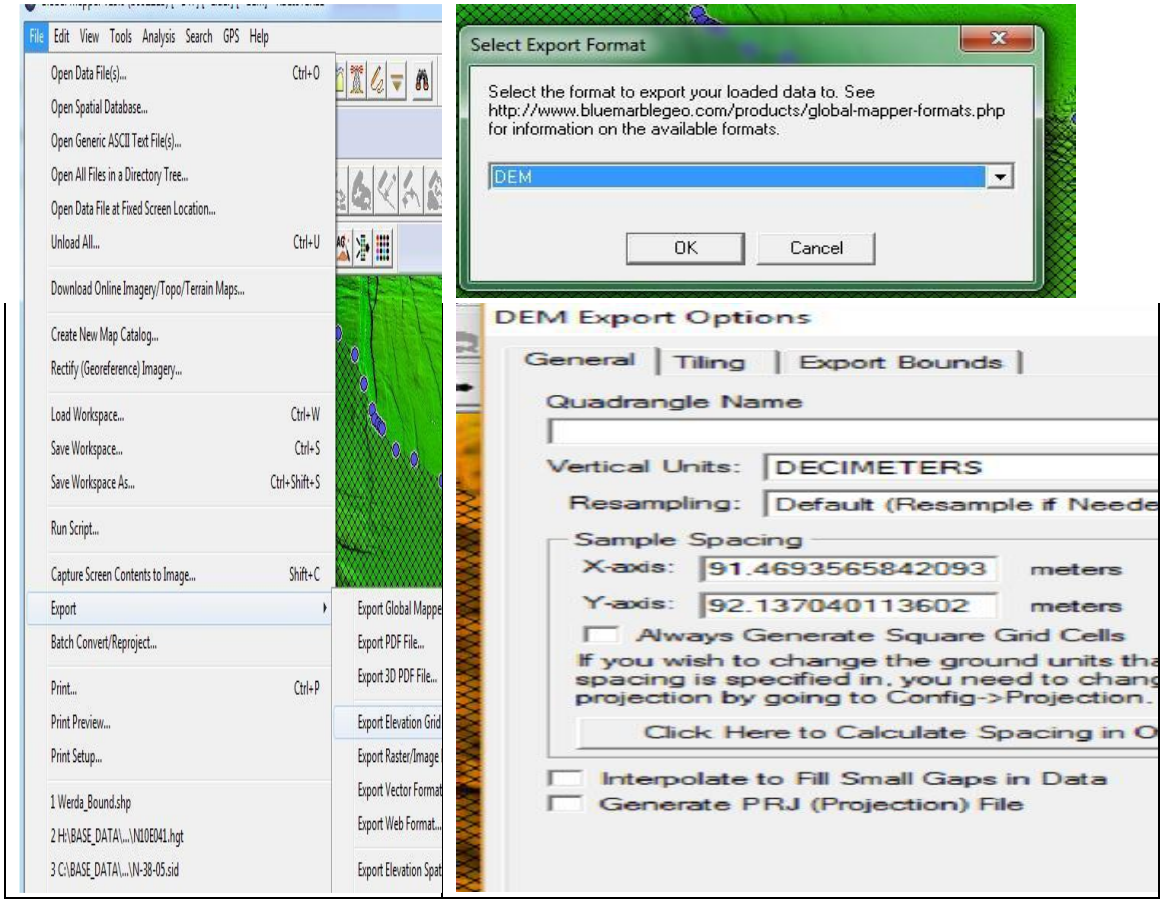
The Following Window is displayed and (Contour Generation Options)



Change in Contour Interval as required (e.g. 20 m)

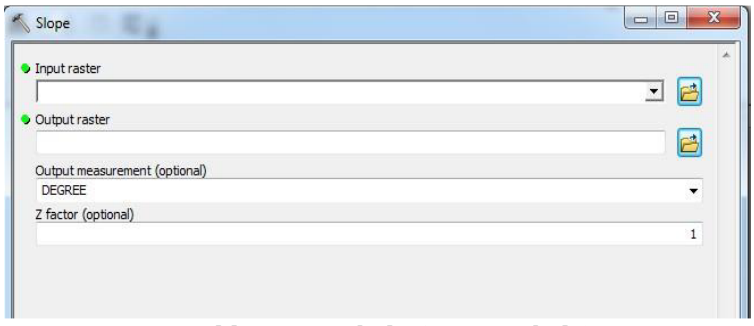
• Select Contour bound and Click On Crop to Selected area Features and Select OK.

b) Working with ArcGis/ArcMap to Generate Slope Class



b.1) Generate Slope Map

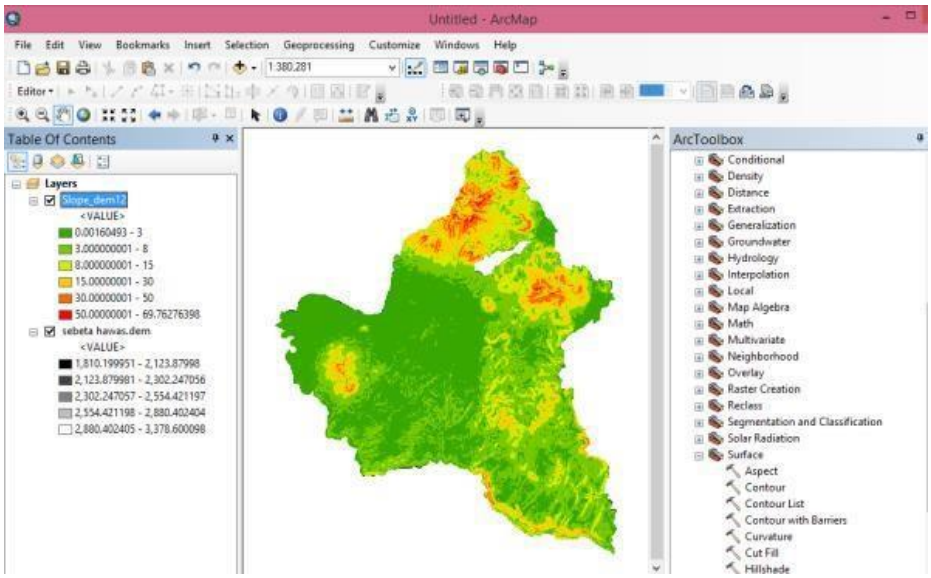
- Open Arc Map
- Add Your Kebele DEM Data
- Double Click On the DEM Data (Open Property)
- Click on Symbology Click on Unique Value
- Click on Classified and Click OK
- Go to Arc Tool Box and Open Spatial Analysis
- Select Surface and then Open Slope



In Input raster Add DEM Kebele (Your Kebele)

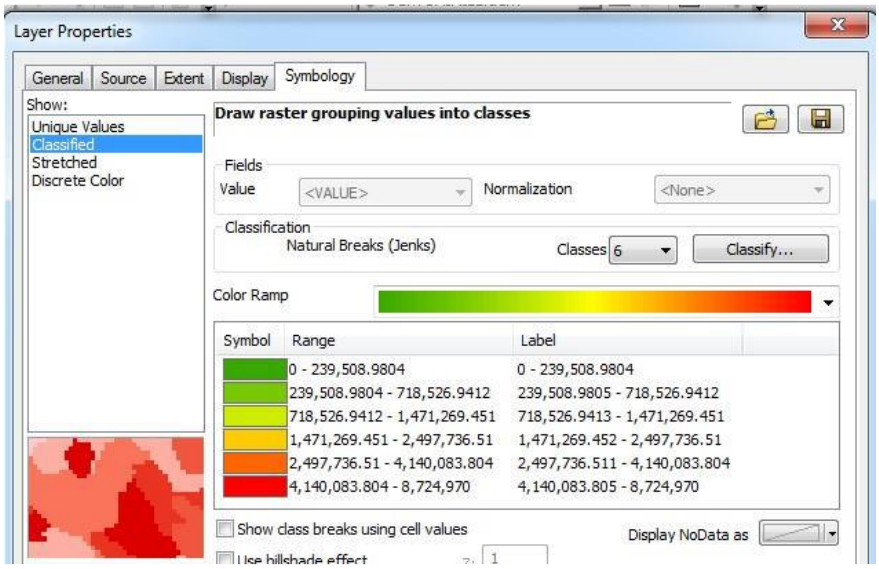
• Output Raster Brose a folder (E.g. Temp)

• Output measurement Change Degree to Percent rise Accept the other default Click OK

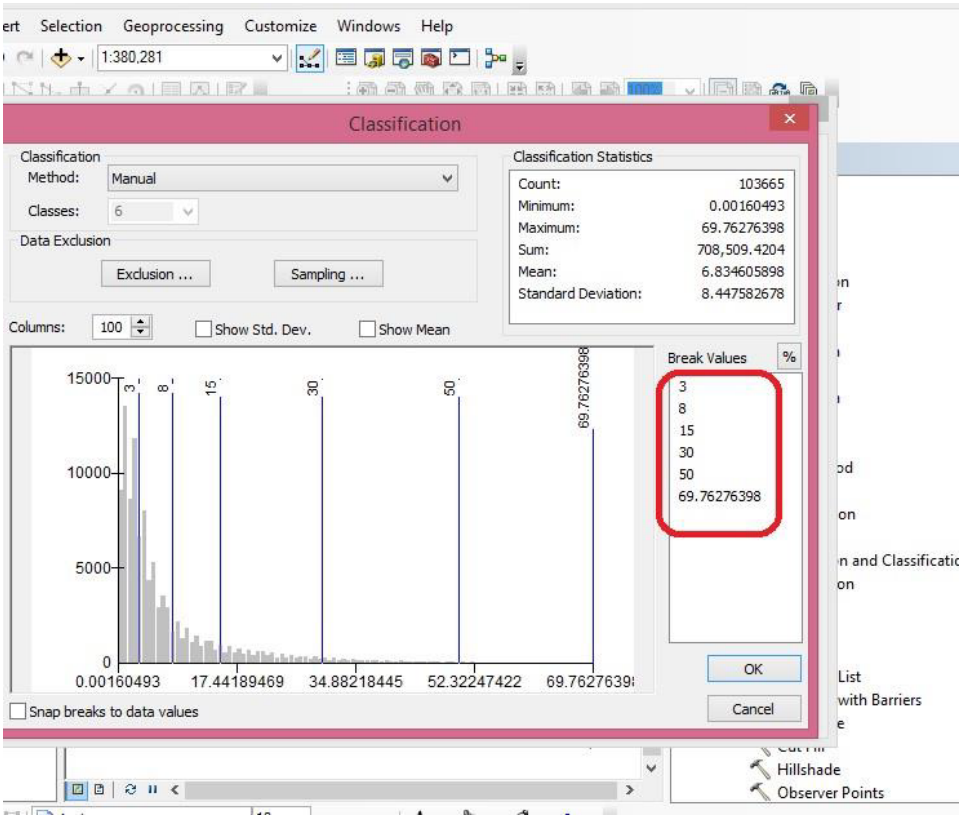


Double Click On the New Slope Data (Open Property)

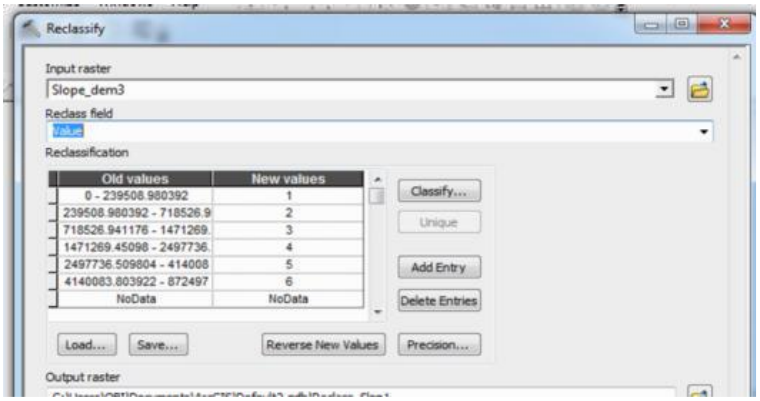
• Click on Symbology Chang the classes into 6



Click on Classify and change Value as required and leave the last value as it is in break Values



- Click OK
- Go to Again in ArcTool Box and select Reclass and Click on Reclassify
- Add in input raster slope DEM and Reclass field Value Browse Output Raster Folder Accept The default Select OK



Conversion Raster format slope data into vector data format

Go to Arc tool box and Select Conversion Tools/From Raster

• Click on Raster to Polygon

In input Raster Add the reclass Slope

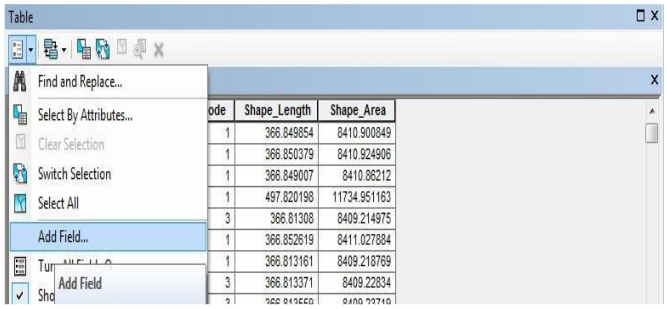
- In field add Value
- Output Polygon features browse a folder (e.g. Temp)
- Select Ok
- Converted polygon layer is displayed into your ArcMap window

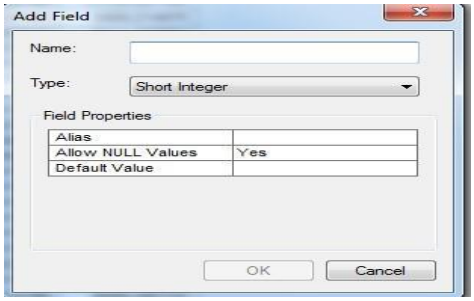
Projecting WGS format Polygon into Local Datum

- Go to Arc Tool box and select data Management Tools /Projection and Transformations/Feature and Click on Project
- In Input Datasets or feature class Add Reclassify slope
- In Output Dataset or Feature class browse a folder (eg Temp)
- Output Coordinate system Select Projected coordinate System /UTM/Africa
- Select Adindan UTM Zone 37 and Click OK

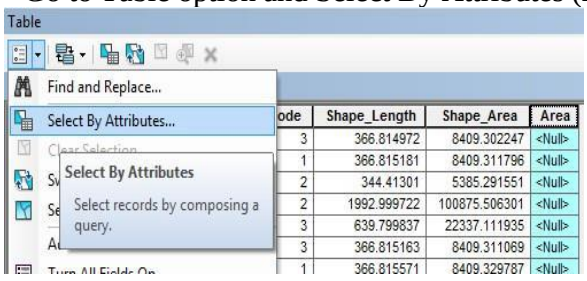
Eliminating Small Polygons by Area

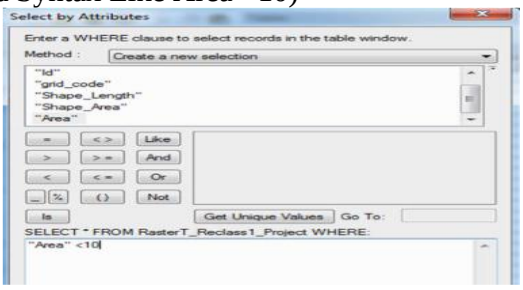
- Right Click on Projected Slope polygon and Open Attribute Table
- Click on Table options And Click on Add Field





- In Name write Area
- In Type Select Long integer from drop down and Click OK
- A new Field in area name is added into your table
- Right Click in Area field Select Calculate Geometry (Hectare)
- Go to Table option and Select By Attributes (Add Syntax Like Area <10)

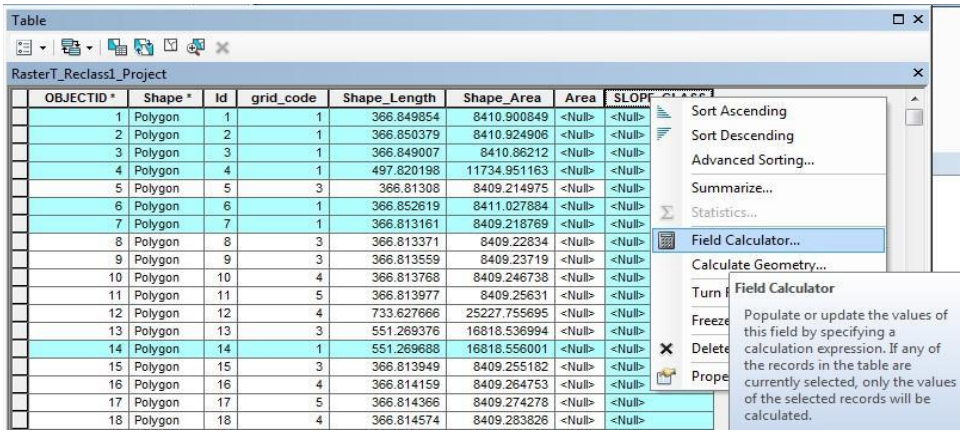




- Go to Arc tool Box Select Data management Tools and Generalization
- Select Eliminate, In put layer add input layer
- In output feature class Browse a folder (e.g. Temp) and save with name

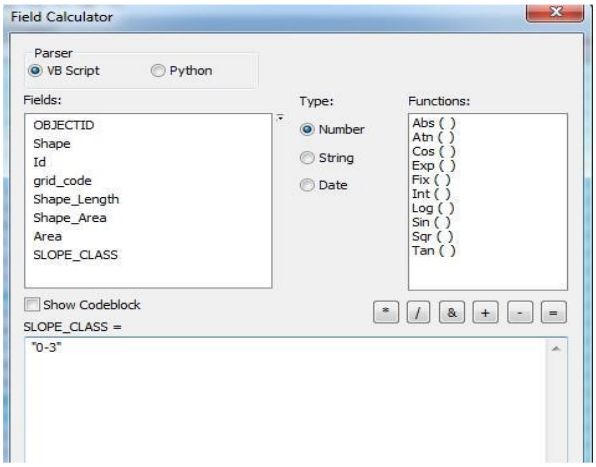
Assigning Slope Class for Polygon Layer

- Go To Table option Add Field Slope Classes (with Text) Type)
- By Selecting Select By Attribute (Grid Code =1) Click on Apply



On Slope Class Field Right Click and Select Field Calculator

• In Field Calculator window Write with quotation Mark Closed Value “0-3”



Grid code	Slope (%)	Landform
1	0 - 3	Flat to almost flat
2	3 - 8	Gentle sloping
3	8 - 15	Slopping
4	15 - 30	Moderately steep
5	30 - 50	Steep
6	›50	Very steep

Finish for all 6 Codes with The Same step, *According to shown in the table assign for each slope class and Land form unit (Attribute Table)*

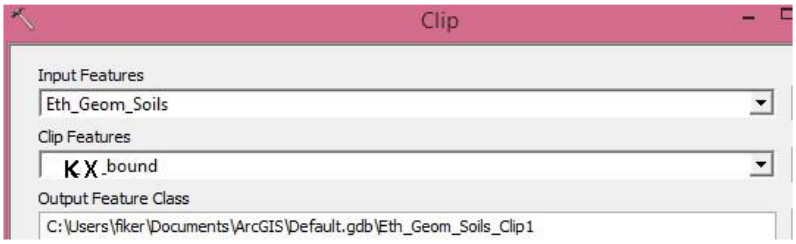
• Create New Folder and name it “Thematic Data”

• Save (export Data) final slope map in the Thematic Folder

b.2) Create Landscape Units Delineation

Clipping Feature (Using Geoprocessing Tool)

- Open New Arc Map Window
- Browse Data Folder and Add Eth_ Soils shapefile
- Add from the Thematic folder Sebeta-Hawas Slope
- Slect Geoprocessing Menu and select Clip (Input feature=Eth_ soils,Clip Features Kebele and Out Put Featre “Eth soils Kebele)



Land Scape Map
Union Feature (Using Geoprocessing Tool)
Input Data = Slope Class/Eth soils

- Open both soils and Slope layers of Kebele X in ArcMap
- Open Geoprocessing Menu and select Union
- The Union Dialogue window is displayed
- In Input features select slope and Soils features
- In output features browse a folder where you want to put and give a name "Land Scape "
- Click on OK
- The output Land scape Feature is displayed in your ArcMap Window
- Open Attribute Table and Add field "Land Scape Unit" in Text Type
- In Attribute table Select Table Options and select "Select By Attributes"
- When Select By Attributes is displayed Add A Syntax
- E.g. Soils=Lithosols and Land form =Flat to almost Flat and Click OK
- Add Both Soil Type and Landform in the attribute Table new Field (Land Scape)
- Do until all Soils and land form Units are Selected

Annex 3 Action Plan for Land Use Planning

Activity	**Unit**	**Total Quantity**	**Monthly Planned Quantity**											**Responsible Party**
			July	Aug	Sep						April	May	June	

Annex 4 Biophysical Data Collection Format for Transect Walk

Slope Class Map Units	**Soil Depth**	**Past Erosion**	**Top Soil Texture**	**Water Logging**	**Infiltration**	**Surface Stoniness or Rockiness**	**Land Use /Cover**
0-2%							
2-8%							
8-15%							
15-30%							
30-50%							
>50%							

Annex 5 Household Income and Expenditure

Sources of Income /Expenditure	**HH Income /Expenditure (Birr)**		**Remark**
	Income	**Expenditure**	
Sales of grain			
Sales of livestock			
Sales of wood			
Wage income			
Sales of straw /hay			
Others (Specify)			
Total Income (1)			
Fertilizer			
Seed			

Sources of Income /Expenditure	HH Income /Expenditure (Birr)		Remark
	Income	Expenditure	
Pesticide			
Veterinary Service			
Human health fees			
Income tax and land use fee			
Clothes			
School fees			
Educational materials			
Others (specify)			
Total Expenditure (2)			
Surplus/Deficit (1-2)			
Human health fees			
Income tax and land use fee			
Clothes			
School fees			
Educational materials			
Others (specify)			
Total Expenditure (2)			
Surplus/Deficit (1-2)			

Annex 6 Socio Economic Data Collection Format

6.1 Data Collection Format for Infrastructures

Date: _____

1. Region: _____ Zone: _____ Wereda: _____ KebeLe: _____ Micro-Watershed/Planning unit: _____ Agro-Climatic Zone: _____ Alt. in m_____ asl.

2. Available Institutions and Infrastructures in the Kebele

Type	Inside KA	Outside KA	Distance in Km	Remarks
No. of Households				
Primary market(local)				
Secondary Market (Woreda)				
Service Cooperatives				
Ware houses				
Flour mills				
All weather roads				
Dry weather road				
First cycle elementary (1-4)				
Second cycle elementary school (5-8)				
Secondary school (9-10)				
Preparatory school (11-12)				
Technical Training Centers/college				
College				
University				
Adult literacy Center				
Youth Association				
Women Association				
Operating Projects				
Churches				
Mosques				
Other Religious Institutions				

6.2 Data Collection Format for Literacy Situation of the Planning Unit

Literacy Level	Male	Female	Total
Illiterate			
Grade 1-4			
Grade 5-8			
Grade 8-10			
Grade 1-12			
College and technical schools Diploma			
First university degree			

6.3 Data Collection Formats for Household Survey

a) KA Name _____b) ***MW*** _____
c) Woreda _____ d) Zone _____ e) Región _____

1) HOUSEHOLD CHARACTERISTICS

1. Household Family Size by Sex, Age and Education

1.1 Total HH size [number of persons in the HH]: _____

1.2. Particularities of HH members

No.	Name	Sex	Age	Relation to HH head	Education Level
1					
2					
3					
Total					

2) Household Land Holding Size

2.1 What are the number of parcels owned?

Parcel No.	Area [ha or local unit]	Use
1		
2		
Total		

3) Household Livestock Possession

3.1 Describe type and number of livestock owned by type?

No.	Type of Livestock	Total Number	Purpose of Keeping
1	Ox		
2	Cow		
3	Heifer		
4	Bull		
5	Goat		
6	Sheep		
7	Other		
Total			

4) Crop Production

3.2 Crops grown and share to HH Economy

3.2.1 What are the major crops grown?

Parcel Locality	Area	Crop Type
Total		

3.2.2 What major crops grown at homesteads?

_____ _____
_____ _____

3.2.3 Estimate the contribution of crop produces/product to the household economy [i.e. both consumption and cash source].

3.2.4 The major crops used for household consumption in ranking?

a. _____ c. _____
b. _____ d. _____

3.2.5 What are the major crops used as cash income in ranking?

a. _____ c. _____

b. _____ d. _____

3.2.6 Improved crop management practices: Have you practiced any of the following improved management practices in order to improve soil fertility and reduce soil erosion in the last 2 or 3 years?

Improved crop management practices	Describe the purpose	Peculiarities of the practice [crops grown, place/parcel and temporal feature]
1. Crop rotation		
2. Crop residue		
3. Inter-cropping		
4. Delay cropping		
5. Others [specify]?		

3.2.7 How do you acquire and access to improved technologies in your area?

a. _____
_____

b. _____
_____

5) Crop Calendar

6.2 Describe and illustrate the "cropping calendar" for the major of crops you grow [i.e. land preparation, showing, fertilization, weeding and harvesting]?

6.3 Rainy seasons a) Meher Rain from _____ to _____.

b) Beg Rain from _____ to _____.

6) Livestock Production

Livestock Species	Reasons for keeping them

6.1 Access and availability of livestock feed

7.1.1 What are the major livestock feed sources during the dry season?

a. _____
b. _____
c._____

7.1.2 What are the major livestock feed sources during the wet/rainy season?

a. _____
c. _____
b. _____ d. _____

7.1.3 When is the critical time in a year where feed shortage is critical and serious?

_____
_____

6.2 Do you access veterinary extension services?

6.3 Kind of veterinary extensive service do you get and describe its service efficiency?

_____
_____

6.4 Would you please prioritize the key problems related to livestock production?

a. _____ b. _____
c. _____ d. _____

7) Forest/Tree plantation

7.2 Do you plant trees?

Yes ☐ No ☐ [if no go to question no. 7.3]

7.3 If yes what kind of tree species do you grow and their functions?

a. _____
b. _____
c. _____
d. _____

7.4 What are the reasons for not planting trees?

a. _____ c. _____
b. _____ d. _____

8) Fuel Wood, Farm Implement and Construction Material Sources

8.1 Prioritize your main fuel wood sources?

a. _____ c. _____
b. _____ d. _____

8.2 Describe the extent of problems in accessing fuel wood?

_____
_____

8.3 What solution do you suggest to minimize the problem?

a. _____
b. _____
c. _____
d. _____

9) Format for Recording Landholdings (per Use) of Sampled Households

Land Use Type	Area in Ha, Timad, Gezim or Gemed
Annual crops	
Perennial crops	
Fallow land and period	
Dry grazing land	
Wet grazing land	
Forest	
Fuel-wood plantation	
Bush and Shrub-land	
Guaro/homestead	
Areas conserved	
Barren land /Rocky or eroded	
Land under closure	
Total	

10) Household Income

No	Income Sources	Annual Household Income for Three Consecutive Years		
		Before Previous Year	Previous Year	This Year
1.	Rain fed crop production			
2	Crop/ Vegetables from irrigated farming			
3	Live animal sales (sheep/goat, chicken, cattle, equines)			
4	Animal byproducts (skin, hides, egg, milk, butter etc.)			
5	Petty trade			
6	Handicraft			
7	Remittances			
8	Fuel wood selling			
9	Charcoal making			
10	Others			

Annex 7 Biophysical Data Collection Formats

1. Percent Estimation of Land Cover Composition Types of a Cultivated Land Mapping Unit

- Date: _____
- Mapping Unit: _____
- Sample #:_____

Cultivated land category	Estimated Percentage					Major crops grown and other uses in the unit
	cultivated	Patches of grass cover	Scattered shrubs	Scattered trees	Others	
C1						
C2						
C3						
C4						

- Note: C1: 80- 100% cultivation; C2: 60-79% cultivation; C3: 40-59% cultivation; C4: 20-39% cultivation.

2. Guide for Determining Physiognomic Vegetation Types by Abundance

Average height				Mapping code	Physiognomic vegetation type
>5m	2-5m	<2 m	0-2m		
Tree %	Bush %	Shrub %	Herbs and Grasses %		
>50	30-40	10-20	0-5	N1	Forest(F)
20-40	30-50	20-30	5-10	N2	Wooded bush-land (WBL)
40-60	0-10	0-10	>30	N3	Woodland(WL)
0-10	40-60	10-40	10-20	N4	Bush/Shrub-land(B/SH)
0-5	10-30	30-50	>20	N5	Shrub grassland (ShGL)
0-5	0-5	0-10	>60	N6	Grassland(GL)

Annex 8 Management Interventions Recommended for Different Land Uses Occurring in Different Slope Classes

Major land Cover/land uses	**Management interventions recommended for different Slope classes**						
	0-2	**2-8**	**8-15**	**15-30**	**30-50**	**>50**	**Legal measures**
Cultivated land	Drainage ditches; grass covered field boundaries, manure with chemical and biological/compost fertilizers, use of improved seeds	Grass and feed bush stripes; grass and bush covered field boundaries; Contour plowing, cut off drains, graded fanya juu; leveled fanya juu, stone & soil bunds, Grass cover between fields and rivers , gullies; manure with chemical and biological/ compost fertilizers; improved seeds	Contour plowing, cut off drains, graded fanya juu; leveled fanya juu, stone and soil bunds; grass cover between fields and rivers, gullies; manure with chemical and biological/compos fertilizers; check dams; use of improved seeds; planting grasses and shrubs along physical measures, cut off drains	Contour plowing, cut off drains, graded fanya juu; leveled fanya juu, stone and soil bunds, grass cover between fields and rivers , gullies; check dams and gabions, manure with chemical and biological/compost fertilizers; use of improved seeds; planting grasses and shrubs along physical measures; cutoff drains	Contour plowing, cutoff drains, check dams, hillside terraces, eyebrow micro basins, tree and shrub planting along conservation measures,	Area closure, cut and carry, half moon basins, micro basins; hillside terraces	
Communal Grassland	Systematic grazing/paddock, reseeding with legumes and grasses; fertilization	Systematic grazing/paddock, reseeding with legumes and grasses; fertilization	Systematic grazing, reseeding with legumes and grasses, fertilization	Area closure, cut and carry, reseeding with legumes and grasses, check dams	Area closure, cut and carry, reseeding with legumes and grasses, check dams	Area closure, cut and carry, reseeding with legumes and grasses, check dams	
Private pasture land	Same as above	Same as above	Same as above	Same as above	Same as above	Same as above	
Dense Forest	Protection and selective cutting	Protection and selective cutting	Protection and selective cutting	Protection and selective cutting	Protection and selective cutting	Protection and selective cutting	
Open/disturbed forest	Protection, selective cutting and enrichment planting	Protection, selective cutting and enrichment planting	Protection, selective cutting and Enrichment planting	Protection, selective cutting and enrichment planting	Protection, selective cutting and enrichment planting	Protection, selective cutting and Enrichment planting	
Woodland/wooded grassland	Selective cutting, systematic grazing	Selective cutting, systematic grazing	Selective cutting, systematic grazing	Selective cutting, cut and carry	Selective cutting, cut and carry	Selective cutting, cut and carry	

Major land Cover/land uses	**Management interventions recommended for different Slope classes**						
	0-2	**2-8**	**8-15**	**15-30**	**30-50**	**>50**	**Legal measures**
Bush/shrub land	Firewood collection, systematic grazing and browsing	Firewood collection, systematic grazing and browsing, controlling invaders	Firewood collection, systematic grazing and browsing, controlling invaders	Firewood collection, systematic grazing and browsing, controlling invaders; check dams	Firewood collection, cut and carry, controlling invaders; check dams	Firewood collection, cut and carry, controlling invaders	
bush/Shrub grassland	Firewood collection, systematic grazing and browsing, controlling invaders	Firewood collection, systematic grazing and browsing, controlling invaders	Firewood collection, systematic grazing and browsing, controlling invaders	Firewood collection, systematic grazing and browsing, controlling invaders; check dams	Firewood collection, systematic grazing and browsing, controlling invaders; check dams	Firewood collection, systematic grazing and browsing, controlling invaders	

Annex 9 Land Capability Classes, Current and Potential Land Uses that can be decided by the ILLPLUP Team

Land capability class	**Major limiting Factors**	**Current Land Use options to be agreed and decided by ILLPLUPT**		
		Cultivated Land	**Grazing Land**	**Forest Land**
I	Nil	Intensive cropping + maintaining good vegetation cover + waterways	a. Convert to cultivated land b. Grassland improvement	a. Convert to cultivated land b. Convert to agro-forestry c. Maintain natural forest with enrichment planting if necessary
IIL	Slope: 2-8%	a. Contour cropping b. Stripe cropping c. Grass stripe d. Alley cropping + waterways, cutoff drain	Same as above	Same as above
IIS	Stoniness; Slope: 15-30%	Removal of stones + application of options of class I	Same as above	Same as above
IIIL	Slope: 8-15%	a. Grass stripe b. Alley cropping c. Combination of grass strips and bunds d. Soil or stone bunds e. Fanya Juu + waterways, cutoff drains	a. Convert to cultivated land b. Grass land improvement c. Convert to agro-silvi-pasture + cutoff drain	Same as the same + stripe plantation following contours
IIIE	Slight past erosion	a. Cutoff drain + waterways + if slope 2-8% apply options of Class IIL	Same as above	Same as class I + cutoff drain + encouraging vegetation cover
IIIW	Intermittently water logged	a. Drainage improvement b. Broad bed furrows on black soils c. If slope 2-8%; apply options of class IIL	a. Convert to cultivated land b. Improve the grass land c. Convert to agro- silvi-pasture	Same as options for class II + selection of species resistant to water logging
IIIi	Moderate infiltration	a. Soil structure improvement; b. Deep plowing If Slope 2-8%; apply options of class IIL	Same as above	Same as options of class I
IIIS	Stoniness; Slope: 30-50%	Remove stones + if slope 2-8%, apply options of class IIL	Same as above + stones removal	Same as options of class I

Land capability class	Major limiting Factors	Current Land Use options to be agreed and decided by ILLPLUPT		
		Cultivated Land	**Grazing Land**	**Forest Land**
IVL	Slope: 15-30%	a. Combination of grass stripes and bunds b. Alley cropping c. Soil or stone bunds d. Fanya juu e. Bench terraces	a. Convert to cultivated land b. Convert to agro-silvo-pasture c. Controlled grazing + cutoff drain & waterways	Same as above
IVE	Moderate past erosion	a. Cutoff drain & waterways b. Selected conserving crops c. If slope 2-8%, apply options of Class IIL d. If slope 8-15%, apply options of class IIIL	a. Convert to cultivated land b. Convert to agro-silvi-pasture c. Controlled grazing + cut off drains & waterways	Same as above
IVD	Soil depth: 50-100 cm	a. Selected shallow rooting crops + if slope 2-8%, apply options of IIi b. If slope, 8- 15%, apply options of class IIIL	Same as above	Same as options of class I + micro-basins for plantations
IVW	Regularly waterlogged	a. Selective seasonal cropping b. Drainage improvement c. Broad bed and furrow plowing + waterways; if slope 2-8% apply the options of IIL	a. Convert to crop land b. Convert to agro-forestry system + drainage improvement	a. Convert to cultivated land b. Convert to agro-forestry system c. Select species resistant to water logging
IV**i**	Poor infiltration	a. Deep plowing b. Soil structure improvement + if slope 2-8% apply the options of class IIL (graded structure) c. If slope 8-15 apply the options of Class IIIL	a. Convert to cultivated land; b. Grassland improvement c. Controlled grazing d. Convert to agro-silvo-pasture	a. Change into cultivated land b. Fuel plantation + encourage vegetation cover growth

Land capability class	Major limiting Factors	Current Land Use options to be agreed and decided by ILLPLUPT		
		Cultivated Land	**Grazing Land**	**Forest Land**
VIL	Slope 30-50 %	a. Establish perennial crops b. Convert to grassland or forest land c. Establish bench terraces for annual crops + waterways	a. Grassland improvement b. Controlled grazing c. Convert to silvo-pasture system + cutoff drains	a. Establish silvo-pasture system b. Enrichment planting of tree species c. Establish fuel-wood plantation + micro-basins
VID	Soil depth : 25-50 cm	a. Convert to grass land or forest land b. Establish perennial crops c. If slope is 2-30%, the perennial crops should be on contour bunds	a. Grassland improvement b. Controlled grazing c. Convert to silvi-pasture system	Fuel-wood plantation + micro-basins
VIS	Stoniness: 50-85%	a. Removal of stones b. Establish perennial crops c. Convert to grassland or forestland d. If slope 8-15% establish stone bunds e. If slope 15-30% establish stone bench terraces for annual crops	Same as above + removal of stones	Same as above + stone micro basins, stone hillside terraces
VIIL	Slope > 50%	a. Convert to forest land b. Convert to silvi-pasture system c. Hillside terraces for annual crops +cut off drains	a. Convert to forest land b. Convert to silvi-pasture land c. Controlled grazing + Cut and carry	a. Fuel-wood plantation b. Tree plantation for catchment protection + pitting or micro-basins
VIID	Soil depth: 25-50 cm	a. Convert to forestland b. Convert to silvi-pasture land hillside terraces for annual crops	a. Convert to forestland b. Convert to silvo-pasture land c. Controlled grazing + grassland improvement	a. Fuel-wood plantation b. Tree plantation for catchment protection

Land capability class	Major limiting Factors	Current Land Use options to be agreed and decided by ILLPLUPT		
		Cultivated Land	**Grazing Land**	**Forest Land**
VIIE	Severe past erosion	a. Area closure b. Convert to forest land + Gully control + cutoff drain	Area closure b. Cut and carry + Gully control + cutoff drain	Area closure b. Tree plantation for catchment protection
VIIID	Soil Depth: < 25 cm	a. Area closure b. Convert to forest land (catchment protection) c. Cut and carry	a. Area closure b. Convert to forest land(catchment protection)	a. Protection of existing natural forest b. Area closure c. Encourage wildlife development
VIIIE	Very severe past erosion	a. Area closure b. Convert to forest land(catchment protection) c. Gully control	a. Area closure b. Convert to forest land (catchment protection) c. Cut and carry	a. Area closure b. Encourage regeneration of natural tree c. Encourage wildlife development
VIIIT	Sandy texture	Not applicable	a. Area closure b. Wind erosion control	a. Area closure b. Encourage wild life
VIIIS	Stoniness: > 85%	Area closure + tree planting	Area closure + cut and carry	a. Catchment protection b. Encourage wildlife development c. Area closure
V	Swamps; riverbeds	Not applicable	a. Biodiversity conservation b. Temporary grazing; c. Controlled grazing	a. Encourage wildlife development

Annex 10 Soil Loss Equation Factors

THE UNIVERSAL SOIL LOSS EQUATION (USLE) ADAPTED FOR ETHIOPIA Equation = R*K*L*S*C*P where R = rainfall erosivity, K = soil erodibility, L= slope length, S= slope gradient, C = land cover, and management factor (P).

1. Rainfall Erosivity									
Annual Rainfall (mm)	100	200	400	800	1200	1600	2000	2400	
Annual Factor	48	104	217	441	666	890	1115	1340	
2. Soil Erodibility									
Soil Color	Black	Brown	Red	Yellow					
Factor	0.15	0.20	0.25	0.30					
3. Slope Length									
Length (m)	5	10	20	40	80	160	240	320	
Factor	0.5	0.7	1.0	1.4	1.9	2.7	3.2	3.8	
4. Slope Gradient									
Slope (%)	5	10	15	20	30	40	50	60	
Factor S	0.4	1.0	1.6	2.2	3.0	3.8	4.3	4.8	

5. Land Cover			
Dense forest	0.001	Dense grass	0.01
Other forest	See grass	Degraded grass	0.05
Badlands Hard	0.05	Fallow hard	0.05
Badlands Soft	0.40	Fallow ploughed	0.60
Sorghum, Maize	0.10	Ethiopian Teff	0.25
Cereals	1.15	Continuous fallow	1.00
6. Management Factor			
Ploughing up and down	1.00	Ploughing on contour	0.90
Strip cropping	0.80	Intercropping	0.80
Applying mulch	0.60	Dense intercropping	0.70
Stone cover 80%	0.50		
Stone cover 40%	0.80		

Source: WISCHMEIR AND SMITH, 1988, and adapted by various writers (as Quoted by Environmental Support Project Buginal Woreda Land Use Plan)

Annex 11 Examples How to Use Socio-economic Data for Land Use Option Selection and Land Management

S.N	Land Use Option (1) /Recommended Land Management (2)	Relevant Socio-economic Data to be Referred	Remark (Analysis)
1	Allocation of communal grazing land (5 Ha) to the youth for fruit and vegetables irrigated production (1)	• Demographic data (youth age category) • Social acceptability	• If the 5 Ha land is sufficient for the existing No. of youth, the land use change option can be implemented • If user community does not support the allocation, option cannot be implemented
2	Consolidation of parcels to improve efficient use of labor and land resource (2)	Demographic data (Social attitude)	If communities do not accept this land reform, the land plan will be endangered
3	Land use change from crop land to forest land	• Crop yield • Land holding size	If yield is at acceptable range and there is crop land shortage, use change should be halted; Instead focus on land management

Annex 12 Plan Report Writing Steps and Content

1. Front Page

Integrated Land Use plan for…….. Kebele of ……. Woreda in …… Region

2. The Kebele

2.1 Agro-ecological Condition

2.2 Socio-economic Condition

3. Plan Justification

3.1 Background to the problem indicating social, economic, and biophysical environment of the Kebele

3.2 The time spent to study, plan, and the process used in identifying the problems

3.3 Causes and consequences of the problems

3.4 Why the problems deserve attention in comparison with other problems (prioritization)

4. Plan Objectives

- Clearly related to the problems identified above. It is the objective what communities want to achieve after the implementation of the plan
- Objectives should be written in a SMART way

5. Implementation Strategies

5.1. Community's participation during surveying and planning

5.2 Community's contribution to achieve objectives

5.3 Contributions expected from others

5. Implementation Plan

5.1 Activities

Put SMART activities in the following format

Table 1 Planned activity

Activity No.	Land Unit	Activity	Unit	Total Quantity	Manag't Intervention	Responsible Party

5.2 Community Organization for Implementation

6. Monitoring and Evaluation Plan

Indicate how performance reports reach each level and when and how joint evaluation is done periodically.

Annex 13 Plan Agreement Assurance of _____ Kebele by Team Members

S.N	Kebele ILLPLUP Team Member	Gender	Agreed /Not Agreed	Signature

Annex 14 Plan Submission Form to Land Users

Uses assigned to each land unit need to be implemented within a given time. Plan implementation entails rights and obligations. This submission form cements these rights and obligations to the party who are responsible for the implementation of the proposed use and its corresponding management interventions. For this purpose the following form can be used.

Proposed Plan Submission Form to Land Users

S.N	Land Unit	Land Use Change from …… to …..		Uses Allowed	Activities Prohibited	Management Interventions	Remark

Name of Recipient ……. Signature ……. Date ……..…

Annex 15 Guiding Bylaw Preparation Model for LLPLU Plan Implementation

Preamble:

After formulation of a ILLPLUP, we the land users of the planning area using the land in micro-watershed/Keble ___, Kebele ___, Woreda ____; Zone____ and Region __ have agreed to entirely implement the land use and land management plan without any change agreed by the community of the Kebele and approved by the concerned body of our Woreda ILLPLUP.

The land use plan formulated by the planning team and agreed by the land users of the planning unit area is based on the regional land administration and use policy, proclamation, regulation and thus we decided to implement the plan as per this bylaw developed based on the Federal and regional governments land laws.

We believe that the plan is made to improve and upgrade our resources, increase production per unit area and improve our livelihoods. The planning options indicated in the plan are based on our interest of development and requirements and capacities of the land units identified by the planning team of which our representatives and had been fully engaged. Changes made in the current land use are seen important to improve the productivity of our land and our livelihoods. Thus any discomfort and displacement caused by the change is agreed to be accommodated by the land users of the planning unit area.

Areas of Agreement:

1. The land use plan made by the planning team is appropriate for proper management and improvement of our natural resources.

2. For the success of the plan, we have agreed to adjust holdings between households of our planning unit so as to have equal chance of livelihood improvements.

3. We have agreed to improve the plan if any error will be observed by the planning team during implementation, monitoring and evaluation processes.

4. We have agreed to implement all land management recommendations shown on the land use plan and our holding map and certificates of land use right. Land use can be changed only based on studies.

5. We have agreed to manage and use communal lands as per the plan.

6. We have agreed to manage and use communal lands and to conserve our soil and water as per the plan and the community action plan.

7. Community forests and water resources will be the property of the community and will be guarded by the community.

8. Government Forests and resources within our planning unit area will continue tobe the property of the government and will be manage by the community as per the ILLPLUP

9. We have agreed to develop and protect our footpaths, all weather roads, irrigation areas, markets, schools, health posts, clinics and health centers as shown on the plan.

10. We undertake development activities as per the community Action Plan developed and agreed with the land use plan;

11. We have agreed to involve all the community members in the development actions.

12. We have agreed to use water resources on equitable basis upstream and downstream

13. Communal forests will be used by the Kebele for communities' common use;

Agreed Punitive Provisions:

1) Land user of the community found using the land out of the plan
   - Will be fined …… Birr punishment for the first time.
   - The violator will be punished Birr ……if found using out of plan for the second time.
   - If this cannot stop the violator, the case shall be taken to the court.

2) Land user found grabbing communal lands, the violator will be punished
   - ….. Birr for the first time;
   - ……Birr for the second time;
   - By sending the case to the Regular court for the third time.

3) If any land user does not respect the plan for community land, the violator will be
   - Dislocated from communal land use or punished ….. Birr if the violator is not a communal land user;
   - Birr …. for the second time.
   - Punished by sending the case to the Regular court for the third time;

4) If any land user is found destroying water sources the violator will be punished
   - ……. Birr for the first time;
   - ……Birr for the second time;
   - by sending the case to the Regular court for the third time.

5) Any land user is found destroying government and community forests will be punished
   - ……. Birr for the first time.
   - …….. Birr for the second time.
   - By sending the case to the Regular court.

6) If any land user does not develop and protect his land as per the plan the violator will be punished
   - ……. Birr for the first time;
   - …….. Birr for the second time;
   - By sending the case to the Regular court.

Conclusion:

This bylaw will serve as a law of the planning unit after being signed by the community and sealed by the Woreda Administration and WLAU office.

The bylaw is endorsed and signed on this date of_____

Note to the planning team:

This is a sample frame document to help assist the planning team to discuss issues with the community while developing ILLPLUP and making bylaws and Community Action Plans. The bylaw should be developed and improved by the community in the presence of the planning team. Sectoral restrictions and standards included in the development plan shall be components of this bylaw.

Annex 16 Proposed Land Use Standards and Restrictions

Standard /Restriction Issues	**Set Standard**	**Action on Violators (e.g. fine, social sanction, etc.)**	**Remark**
Eucalyptus planting	Distance from crop land … m		
	Distance from water point … m		
Cropping	Distance from water point … m		
	Distance from gully land … m		
	Distance from forest area … m		
Free grazing	Controlled grazing agreed		
	Stall feeding agreed		
	Cut and carry agreed		
	Rotational grazing agreed		
SWC	Specific structures on specified parcels agreed		
Foot paths	Agreed to let others pass on foot on ones parcel		
	Agreed to leave …. m swath for foot path on own parcel		
Land use adjustment	Agreed to change land use from _____ to_____.		
Destocking	Agreed to reduce livestock from _____ to_____ Tropical Livestock Unit.		
House construction	Agreed not to build house on crop land unless permission received.		
	A house away from road at least __ m.		
	A house above a water point at least __ m far away from that water point.		
	Distance between two houses should not be less than __ m.		
Tree cutting	Forbidden on communal and government lands		
	Forbidden within __ m radius from water points		
Current land use change	Agreed not to change land use unless permission received.		
Wetlands	Agreed on how to manage wetlands		
Parks	Agree buffer zone free from encroachment		

Standard /Restriction Issues	Set Standard	Action on Violators (e.g. fine, social sanction, etc.)	Remark
Game reserve areas	Agree buffer zone free from encroachment		
Etc.	Etc.		

Annex 17 Action Plan for Plan Implementation

Activity No	Budget	Activity	Unit	Total Quantity	Monthly Planned Quantity											Responsible Party
					July	Aug	Sep							Apr	Ma	Jun	

Annex 18 List of Public Consultation Workshop Participants of ____ Kebele

S.N	Name of Participants	Gender	Agreed /not Agreed	Signature

Annex 19 Format for land management interventions as part of the land use plan

Land Dev't unit	Area in ha	Current Land Use Land Use /Cover	Proposed Land Use	Proposed Interventions (land management recommendations)	Implementer and Implementation Timeframe		Remark
					Implementer	Time	

Annex 20 Proposed List of Materials Needed by Different Level of Planners

S.N	Planning Levels				
	Item	Region	Zone	Woreda	Kebele
1	4 Wheel Drive	2	2	4	1
2	Motor Cycle	-	-	2	2
3	Cycle	-	-	-	2
4	Mirror Stereoscope	3	-	2	1
5	Pocket Stereoscope	2	-	2	4
6	Topographic maps(1:50'000-1:20,000)	Regional Coverage(1:50,00)	-	Woreda Coverage(1:50,000 and 1:20,00)	Kebele coverage > 20, 000
7	Digital Satellite Imagery	Regional Coverage 1: 50,000	-	Woreda Coverage 1: 50,000	Kebele coverage > 1:20,000
8	Digital Map printer	1	-	1	1
9	Large Capacity Desktop Computers	3	2	3	1
10	Large Capacity Laptop Computers	2	1	2	2

S.N	Planning Levels				
	Item	Region	Zone	Woreda	Kebele
11	Hand Hold GPS	5	2	5	3
12	Augers	10	-	10	3
13	Color Chart	5	2	5	3
14	Clinometers	5	-	5	3
15	Software (ARC-GIS)	yes	yes	yes	yes
16	Adequate Working Space	yes	yes	yes	yes
17	Aerial Photographs	Regional coverage(1:50,000) and larger	no	Woreda Coverage(1:50,000) and larger	Kebele Coverage >20,000

Annex **21** List of Participants

Participants of Regional States and Ministry who Attended the Workshop held in Debrezeit /Bishoftu in August 21 & 22, 2012, Adama August 06-07/ 2016 and in Feb 1-2/2017, and provided constructive comments for enhancement of the Manual

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Annex 22Terms of Reference (ToR) When Mengistu outsourced

Back Ground

The Ethiopian government has taken very essential steps that are necessary to address problems associated to land and tenure security of the country. The main measures taken by the government include establishment of responsible land administration and use organizations and enacting land related legislations. The Federal and regional land laws calls for preparation and implementation of land use plans. The local level plans to serve as a pillar to expedite the implementation of most provisions contained in Article (13) of the federal proclamation. Thus, the federal government as well as regional states has established land administration and use organizations which are responsible for administering and managing the rural lands of the country. In fact at national level, the land administration and use department is organized under the ministry of agriculture as a directorate

Moreover, land related legislations have been formulated both at federal and regional level which are assumed as most important policy instruments to tackle the rural land administration and use problems. In line with this tenure insecurity and improper land use practices are noted in the legislations as the major causes of land degradation in the country. Furthermore some of the policy stated objectives of the legislations indicate that regulation of rural land uses will be through land use planning.

On the other hand, the federal land administration and use directorate is in the process of organizing itself by putting in place the required manpower and internal arrangement to assume the responsibilities to conduct land use studies, planning and implementation. It also has the responsibilities of developing various land administration strategies and implementation plans by establishing harmonized methodologies for cadastral survey whose input is crucial for the various land administration activities which include but not limited to undertake land registration and issuing of certificate for holders right which are instrumental to sustainable natural resources management in particular and rural development in general.

Meanwhile, the regional government has advanced forward towards establishing and strengthening the land administration system. Yet, the move of the regions towards preparing

rural land use plans, and the regulation of land uses and development through planning control is gradual. In this regard, the land administration and use offices at all levels which have the official mandate for local level land use planning and enforcement of land use plans are not carrying out their responsibilities adequately despite some watershed based local level land use planning activities has been undertaken in different regions. Even if land use planning is a tool for putting into effect the regulatory function of land administration system, many of the local plans were prepared largely to serve as a tool for watershed management, and moreover the plans are not quite integrated and legally binding.

Hence, it is very important to assess the existing land use planning practices, the major land use problems and challenges of local level planning in rural parts of the regional states. Above all, it is also essential to produce operational local level land use planning manual that will be used by the regions as a guidance material for preparing participatory and enforceable local land use plans.

In order to carry out these activities the LAUD would need to engage an individual consultant who has adequate academic background and experience especially in the field of land use studies and planning. LAUD will also consider attaching its own experts who have knowledge in the area to build their capacity working with the consultant.

Therefore the consultant is highly expected to critically assess and evaluate all the past and current works on local level land use planning and evolve appropriate manual for the planning that also include a methodology to implement the provisions of the proclamations.

Purpose of the consultancy

The main purpose of the consultancy work is to produce a practical operational local level land use planning manual, which will be used by sub professionals or Development Agents at woreda or kebele level.

Specific duties of the Consultant

- To assess existing information from the different regions ;Specifically, from Oromyia, Amhara, SNNP, Tigray, Benshangul and Gambela concerning major land use problems, planning constraints and local level land use planning practices in collaboration with experts from the federal land administration and use directorate, and produce report document. Moreover, the consultant should consider thoroughly multiple earlier manuals of FAO on approaches to prepare local level land use plan in Ethiopia.
- To design and prepare a simple, user-friendly participatory local level land use planning manual that can help local level experts to prepare local plans which can be enforced by the land administration and use legislations in place. The kind of manual to be prepared by the consultant shall be brief and, which clearly shows all the necessary steps including enforcement mechanisms.
- To present the prepared manual on the consultative workshop, and finalize the manual by considering all the comments to be raised by the concerned participants of the workshop.
- To train field technical staff of the regions using the prepared manual in collaboration with the federal LAUD experts. In line with this the Consultant should have high capacity lap top computer for the study and ready the required training materials and manuals.

Required Qualification and Experience:

- The consultant should have Master's degree in Land Use Planning /land resource management or any other related professions /fields with a minimum of 7 years of proven experience working in land use planning and land resource management or related areas, preferably with experience in land administration and rural development and some knowledge in GIS. Experience must include prior and existing works or understandings of local level land use planning and sustainable land management practices in Ethiopia.
- Knowledge of current land administration and land use policy instruments, such as land laws, strategies and systems in Ethiopia
- Excellent English written skills are required Federal language knowledge is also a plus.
- Proven and demonstrable report writing skills as well as some technical research skills including both qualitative and quantitative methods and cost benefit analysis is essential
- Adequate knowledge of FAO land evaluation techniques such as land capability and suitability classification technique is also one of the preconditions that the consultant to possess
- Proven knowledge of multidisciplinary or integrated watershed or kebele based land use planning techniques including Some knowledge of
    - → Crop and LGP assessment in local level land use planning.
    - → Agro-ecology classification
    - → livestock and range land ecology study in land use planning

- → rural socioeconomic assessment using PRA tools
- → Land use and land cover study and change analysis
- → Experience on remote sensing and interpretation of satellite Imagery.
- → Conventional and participatory soil survey and
- → Land use plan enforcement mechanisms

Requirements

- Interested individual consultants are invited to submit hard copies of a professional license, detailed technical and financial proposal along with their credential
- The consultant should bring certificates for all required qualification and experiences mentioned above, and for the whole thing mentioned in his credential.
- The consultant shall be willing to travel within all the six study regions.
- The consultant who will win the tender will consign consultancy agreement with the directorate and sustainable land management program coordination unit within MOA For the consultant reporting is mandatory - verifiable instances of failure to report the progress of the study and or letdown to submit the manual on the agreed date may lead to immediate termination of the consultancy agreement

Hiring Entity's Responsibility

The client will provide vehicle for the field work with driver and cover the costs of fuels for the car. All the necessary room and equipment like photocopy machine and a desk top computer for the office work shall be availed by the client as well.

Expected output/ Deliverables

A practical operational manual for participatory local level land use planning is the main output of the consultancy. The final manual shall also be prepared after undertaking a national workshop.

Annex 23 Basic Concepts as Input for Land Use Planning

The two major factors Land Use Planning takes into account are biophysical and socio-economic factors. Both aspects require an objective and systemic method of data collection and analysis. These two aspects should come together and be used to decide on land for its better use. We therefore need to equip ourselves with different conceptual theories of the land use planning science. The following parts focus on such concepts. It is to be read mainly for additional conceptual enrichment. While reading this part, you may find points already raised along the planning steps

1.1 Land Resources

Understanding the quality and quantity of the land resources by type is so essential and prerequisite in undertaking local level participatory Land use planning. Local level participatory land use planning (ILLPLUP) is basic for obtaining optimum level of production and introducing appropriate land management practices for better or improved livelihoods.

Thus, land resources are understood as conditions and elements of the land that can be exploited, developed or managed without causing negative impact that risks the fragile environmental relationships and challenges sustainability. The conditions and elements of the land which are crucial for living are climate, soils, vegetation/flora, fauna, water, minerals, etc.

Their features as they appear in the space can be represented in sequential manner above, around and below as part and parcel of the environment. The land features constituted elements that partially or entirely fulfill the needs and demands of human beings and other living things. The important sequential categories of land resources from apex to the bottom are:

a) The Atmosphere
b) The Biosphere
c) The Lithosphere; and
d) The hydrosphere

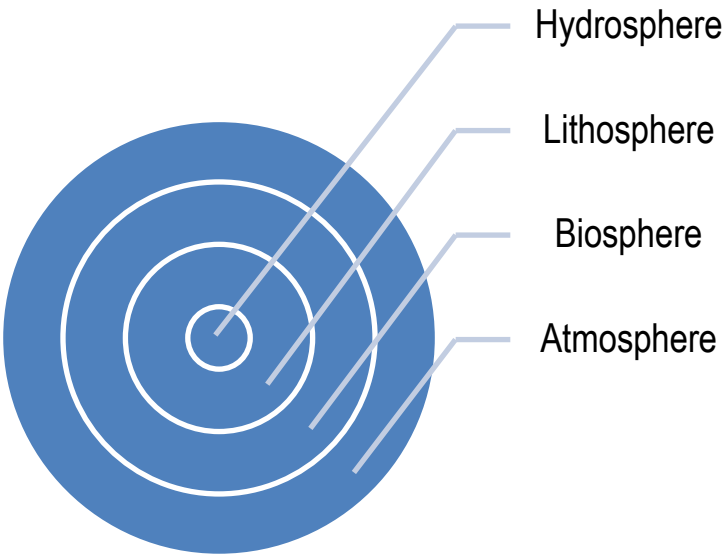

Figure 1 Topo-sequential Homes of Land Resources

The atmosphere constituted the climatic elements such as air, temperature, clouds, humidity, etc. On the other hand, the biosphere contains mainly human beings, the flora, the fauna, and manmade features. While the lithosphere is represented by soils, moisture, heat, water, geology, minerals, etc.

The hydrosphere for the most part represents the ground and surface waters which are composed of various minerals and gases. The balanced combination of these resources is the major source of livelihood. However, if some elements are unwisely it used could be causes of destructions and eliminations of diversity and consequently dependable livelihood.

1.1.1 Climate

Climate is the major controlling physical factor in agricultural land use. It is one of the main development factors of relief (topography) and soils. The main agent in determining water balance in geo-hydrology and hydrology is climate. Climate also decides the nature and floristic compositions of the natural vegetation of a specific site. Interactions among climate, relief and soils are important in determining socially acceptable, economically viable and environmentally sound land use types.

The main climatic elements, which directly govern land use types to be considered for a certain area are the rainfall amount and distribution, and the air temperature level. Thus data on these elements are so important for sustainable local level land use planning processes.

The following climatic elements are important factors in determining the land use options of a certain locality or planning area.

1.1.1.1 Precipitation

The term precipitation includes rainfall, snow and dew. The availability of water through precipitation or rather the lack of it is often the most limiting physical factor in crop and livestock production in countries where water is scarce for irrigation. In our country while undertaking any level of land use planning, it is important to know the spatial reliability of the rainfall amount and distributions. In addition, its seasonal distribution governs the choice of major land uses, crops, and the optimal planting time, harvesting and other farming

operations such as land preparation, weeding, and threshing. The general trend of rainfall in Ethiopia is that the amount increases as the altitude increases and the temperature decreases as the altitude increases. Meaning that, the highlands receive dependable rainfall with reliable distributions.

Cropping calendar of a planning unit can be determined by discussing with farmers of different Climatic Zones and/or Agro-ecological zones.

1.1.1.2 Air Temperature

As far as air temperature is considered, average temperature data has very little meaning in the assessment of the temperature conditions of an area. For agricultural development planning, monthly, seasonal, and decade data as well as data on diurnal fluctuations and average daily minimum and maximum temperatures are very essential.

1.1.1.3 Wind

Certain crops are sensitive to wind during critical growth stages (flowering, pollination, fruit setting, etc.). Considerable damage might result from strong winds in the period just before harvesting. Thus a planning team established at agreed planning unit area has to be aware of the wind conditions of the planning unit in different seasons of the year.

1.1.1.4 Frost

Frost affects crop growth and development. In Ethiopia, frost occurs specifically anywhere in valley bottoms, depressions and at higher and highest spots of certain topography or locality.

Certain crops do not stand frost hazard while others tolerate. For example, from cereal crops, relatively barley and rice are rated to be *"frost tolerant".* Frost hazard shall be assessed by estimating frost risk (i.e. based on altitude and topographic situations and discussion with farmers) with crop sensitivity of crops to be assessed and evaluated.

Frost is classified into four according to its severity levels as follows:

- Light frost between 0^0 c and -2,5^0c;
- Moderate frost between -2.5^0c and -50^0c;
- Severe frost between -50c and -100c; and,
- Very severe frost below -100c.

Therefore, any agricultural development planning should involve assessment of frost conditions of an area so as to point out risks of development and involve possible passing mechanisms, and important for land use planning.

1.1.1.5 Length of Growing Periods

Lengths of growing periods severely govern the production capacity of an area/or a unit of land. In order to design a sustainable participatory local level land use planning for an area or unit of land, one has to analyze the records of the climatic elements so as to determine the existing and/or available LGP.

The major climatic elements, which determine the type of land use of an area, are temperature, evapo-transpiration and amount of rainfall. The amount of evapo-transpiration is always governed by air temperature and wind conditions. When the temperature is high the amount increases and when low its amount decreases. Similarly high wind speed increases the amount of evapo-transpiration and in low wind speed areas it is low. Combination of strengths of the two is a big danger in crop production. Table 10.2 gives an example of mean monthly climatic data and Figure 10.3 Length of Growing Period graph.

In areas where there is no recorded data, length of growing period can be determined by interviewing elder farmers when the big and small rains begin and terminate in good and bad years.

Table 1 Examples of 25 Years Mean Monthly Climatic Data

Climatic parameters	Months												Total
	Jan	Feb	Mar	Apr	M	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
MMRF(mm)	30	80	100	160	15	75	240	300	150	25	5	3	1183
MMPET(mm)	160	150	160	170	200	100	75	60	70	75	100	150	1470
½ PET(mm)	80	75	80	85	100	50	37.5	30	35	37.5	50	75	735
MMT(^{0}C)	17	20	15	16	20	19	15	14	16	15	17	16	16.7

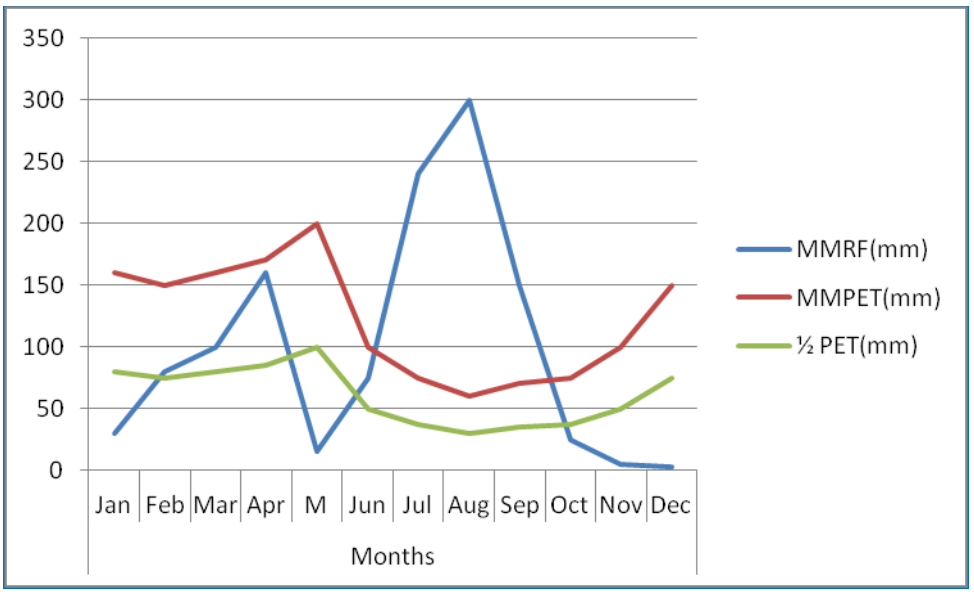

Figure 2 Example Graph Showing LGP

Box 1: Reading Instruction for Figure 10.3.

- The point where the ½ PET and RF intersects in February is the beginning of moist period.
- The point where ½ PET and RF intersect in May is the end of moist period and starting time of dry spell
- The point where ½ PET intersects in June is the end of Dry spell and beginning of the second growing period; this period is moist till RF intersects full PET in again in June
- The point where ½ PET crosses RF in October is the end of the second growing period; soil moisture holding capacity extends till end of October depending on soil type
- Since the figure shows two independent LGP; the RF is bimodal
- The two growing periods supplement to each other and form the annual LGP
- The period where the RF is greater than full PET is a moist period where there is plenty of water to harvest and conserve.

1.1.2 Topography

It is the physical feature of a landscape or terrain. There are four aspects of topography on which information is required when assessing their impact on land use. These are slopes to

be measured in percent and length in m, macro and micro relief and positions. These factors influence accessibility, drainage, rate of erosion, costs of land development and size and shape of fields that have to be developed and managed.

1.1.3 Soils

One of the natural resources that determine land uses anywhere in the world and specifically in Ethiopia are soils with their physical and chemical characteristics / properties.

The nature of soils exerts major influence in determining the feasibility of land uses and composition of natural communities (plants, animals, etc.) of an area or site. Therefore, a study on the physical and chemical conditions, structure, composition, and overall characteristics/properties of soils is necessary for land use planning. Soil physical and chemical properties data are collected through soil survey activities.

Soil survey is a process of measuring the extent, characteristics and properties of soils at a site or location of an area under study. Properties that would be measured during soils survey include:

- physical and chemical characteristics;
- Classified Soil types based on property data into defined units/types;
- Boundaries of units mapped and located on large sheets of papers; and
- Predicted suitability of types for various uses (crops, grazing, forestry, construction, etc.).

The knowledge of soils conditions is indispensable inputs for undertaking studies of the past and present land uses as well as for prediction of future use potentials.

Detail information on soils of Ethiopia is very scanty. The existing soil inventory map, which covers the whole country, is available at a scale of 1:2,000,000 produced by the Land Use Planning and Regulatory Department of the MoA (1984) and 1: 250, 000 scales for Basins Master Plans studied by Ministry of Water Resources (MoWR).

Detail/large scale soils study data are also available as prepared for areas of research stations, state farms, investors' farms, and specific project and development areas, etc. This secondary information is so important to help assist participatory land use development planning.

According to the MoA Soils map (1984), there are 18 dominant soils associations in Ethiopia. Their variability is also very high. This is attributed to the diversifying nature of climate, topography, parent material, time, and biological attributes such as vegetation, land use and activities of organisms in the soil. Major characteristics and extents of these soils can be referred from FAO/MoA study conducted in 1984.

Land use planning options mainly depend on characteristics and qualities of soils such as texture, rooting depth, stoniness, rockiness, organic matter content, nutrient status, physical structures, drainage conditions, slope, etc.

Added to that, farmers through their long years of experiences categorize characteristics of different soils of their localities in their own ways and can describe them. They also determine their potentials and constraints. In order to develop a participatory local level sustainable land use plan, a planning team has to be well acquainted with land users' categorization of characteristics, limitations and potentials of soils for different land uses.

Soils in Ethiopia are highly eroded due to steep slopes, cutting of the vegetation cover, overgrazing and poor management practices. The fertility statuses of most of the soils have declined due to erosion, high nutrient exploitation, and little or no return of nutrients (for instance burning of dung cakes and crop residues).

Box 2: Soils

- In order to design a sustainable local level land use plan, the topography, soil types, slope and the soil qualities and characteristics of any development area must be studied, classified, analyzed and understood.
- Soils of half of the highlands in Ethiopia are severely eroded to the extent that they cannot support crop and animal production (the highland reclamation study, 1986).
- The dominant soils in Ethiopia are: Cambisols (11.6%), Fluvisols (8.3%), Leptosols (17%), Nitisols (12.2%), Regosols (10.9%), and Vertisols (10%) (FAO/MoA, 1984). But when it comes to local level planning areas, detail surveys must be carried out.
- The poor and shallow soils i.e. Regosols, Leptosols and Cambisols occupy about 40% percent of the country's land area. These soils require special attention and management to make them sustainably productive (FAO/MoA, 1984).

1.1.4 Water and Hydrological Cycle

Water is an essential resource required for drinking by human beings and animals, and for irrigation and navigation by human beings and plants to perpetuate, grow and produce. The quality and quantity of available water determines the type of land use options and land utilization types we can think of full irrigation, supplementary irrigation, and rain-fed.

The known sources of water are lakes, rivers, ponds, and springs, well (shallow and deep), and overall rain. The availability and accessibility of water resources in an area determines sustainability and the types of land uses that can be implemented.

In areas where water is scarce and evapo-transpiration is high, we should look into the possibilities of water harvesting techniques during rainy periods. In Ethiopia, a lot of water is flowing away in the form of overland flow/runoff during wet seasons. To collect this water, farmers need to be trained in different techniques of water harvesting (CBPWSDG, 2005). Water could be collected in ponds, dams, and reservoirs for different uses. Roof catchments could also be used as one of the techniques of water collection/harvesting. Sustainability of a land use is highly influenced by availability and unavailability of water. In our country, and in the world as well, good soils of some areas/sites do not produce crops mainly due to shortage and lack of rain and /or water/moisture. There is no synchronization of resources at places especially between land and water.

Hydrological cycle is concerned with studies of water balance in the soils and on the surface. Water and soils are on the one hand stable resources on which all land use must be based. On the other hand, they to some extent be manipulated and adopted to human being’s requirements.

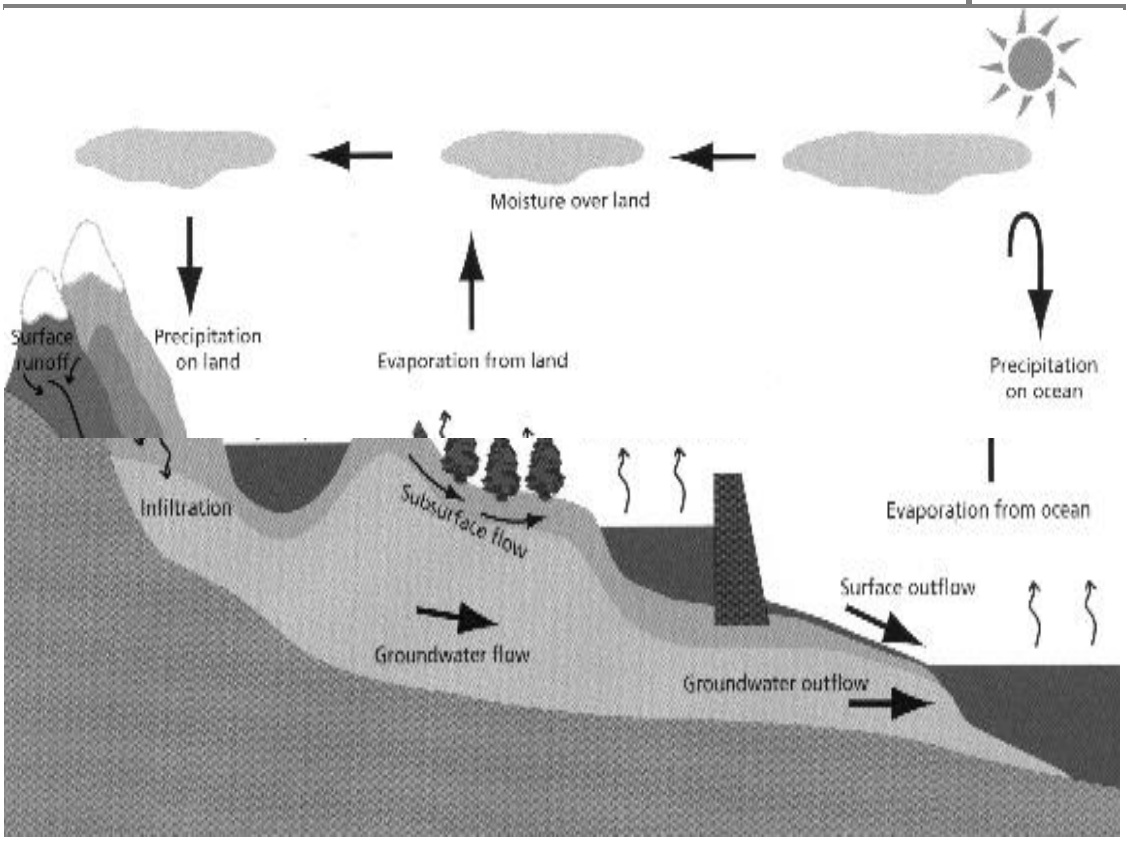

Figure 3 Hydrological Cycle

1.2 Land Use Planning

Land use planning is a process of decision making on the use of the resources of a certain unit of land for options of more productive, environmentally sound, and sustainable economic uses. Decisions on options of land uses are always made based on analysis of potentials and constraints of the land resources guided by the needs of the communities, the government development policies and laws of land uses and land resources management and conservation. Land users, other concerned stakeholders, technicians and decision makers engage in the process of local level participatory land use planning (ILLPLUP) so as to make the decision demand oriented i.e. in terms of infrastructures including market and roads, land users choices and land management, land administration and resource conservation needs, and available budget allocation for implementation of the plan.

The processes of land use planning bases on the quality and quantity of the resources and inputs available for improvement of livelihoods and the environment. Thus, decision making processes will take place on the basis of the knowledge of the land resources by all participating bodies and/or stakeholders. Facts on the existing conditions and or prevailing problems and potentials of land resources will be obtained from primary and secondary sources by working together with land users.

Land users being the main actors and the ones facing the impact of changes in land use planning and resource management and conservation have to play the leading role in identifying problems, solutions and alternative potential uses. Technicians should recognize and accept that land users have accumulated knowledge for classifying their

land resources by type and judging their problems and potentials to open an avenue for technical decisions and mutual agreement on options of suitable land uses.

Primary data can be collected through ground surveys and by holding discussions with communities, focus groups, key informants while secondary data are collected from documents of previous studies, aerial photographs including Ortho photos, satellite imageries/Google map and any archives existing in relevant Woreda, KA and DAs offices and from any other sources.

A land use plan should not only improve the livelihoods of the existing community but also meet the resources development and administration needs of the future generation. In the process of participatory land use planning the participating planers should identify simple techniques, procedures and instruments of planning to improve economic benefits of the land and social infrastructures. Accessibility, market, health facilities and types of outputs are important aspects of the plan those should be considered and agreed ahead of planning.

Participants of local level land use planning must base themselves on clear understanding of extents, quantities, and qualities of the land resources such as climate, current land use, socioeconomic situations; rural development policies, programs and laws, farming systems, land types by slope, soils, crops, livestock and national strategies of development. Added to that, data on water, landform and current land cover and use are important aspects of the process that can be collected by combining PRA techniques and straight sources/archives.

Excellence of a local level participatory land use plan will be mirrored by the quality of the planning team composition/stakeholders and the data quality collected and used by the team. Participatory land use planning should also be guided by goal and objectives. They emanate from understanding of problems and constraints of the resources and development demands of the community and environmental management requirements of the planning unit.

Community level land use plans and/or local level land use plans are always participatory where the land user and stakeholders play major roles in the process. Technicians provide technical support, and play the role of facilitations, reminding and advising while the community makes decisions on choices and what should be produced on a certain unit of land recognized by the planning team.

Important in ILLPLUP is to identify and map the planning unit, identify problems and discuss them in-depth, identifying optional solutions and potentials of a certain land unit and make decisions on its future use, inputs required to overcome the problems and determine the costs of improvement, and inputs that can remove the problems and decide what should be more productive on that unit of land. Land use options should confirm sustainability though it could be flexible based on demands of markets and the community needs.

1.3 Land Capability Classification Approach

Land capability classification is a simplified method of land use planning developed by the United States Department of Agriculture (USDA) in 1930s. It is simple and easy to use and unsophisticated to apply. The method focuses on inventory of major characteristics of

landforms, land use and soil physical properties. In order to have more accurate ILLPLUP, the team can use climatic data such as rainfall, temperature and LGP for enhanced accuracy.

The major data required to employ the method are: classes of slope, soil depth, past erosion status or class, soil texture, soil infiltration rate, and stoniness of a land unit. To embark on this easy classification method, mapping units can be determined by drawing boundaries following slope brakes on topographic maps, large scale APs and or using GPS or PRA mapping techniques for drawing Sketches of land forms.

As stated above, the land capability classification method is much simpler and more general. The advantage is that it can be carried out by Woreda and or Kebele staff and Kebele extension workers after a short training. In this system, land is often classified in eight classes according to its degree of limitation for a number of general land-use categories. These categories may be: annual crops (maize, sorghum, teff, wheat, sweet potatoes, etc.), semi-perennial and perennial crops (banana, enset, coffee, etc.), pasture, forestry, and nature reserve (no significant utilization recommended). The limitations may refer to: topography (slope, past and existing erosion), soils (soil depth, texture), stoniness, nutrient availability, salinity/toxicity (presence of salt/heavy metals, etc.), drainage, flooding risks), climate (rainfall classes, temperature, etc.).

Kebele Development Agents for instance may, together with some land users, categorize the lands in a Kebele into mapping units, based on the severity of the possible limitations and recommended uses. For instance, when considering the slope as limitation for cultivation of annual crops, there may be no limitation for it on flat land; little limitations on gentle slopes, which can be corrected with moderate soil conservation measures, such as contour ridges, and severe limitations on steep lands, which may not enable sustainable and economic viable use for annual crops.

1.4 Socioeconomic Resources

1.4.1 Socio Economic Data Collection

Socio-economic data is so important for preparation of participatory land use planning in order to make the plan social, economic and ecological problems solving and changing livelihoods of the community. Socio economic data can be collected from different agro-climatic zones as problems vary and relate to different ecosystems being influenced mainly by temperature and moisture conditions.

The common agro-climatic zones prevailing in Ethiopia are Bereha, Kolla, Weinadega, Dega and Wurch (Figure 5.1). Socioeconomic data can also be collected from secondary sources such as previous study documents, Woreda Agriculture Office, KA administration, and DAs archives. Primary data can also be collected through focus group discussions, random sampling and questionnaire surveys and discussions. Instruments are checklists & questionnaires. The amount of data that need to be collected should be limited by the expert and the team depending on the problems of the society in a definite planning unit.

1.4.2 Farming Systems

Farming systems are relationships of farming activities with the environment that mainly depends on climate and social interest of the community. Climate influences the type of crops to be grown and the community chooses crops based on tastes/flavor, food value, and production capacity per unit area. On the other hand, the farmer likes to keep animals based on their services, market and food value, resistance to diseases, availability of feed

and climatic condition. The farming system thus can separately deals with homestead farming and field level farming of a certain climatic zone.

1.4.3 Demography

It is highly important to know the population structure by age group and density of a planning unit area in undertaking a local level land use planning. The data is required to plan the area of land required for cropping, livestock keeping, forestry etc. Moreover, it is necessary to determine the level, facilities and capacities of schools; health facilities and supply of clean water available in the area. The data can be collected from secondary and primary sources.

1.4.4 Livestock pattern

This information is also important to determine land area required to feed the livestock and fit the feed resources available from crop residues to the livestock. Carrying capacity of the planning unit feed resources can be determined by the production capacity of the land and requirements of the livestock. It also helps to know the livestock products and uses obtained for livelihood of the community

1.4.5 Availability of Animal Power

In the Ethiopian farming systems, oxen power is the most important animal power to cultivate and/or plow the land and thresh crops after harvest. In some highland areas horse power is also important in a farming system. Thus census data on availability of oxen power per each household is so important to undertake crop production and use the land at optimum level. The ratio of availability of oxen pair to cultivable land per household and available feed is so essential for planning and determination of interventions.

1.4.6 Availability of Land

Livelihood in rural Ethiopia is mainly based on availability of land for cropping, livestock rearing, settlement/homestead, tree planting etc. Land holding per family is an important data that need to be known to determine the amount of crops, livestock, and wood to be produced per household and plan the management practices that have to be incurred during planning per each family land holdings and regulations to be set while issuance of land use right certificate and use right and obligation map.

Other data required for socioeconomic inputs during preparation of local level participatory land use planning can be specified and collected by the respective participating professional expert. Example of socio economic data formats are presented in Box 3.

Box 3 Steps in socioeconomic data collection

Preparatory work:

- Undertake preliminary field visit to identify major problems and major agro-ecological zones
- Prepare agro-ecological zones boundary in the planning area
- Determine data collection methods(FGD, questionnaire or KII}
- Determine sampling or census sites
- Prepare checklist for FGD and/ or structured questionnaires
- Determine number of samples based on household number
- Recruit and train enumerators
- Undertake test data collections using questionnaires
- Review documents, identify missing issues and document findings to fill gaps

Field Survey:

- administer questionnaires and checklists survey
- filter and clean questionnaires and checklist data

Post fieldwork:

- organize, classify and compress data
- undertake data and information analysis
- use findings for land use planning
- undertake land use planning

1.4.7 Data Collection Methods

Socio-economic data including land use problems can be collected using different approaches and tools. Secondary data can be accessed from Woreda and Kebele offices. For primary data collection, a number of tools can be considered, assessed, selected and used depending on the land use plan objectives and data needs.

1.4.7.1 Categorizing the Wealth of Farming Communities

The purpose of wealth ranking is to categorize the micro-watershed and Kebele community members into different wealth categories. This categorization allows selecting representative farm households. Wealth ranking can be done by studying the criteria that are used by community. Raking can be done also by using gravel to proportionately divide them into different wealth categories.

Follow these steps:

- To do wealth ranking first ask participants to list the wealth ranking criteria they locally use (such as land holding size, no of owned oxen, etc.);
- Then ask discussants consensus how many categories are existing among the community; and
- Give them, for example 10 seeds or equal-sized gravels, which represent households and ask them to divide these seeds or gravels into the agreed wealth categories proportionately.

1.4.7.2 Stakeholder and Problem Analysis – OOPP

Objective Oriented Project Planning (OOPP) is one of the tools to design a project in a participatory manner. By discussing the problems and possible solutions, the participants can come to a mutual understanding of each other's points of view. Once some form of consensus is reached, these problems are organized into a logical sequence. Subsequently, they are reformulated into objectives to be attained. Based on a number of criteria, a part of the objectives is selected to be the focus of the project, i.e. the selected strategy. Subsequently, these objectives are translated into a Project Planning Matrix or Logical Framework. This planning matrix describes the objectives at different levels, referred to as Overall Objective (Goal), Purpose, Outputs, and Activities.

Table 2 Logical Framework

Objective Link	OVI	MoV	Assumptions
Goal (General Objective): *Improved Nutritional Situation*			
Purpose: *Improved Crop Production*	Put SMART indicators	Indicate sources of information for verification	
Output : *Improved soil fertility*			

Objective Link	OVI	MoV	Assumptions
Activities: *To organize extension system*	Inputs:		
		Preconditions	Woreda Supported Plan

Logical framework is a 4X4 matrix used for a systematic planning procedure for complete project cycle management. It is developed in response to poor planning and monitoring of development projects. It is advisable to construct log frame after completing the design of Problem Tree and Objective Tree. Column wise, log frame contains Objective Link, Objectively Verifiable Indicators (OVI), Means of Verification (MoV), and Assumptions, whereas horizontally it has Goal, Purpose, Output, and Inputs. Hypothetic examples for Problem Tree and Objective Tree are given below; Figure 4b and Figure 4c.

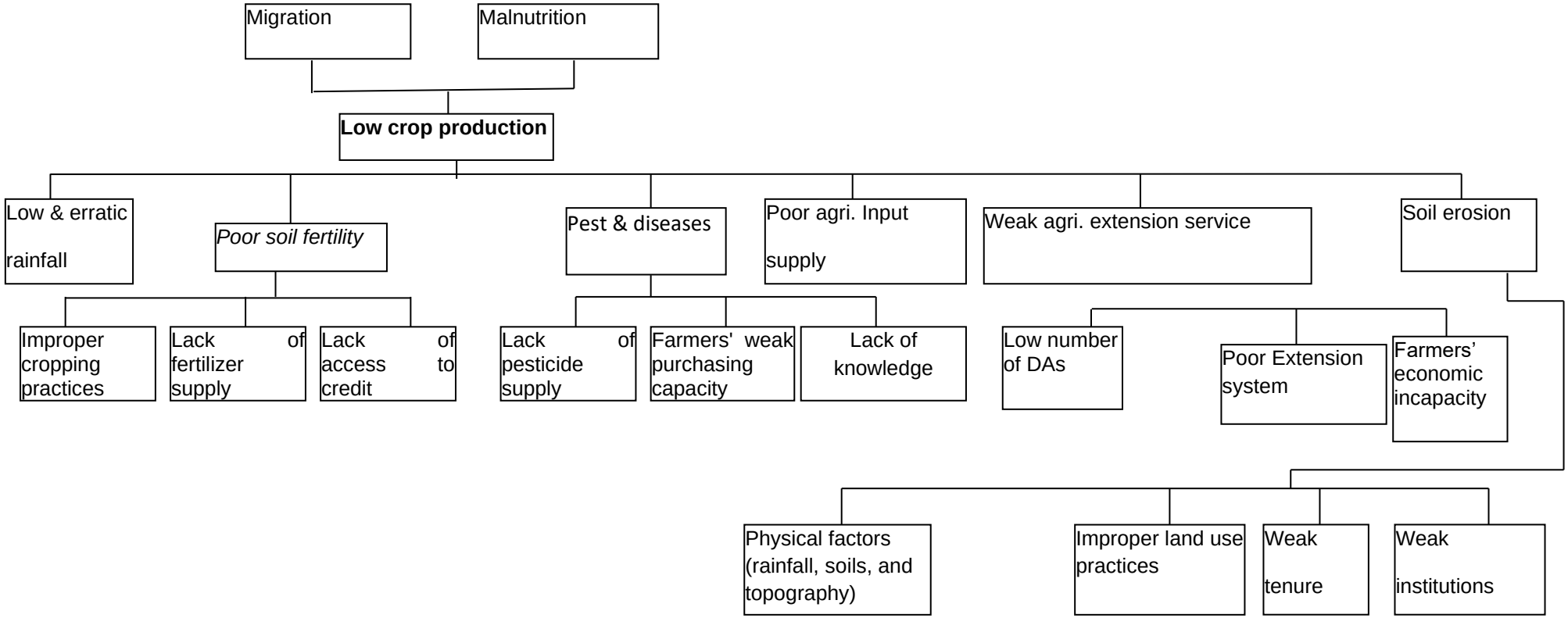

Figure 4b Problem Tree

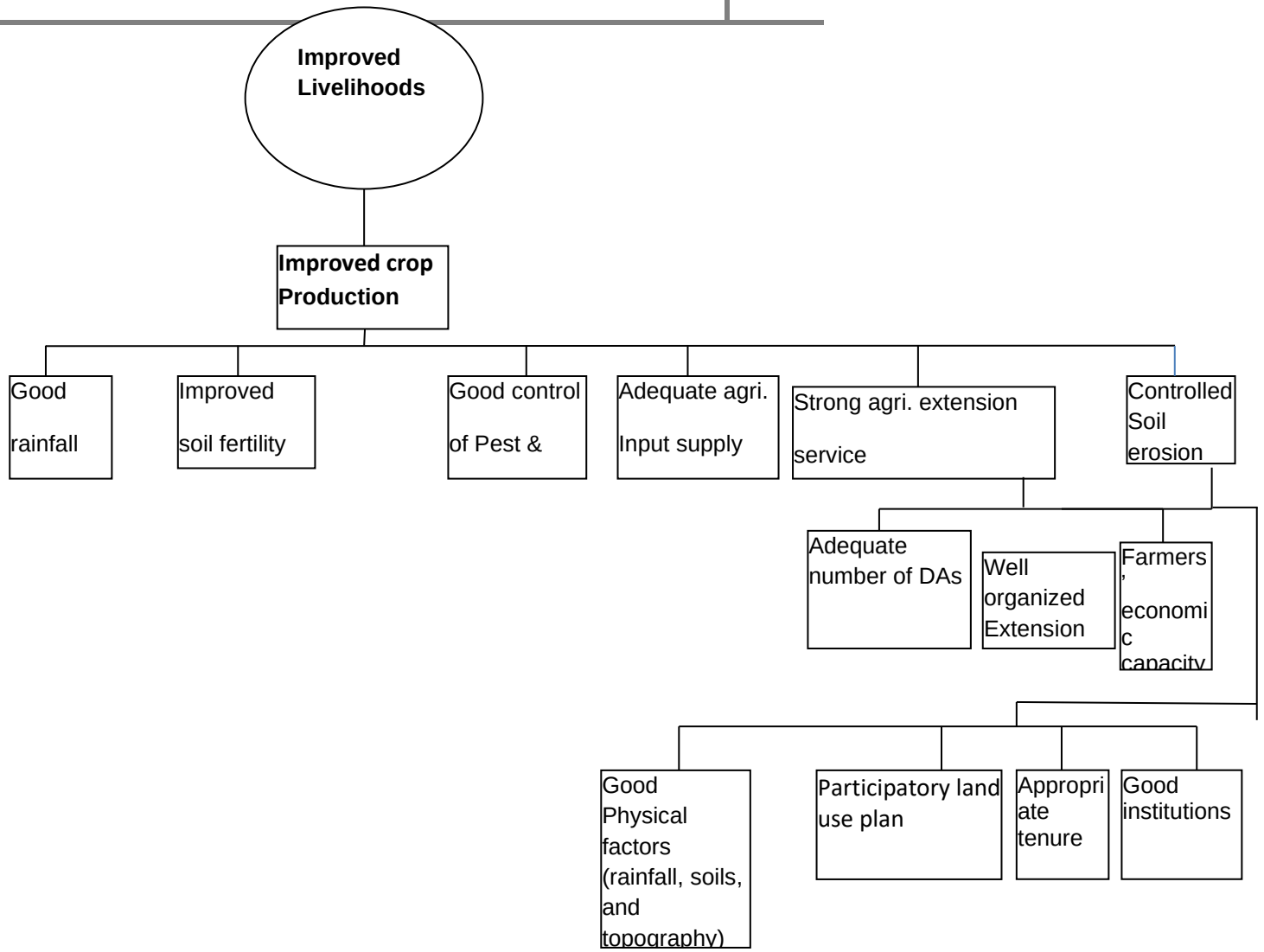

Figure 4$_c$ Objective Tree

1.5 Important Technical Packages

Natural resources and socio-economic data for ILLPLUP can be collected from primary and secondary sources with assimilation and simple tools of the PRA and remote sensing methods and tools. The following are simple and easily implementable techniques after short training.

1.5.1 Aerial Photographs

If Local level participatory land use planning team can establish access to acquire remote sensing data base such as large scale Aerial Photographs (> 1: 10,000) and Ortho photo from Ethiopian Mapping Agency (EMA), the team can use them as first hand data sources. Data acquisition from these sources requires technical capacity to do interpretation, annotation and mapping. Supporting instruments required to use these data sources are mirror and pocket stereoscopes. Topographic maps larger or equal to 1: 50, 000 scales are also good sources of physical and social information. Large scale data bases can also be interpreted visually.

Aerial Photographs are prior results of Remote Sensing. Small scales Aerial Photographs (AP) provide general information than large scale photographs. Large scale AP and Ortho-photos taken from low flights are detail & useful to undertake visual interpretation with land users, though it is more appropriate to use Stereoscopes to study properties of objects registered by seeing three dimensional views and where they exist in the terrain system.

Large scale photographs assist to recognize, differentiate and see objects (land cover types, soils, vegetation, etc.) with stakeholders on the photo and compare them with similar objects on the ground and to see where they are situated during assessment. The quality of APs data will be affected by weather and irregular terrain conditions. Rugged terrain and cloudy, misty and rainy weather during flights cause distortions. In general, the central portions of aerial photographs contain reliable information than outside of a match line area. Photo elements that help assist aerial photo interpretation are: size, shape, shadow, tone /color, texture, pattern, site, association etc. to identify land cover types and other elements.

Table 3 Application of Photointerpretation Elements to Photo Interpretation

Land Features	**Photo Interpretation Elements**						
	Tone	**Size**	**Shape**	**Texture**	**Pattern**	**Location**	**Association**
Built-up area	Dark bluish, green, & bluish	Small to big	Irregular, Disconti-nuous	Coarse & mottled	Clustered to scattered	Plains, hills, slopes, valleys,	By agriculture lands, rivers, road & rail
Crop land	Bright red to red	Varying in size	Regular to irregular	Medium to smooth	Contiguous	High relief	Amidst irrigated
Forest area	Bright red to dark red	Varying in size	Irregular	Smooth to medium	Contiguous to Non-contiguous	Plain lands	High relief
Gullied land	Light yellow to bluish yellow	Varying in size	Irregular, Broken	Very coarse	Dendrite to Sub-dendritic	Stream	Plain lands

Tone: Each distinguishable from white to black.

Texture: Arrangement and frequency of tonal variation (visual smoothness or coarseness).
Shape: It refers to the outline of an object. Numerous components of the environment can be identified with reasonable certainty merely by their shape or form.
Size: Size is a function of scale. Size can be relative to other objects or in absolute terms.
Pattern: Spatial arrangement of visibly discernible objects. An orderly repetition of similar tones and textures produce a distinctive and recognizable pattern.
Site or Association: Features in proximity to the target of interest.

1.5.2 Topographic Maps

Technicians who will be involved in the planning process need to be able to read topographic maps. If the planning team knows the coordinates of its Woreda, Kebele or watershed can order the required scale map from Ethiopian Mapping Agency to derive the required information and delineate the boundary of its planning and land units at the initial stage of the work.

Topographic maps contain information on land forms, contours, rivers, roads, settlements, land use distribution and vegetation cover, names of prominent features, streams, springs, developed water sources, low and high spots etc. Moreover topographic maps can help calculate slopes, draw cross sections, delineate micro-watersheds by identifying water divides, and prepare base map for transferring annotated data from AP and PRA surveys.

1.5.3 Ortho photo

In comparison to topographic maps, orthophoto maps, provide a large amount of detail visible information, which is not present on the topographic map of the same area. It provides an excellent means of communicating spatial information among those involved in planning process, especially to the farmers and enables them to quickly adapt to the abstract concept of map.

On the other, however, the orthophoto lacks the details on the elevation of land marks and do not have contours shown on them. Therefore, it is important to extract this information from the topographic map and superimpose the same on to the orthophoto maps.

1.5.4 Participatory Rural Appraisal

The Participatory Rural Appraisal (PRA) survey method encompasses different simple and quick tools of data & information acquisition by natural resource and socioeconomic experts, communities and other stakeholders. The primary tool in the participatory land use planning exercise is resource and social mapping of the planning unit area; the second: transect walk; the third: Venn diagram; the fourth: discussion and interviewing at various stages and the fifth ranking. Though there are more PRA techniques and tools, the ones mentioned above are adequate for quick and simple local level participatory land use planning.

1.6 Natural Resource and Social mapping

The tool can be applied by the planning team at one go or independently for social and natural information mapping. Via employing this method subject matter specialists of the planning team and stakeholders other than the community play facilitation, listening and recording role. Social maps and natural resource maps can be drawn separately or together. At the beginning of the exercise facilitators introduce the objective of mapping to participants; leads the community elected map drawer how to start and go ahead with

mapping the natural resources of the community and social infrastructures of the planning unit.

The mapping activity will begin by drawing the planning unit boundary, roads, footpaths, rivers, settlements, water sources such as springs, ponds and wells; schools, health posts, clinics and health stations; grain mills, markets, land cover types, naming neighboring Kebeles and or micro-watersheds on selected and agreed flat ground.

Mapping units and linear features will be identified, delineated and annotated with materials available in the surrounding area such as pebbles, sand, straws, leaves and ash or seeds. The map drawn on the ground will be copied by the note takers and listeners/observers of the team at the end of the exercise. The community and the map drawers discuss on the appropriateness of the boundary of units, annotated features and positions of social infrastructures in order to correct and adjust them as they appear on the ground as per agreements reached by the community or its representatives.

Maps drawn by the community do not provide the exact size of units and accurate boundaries and do not specify scale of the map. However, they are good foundations for knowing the existing planning units, initiate questions by outsider participants and experts, enable the participating stakeholders to recognize different problems through discussions appearing in each unit and to discuss alternative solutions for correcting the problems and setting appropriate land use solutions and land management techniques.

Exact boundary of units can be delineated by the planning team on large scale aerial photographs, satellite imagery and topographic maps to compare and appreciate the communities' knowledge of their resources and the problems associating with them. The scale can be adjusted using one of the above remote sensing data bases. Discussion on these maps can help appreciate the work by the planning team especially by land users' representatives.

The map drawn by the community being base for field survey, the planning team can collect adequate/Just enough data and information through transect walk discussions, ranking and using Venn diagram. These methods are simple, strong and appropriate to get clear pictures of the existing land use related problems, potentials of different units for different uses, social problems, and limiting factors for improvement of land uses as per felt needs of the community.

Box 4 : Optional Steps in Participatory Resource and Social Mapping

- Contact DAS & the Kebele administration
- Organize a planning team and plan of action
- Take appointment for undertaking the task
- Remind the appointment
- Discuss and agree on the objective of the planning based on socioeconomic and resource problems
- Assemble the planning team
- Elect facilitator and note takers from the planning
- Select a clean ground to undertake social and resource mapping
- Collect recognizable materials for delineation of units, sites of social infrastructures and natural features
- Elect a sketch map drawer from the community representatives
- Ask the map drawer to delineate the boundary of the planning unit with a stick

discussing with the community members representatives

- Agree with all community members on the boundary
- Ask the map drawer to draw rivers, roads, footpaths, settlements, springs, wells, mills, schools, etc. falling in their planning unit (one by one)
- Ask the map drawer to draw land cover/ land use types
- Ask all the community representatives to dialogue and agree on units boundaries
- Mark unit boundaries and line representations with available local and easily recognizable materials
- Develop legend and naming with symbols preferred by the community
- Mark north arrow
- Indicate adjacent/ neighboring planning units/Kebeles
- Compare the community map with the Map drawn on aerial photographs, topographic maps with the community representatives, etc. if available
- Ask observers and note takers to transfer and sketch the map on papers
- Identify and draw transect walk routs on a map
- Assign data collection groups of natural resources and social and economic aspects during transect walk with the community representatives
- Use appropriate PRA tools during data collection
- Record data on prepared checklist or sketch cross-sections
- Undertake data analysis and ranking
- Undertake land use options identification and ranking for each unit of land
- Prepare land use plan
- Prepare bylaw
- Prepare action plan
- Present the plan to the community
- Incorporate community comments and submit the plan including appropriate interventions for implementation

Figure 5 Participatory Social and Resource Mapping

1.6.1 Transect Walk

Transect walk routes can be distinguished by the planning team in such a way that it helps assist to visit and pick information from different agro-ecological, physiographic, soils and land cover units of the social and natural resource map. Since transect walks capture cross section of the representative landscapes, and mapping units, the shape could be straight, diagonal, zigzag, comb or circular depending on the nature and distributions of different mapping units in the planning unit. Useful information that would be collected through transect walk are existing land management practices, crops planted in different units, major cover types as related with slope and elevation, major land use problems of different mapping units, soil texture, drainage, slope class, depth, structure, color and stoniness and rockiness.

Availability and unavailability of social structures and resources needed for development must also be recorded. During transect walk, knowledgeable community representatives can be asked to discuss problems, potentials and constraints of development as related to each subject such as livestock development, crop development, soils development, natural vegetation development, degraded land management, introducing new crops and

breeds, introducing grazing land management techniques, and on the required changes of current land use patterns, etc.

1.6.2 Venn Diagrams

Venn diagrams help assist in identifying important institutions involved in the development of the society's livelihoods. Specific to this context are the endeavors of local level participatory land use planning and development of the respective resources.

The closest institution to the society representation circle is the most useful and relatively the farthest is less useful though all are important. This can be shown by placing circles representing each institution on a flat and clean ground as closeness and distance from the community.

Figure 4.3 shows the relationship levels of different institutions to the community. Wide overlaps show more closeness and helping each other in any of the development activities. Such a relationship can easily be illustrated by the community representatives, if hint is given by the planning team how it will be done. Office of Agriculture deals equally with the Kebele administration and religious organizations as they are organized to serve the people in agricultural development activities and religious matters. Since religious organizations have close ties with the society; it is wise involving them in development planning as they have significant say in the community.

On the other hand, the overlap between Kebele administration and Office of Agriculture will not be that wide because, the Kebele administration is more close to the DAs office which is working very closely with the community. Religious organizations have less ties or overlap with the DAs office because development activities are mostly done with the community which is closer to the DAs.

RO represents religious organization in the Venn diagram (Figure 6). Thus, the circle represents all religious organizations that could be available in a planning area. The purpose is to represent all religious organizations that could be available in a planning area. It should equally represent Mosque, Catholic Church, Orthodox Church and all other Christian churches as are relevant to any planning unit area. There should not be any unfairness to give priority to any religious organization; rather all should be equally part and parcel of the planning team.

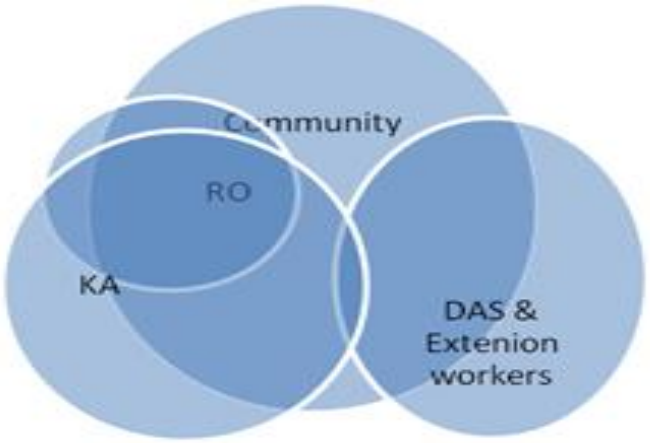

Figure 6 Venn diagram Showing Interrelationships among Different Organizations

1.6.3 Discussion with Representative or Delegates of the Community

Discussion with farmers is one of the best methods of data and information collection during field investigation of a local level participatory land use planning. The method can be applied by all member stakeholders of the planning team as felt interests relate to inputs required by the team. Information can be collected through this technique using the resource and social maps as a base to identify problems as related to subjects of social, economics, infrastructures, land use, soils properties, land management, landholding & land administration issues, forest management and utilization, grazing land or communal land utilization and degradation issues, etc. The technique can also be implemented during field visits/transect walk, focus group discussions and secondary data collection from various sources.

1.6.4 Ranking

It is a technique of systematically arranging problems, constraints, development options and social wealth statuses of a community member etc. as have been investigated. The technique help assist in identifying and arranging issues that have to be given priority orders from top to zero level as per the community needs during planning. These could include priority orders of land use options and problems.

Pair wise ranking is one of the techniques that gives chance to see how many times one of the issues is selected by the community representatives and its order of rank of all. The other way of identifying priority orders of issues is by giving equal chance of scoring to each issue and recognizing the issue given high score by adding the score given by different evaluators. This must be done by the community representatives with free actions. Other stakeholders observe record and appreciate the result.

1.6.5 Biophysical Data Collection

Biophysical survey involves the assessment and inventory of climate, vegetation, soils, crops, livestock, land use, drainage conditions, water resources, infrastructures, past and present watershed development activities, and trends in land degradation (soils, vegetation, water, etc.) to determine the potentials and constraints which can be used for analysis and determination of alternative and sustainable land management practices and land uses for each land unit.

The task starts by preparation of a base map, and then land capability map.

Important natural resources data that have to be collected from a planning unit area of different land units or mapping units for the purpose of local level participatory land use planning should be determined by the planning team at the beginning of the task. Identification of relevant data and information will be based on preliminary area visit recognition of major land and socioeconomic problems and potentials in the planning unit area. This should be followed by preparation of relevant formats or checklists.

1.6.6 Agro-ecological/Agro-Climatic Zones Identification

Agro-ecological or agro-climatic information of a certain planning unit can be collected from existing thematic maps or by asking farmers in which traditional agro- climatic zone unit is situated. Added to that, an experienced expert can differentiate the traditional agro-climatic zones of a mapping unit by searching indicator plants if available and/or judging

the environment. The data collection form, Box 5, can be used to record the agro-climatic zones of a specific mapping unit and detail characteristics of ACZs are shown on Table 4.

Box 5 How to Collect Agro Climatic Information

- Carefully Look at the surrounding area of the planning unit
- Note if there are different levels of landscapes in terms of height/altitude
- Ask the participating farmers if the different landscapes make differences in warmness and coldness
- Ask again if each one make differences in crop types, vegetation composition and farming practices
- Ask and record what they are called in local climatic zone terms
- If you have GPS or Altimeter read and record the altitude and X Y coordinates

Table 4 Detail Characteristics of ACZ

ACZ	Location	Altitude in	Temp ^{0}c	MARF in mm	PET in mm	LGP in days	Vegetation
Bereha	Danakil depression, eastern plains of Ogaden	<500 asl	>27.5	<200	>2000	Not reliable	Scattered low shrubs
Kolla	Northern part of the rift valley, eastern part of Hararghe; central part of Bale; southern part of Gamogofa & Keffa	500-1500	25-27.5	In most areas <700 and in the western part 700-1200	1500-2000	Not reliable in most areas and <50 in some areas; in the western part: 90-200	Variable vegetation types; vegetation density and type increases with increase in moisture; steppe in dry areas and open woodland, Savannah woodland, deciduous woodland, evergreen woodland and lowland forest
Weina-dega	Eastern escarpment, most of the Chercher highlands, the western mid highlands	1500-2300	18-25	In most areas 1000-1500 & and some spots 2000	1300-1800	Marginal in some areas with 90; most areas with 90-200 & in southwest > 2000	Mostly evergreen woodland; lowland forest; highland forest; and mountain woodland; acacia, croton, Podocarpus and Juniperus are common trees
Dega	Most of the central highlands; small part of Chercher highland; parts of bale & Arsi highlands	2300-3200	10-17.5	700-1500	1000-1500	90 – 200 & in small areas >200	Mountain woodland, mountain Savannah and Alpine vegetation; that consist of Festuca sp., Erica sp., Hagenia abyssinica, Juniperus Sp.
Wurch	High altitude areas like Bale & Semein	>3200	< 10	1200-1500	< 1200	90-200	Alpine vegetation consisting of Lobelia sp., Festuca sp., Erica sp.,

ACZ	Location	Altitude in	Temp ^{0}c	MARF in mm	PET in mm	LGP in days	Vegetation
	mountains; the Plateaux of Gojam, Shewa & Arsi						and Helichrisum.

Agro ecological/climatic zones widely determine types of crops to be grown, types of livestock to be reared, types of vegetation, and types of physical and biological land management practices to be applied. The relationship of agro-climatic zones and altitude is illustrated on Table 4. Since the amount of RF and the degree of temperature determine Agro-climatic zones, data can be collected from the nearest stations (not far from 80 Km but closer) with relatively homogeneous terrain and/ or can be acquired from records of National Meteorological Agency (NMA) for available nearest distance stations of similar AEZ.

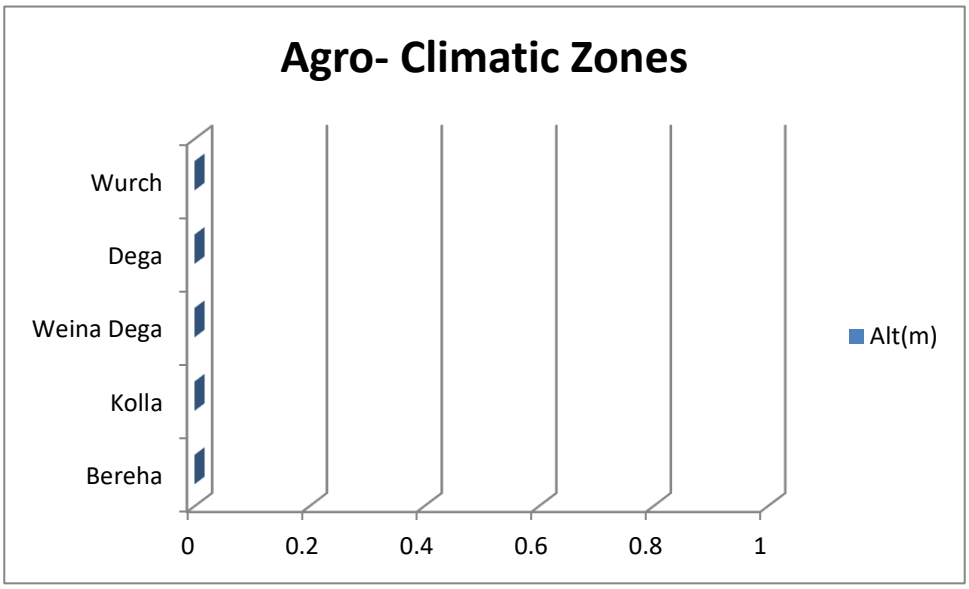

Figure 7 Vertical Positions of Agro-climatic Zones

1.6.7 Land Use and Vegetation

It is a simplified and plane representation of geographical features that can be easily read as a book and is important tool in ILLPLUP.

Study on land use and vegetation begins mainly from review of existing maps, documents and pre-field interpretation of recent aerial photographs and satellite imagery. To analyze land cover and land use, aerial photographs not older than 5 years are preferable. If not available old photographs can be used with intention of careful field verifications. Land cover of a certain area constituted different land uses that can be revealed during field survey or based on accumulated knowledge of the area by the interpreter.

For local level participatory land use planning, data on existing land cover, land use and vegetation can be availed from large scale aerial photographs and Ortho-photos with visual interpretation by involving the planning team members to distinguish differences of mapping units based on characteristics of photo elements. If the two data bases are absent interpretation can be made on topographic maps by traveling around the planning unit to sketch the units. The other options are delineating the units using GPS or mapping the units by community representatives on clean ground and copying on a piece of paper/flip chart using the PRA tool.

The land cover and vegetation map can serve to describe and analyze the existing land cover types. It also helps assist to distinguish land use problems associating with each mapping units during field survey. The present land uses associating with land cover and vegetation types are the activities of human beings on the land and its resources to fulfill their living needs in a given period of time.

The common and major land cover types that can be distinguished in an area could be all of the following or some of them depending on the nature of the landforms and needs of the community. Subdivisions can be made if need arises and when there is technical capacity.

- Built-up area
- Cultivated land
- Forest
- Woodland
- Bush land
- Shrub land
- Grassland
- Marsh land
- Rock outcrop
- Bare land including sandy surface; and
- Water body

1.6.7.1 Vegetation

In this unit, land cover types of different physiognomic vegetation types including plantations, water body and bare surface can be categorized. The vegetation category includes different % levels of associations and strata of trees, woods, bushes, and grasses. These may be recognized during interpretation and field verifications in a planning area. Vegetation in a planning unit area may compose of natural and manmade or planted species.

Vegetation is a collective name to all plants managed by man or naturally perpetuated. Vegetation in general has ecological values that interrelate with soils, climate, geology and water and economic benefits. Their economic benefits include food, medicinal, fuel energy, construction, conservation and aesthetic values. Livelihood without vegetation is very difficult in the World.

The following descriptions shown on Table 5.10 are the main categories of vegetation types that could be recognized and delineated during interpretations and field verifications. The expert can also record species, height and density of species and their uses using the techniques he acquired from regular studies.

Land uses of a definite land cover unit area can be discovered during field surveys and /or interpreted if the interpreter is knowledgeable about the planning unit area and had previous experience in the region, zone, Woreda and Kebele land use patterns. The land uses of a certain land cover unit could be one of the following or an association of two or more.

- Perennial crops cultivation;
- Annual crops cultivation;
- Grazing and browsing
- Grazing
- Wood collection
- Nature conservation
- Forestation
- Area closure
- Cut and carry, etc.

The crop types grown, species of vegetation and the livestock composition and can be determined during field survey on a format or checklist with their density and quantity respectively. Other land uses like wildlife existing in a mapping unit can also be recorded by a surveyor.

Box 6: Steps In land cover and land use mapping

Pre-field Work:

- Collect data bases; (enlarged AP and Topographic maps)
- Delineate the land cover units on aerial photographs or sketch the units using GPS; or sketch the units using the PRA resource mapping tool;
- Prepare code and legend for the mapping units;
- Transfer the units and legend to a base map;
- Prepare preliminary land cover/land use map

Field Survey:

- Undertake field survey to verify units and boundaries and legend;
- Collect any relevant land use and land management information from units or representative units as related to slope breaks;
- Collect relevant vegetation and land use data from units or representative units

Post Field Work:

- Compile, compress and analyze the land cover and land use data
- Transfer compressed and analyzed field data and boundaries to finalize land cover and land use map and build final legend;
- Prepare land use plan by integrating: land form, soils, socio-economic and environmental information
- Prepare implementation and action plans and bylaws;
- Submit the plan to the community/land users, and Woreda steering committee for approval;
- Follow- up Implementation of the plan and bylaws.

1.6.8 Management Interventions

Interventions to improve the productivity of a definite land unit depends on the problems relating to climate, soils, vegetation cover, land use and wrong measures undertaken in the past. It is believed that by controlling the processes of erosion resulting from de-vegetation, overgrazing, trampling, over cultivation, steep slopes and intensity of rainfall can be controlled by undertaking appropriate measures that overcome the problems and ameliorate the land.

Application of the physical and biological soil and water conservation measures in the agreed units of the participatory land use plan must be based on the techniques and work norms given in the Community Based Participatory Watershed Development Guideline prepared by MoARD in 2005. This guideline must be used side by side with this manual during planning.

The watershed concept as presented in the guideline is “any surface area from which runoff resulting from rain is collected and drained through a common confluence point”. Thus hydro-logically it is defined as an area from which runoff drains through a particular point in a drainage system. A watershed is made up of the natural resources in the basin like water, soil, and vegetative factors. At socioeconomic level a watershed includes people, their farming systems including livestock, and interactions with land resources, coping strategies, social and economic activities.

Table 9 on the other hand provides work norms that help assist in calculating costs of development for recommended interventions. Cost per unit area can be based on regional daily wage rates. The norms are taken from CBWSDG in order to create quick identification of norms during planning.

Table 5 Work Norm for Different Land Development Activities

SN	Management intervention	Measurement	Person Days
1	Level soil Bunds	Km	150/Km
2	Stone Bunds	Km	250/Km

SN	Management intervention	Measurement	Person Days
3	Stone Faced Soil Bunds	Km	250/Km
4	Level Fanya Juu	Km	200/Km
5	Bench Terrace	Km	500/Km
6	Hillside Terraces	Km	250/km
7	Waterways(vegetative and stone paved)	M3	1/m3 vegetative water way 0.75/m3 earth & stone
8	Cut off drain	M3	1/0.7m3
9	Graded Soil Bunds	Km	150/Km
10	Graded Fanya Juu	Km	200/km
11	Area Closure	Ha	4/ha/year
12	Micro-basins	number	1/5 Micro-basins
13	Eyebrow basins	birr	2 birr/person day
14	Micro trenches	meter	1/3 met
15	Stone Check dams	M3	1/0.5 m3
16	Community road	Km	3000/Km-6000/km depending on standard and terrain conditions

Source: CBPWDG, 2005