Guidelines for the Preparation of Agricultural Development Plan in SSI schemes

Contents

1. Introduction

The current agricultural system in the new schemes is commonly practicing an extensive rain-fed agriculture, which is prone to weather shocks, attract limited inputs, guided by low-input low-output principles, and prone to food insecurity and environmental degradation.

The agricultural development plan, which will be part of the feasibility study, will form a base for sustainable irrigated agriculture development in the proposed small scale irrigation schemes for the community to attaining food self-sufficiency of the local people , get additional income and fulfilling the dietary need of the farmers through diversify the crops production system and application of improved irrigated agriculture technology and agronomic practices, soil fertility and integrated pest management (IPM) within the farming system of the irrigation schemes.

Designing an integrated scheme development plan for irrigated Agriculture will strengthen the agricultural service in SSI and MI schemes.

The Woreda experts will guide the planning process with back stopping from regional and Zonal experts of the respective bureaus of agriculture and, cooperatives and water.

Each scheme is expected to include a detailed and step-wise agricultural development plan in the command area. This would be tailored to the agro-climatic conditions of the area, the farm sizes involved, marketing conditions, local priorities of communities and Woreda and the level of food insecurity among participants.

2. Objectives of the Agricultural development plan

The main objective of development of Agricultural plan is to identify the basic constraints through the detailed assessment of the existing agricultural practice and design a suitable agronomic practice. Besides, the following specific objectives are targeted in the study.

- To propose most appropriate cropping pattern and cropping calendar for irrigated schemes;
- To identify effective crop, soil and irrigation water management practices suitable for project area;
- To identify potential crops with high yield and promising economic return which ensure food security;
- To identify appropriate and effective agricultural support services that facilitate the Small Scale Irrigation agriculture and post-harvest interventions;

3. Major Methodologies of Data Collection and Planning

There are several techniques of data collection in irrigation agronomy.

Focus Group Discussion (FGD): requires the preparation of checklist for the intended focus group. The preparation of the checklist will be performed in close collaboration with the beneficiaries, stakeholders and clients.

Agricultural survey including household survey: Stratified random sampling must be used to select the target group and households for discussion. The sampled population can be classified in to a strata of economic status (poor, rich), age (youth, old), sex (male, female), education (literate, illiterate) ... etc. The size of the sample depends on the homogeneity of the population, farming system, soils, agro-climatic zones, ethnic complexity ... etc.). Before conducting the survey, the questionnaires and the checklists have to be pre-tested.

Experience exchange and discussion: discussion and interviewing with stalk holders at National, Regional, zonal woreda level, NGOS, PA leaders etc. would help in getting information's and past experiences of similar development and activities.

Secondary data collection: secondary data collection and review from official documents, publications, previous studies, annual reports, census reports, survey documents ... etc.

Direct field observation: looking for and assessment of firsthand information on the potentials, constraints and opportunities for development, the ongoing agricultural practices ... etc.

Participatory rural development and management planning (PRDMP): After collection of primary data by PRA and other methods discussed above it is advisable to call the same focus group or other as found convenient to consult and prepare an agricultural development plan and options.

4.Planning Tools and Procedures

Proper agricultural development planning depends on human element. Agricultural planning starts from the bottom and involves beneficiaries at all level. The basic elements included in the agricultural development planning process are agronomy, soil fertility, and livestock and related farmers livelihood investigation. Therefore, it is important that the different sectors involved interact and combine their skill with that of the community to come up with realistic and integrated plan: capitalizing on the local knowledge. The point is, however, approaches that can ensure this participatory process. Experiences show that there are multitudes of participatory planning tools, if carefully followed that can yield good results. The following table indicates different participatory tools that can be applied in participatory agricultural development planning for irrigation of different scales.

Examples of participatory tools for agricultural development planning are given below.

Name of the Tool	10 ha	100 to 250 ha
Transect walk	1X with group of 3-5 farmers	2X with group of 3-5 farmers
Irrigation system map	1Xwith group of five to 7 farmers	2Xwith group of 5-7 farmers
Crop rotation &seasonal calendar	With five individual farmers	With 15 individual farmers
Cost benefit analysis	For two major crops 5 farmers per crop	For 4 major crops (5 farmers per crop)
Organizational analysis	For the whole scheme	For the whole scheme
Rapid gender based differences analysis	1X with group of women beneficiaries	1 or 2X with group of women beneficiaries depending on number
Semi structured interview	1X	1X
Constraint ranking	2X with male and female group of 5-7 farmers)	3X with (group of 5-7 farmers) near head, middle, tail & females
Multi criteria analysis	1Xwith group of 5-7 farmers	2X with group of 5-7 farmers
Action plan formulation	1X with farmers &1X with local officials	2X with farmers&1X with local officials

5.Steps in Agricultural Development Plan Planning

a/ Select participants involved in the planning:-

Agricultural development planning will be the tasks of the DAs, Woreda and Regional experts. A participatory agricultural development planning requires the involvement and commitments of various disciplines. With this perspective, there should be a team of expertise comprising of (but not limited to):

- ✓ Irrigation agronomist responsible for overall team leadership and also addressing irrigation agronomic and related components ;
- ✓ Soil and land evaluation expert who can handle soil survey, land use land cover, soil and water conservation and household energy issues;
- ✓ Socio-economist who can handle land use and administration issues and land redistribution issues; socioeconomic issues, cost benefit analysis; developing scenarios in cooperation with other expertise; and
- ✓ Community facilitation expert who will contribute to the sensitization of the community at different level, situation analysis to establish FRG, identification of the sources of different seed (in collaboration with agronomist) and also handles marketing issues;

b/Preparatory Phase

The preparatory work will involve:

- Mapping of the scheme area with clear indication of watershed and command area component (1:50,000 Topographic map);
- Identifying administrative units within the catchments and also identify if the command area is within one or more administrative units such as Kebele, Woreda and Regions (1:50,000 Topographic map)
- Identifying accessibility in dry and rainy season using the topo-maps and information gathered;
- Organizing materials that will assist for initial field observation and field survey (e.g. GPS, altimeter, clinometers etc);
- Prepare check list for collecting primary and secondary data
- Reviewing, thoroughly, literature related to the project sites; and
- Identify tasks for DAs for the successive project related activities.

C/Conduct data collection using the methodologies of data collection

d/ Preparation of first draft agricultural development plan

e/ Review and comment on the draft report

f/ Preparation of final report

6. Datato be collected during feasibility study and prepare Agricultural development plan

6.1 Farming system of the command area

Farming systems show considerable variety, and are differentiated by how production is organized, by the nature of technologies employed, and by the types of crops and livestock

produced. Technical, institutional, and human factors affect the type of agricultural system. In turn it determines the type of farming systems adopted in the area to sustain the livelihood of the community. It is helping to identify the potential crops in a given farming system and precipitation conditions. Therefore, it is important that agricultural development planning includes detailed analysis of farming system and agricultural practices of the project areas; example of some types of farming systems: cereals highland mixed farming system, lowland mixed agriculture, pastoral/ agro-pastoral farming system,the horticulture complex farming system and Commercial farming system:

6.2 Agro-ecological characteristics of the command area

Agro-ecological characteristics of the given area determine the agricultural practice, type of crops grown, potentials and crop growing factors. Therefore the agronomist needs to give considerable attention in identifying and characterizing the agro-ecology of the project area. it helps to identify typical constraints associated with environment, agriculture and land use systems for given agro-ecology and helps to draw workable development strategies, which will enable planners to take advantage of the development opportunities.

6.3 Length of growing period

It defines as “the total number of days per annum with sufficient available moisture for crop growth” the growing period analysis is based on a simple water balance, using rainfall, potential evapo-transpiration and soil moisture storage capacity

The length of growing period could give a highlight about the potential crops and varieties to be considered to develop crop basket for the given area. Further the main constraints related to the agricultural development could be identified that can indicate the area that need more attention and intensive data assessments.

6.4 Agro Climate data from near metrological station

Crop water requirement is one of the critical data requirements for irrigation scheduling. Therefore, it is recommended to collect agro-climatic parameters (Rainfall, temperature, relative humidity and sun shine hours)at different time limits that could be daily, decade and monthly from near meteorological station of the command area; to establish cropping/intensity; investigation of soil water plant relationship for each crop; to estimate reference (crop) water requirement; to estimate crop water requirement; project irrigation interval;

6.5 Topographic feature of the command area

In irrigation agronomy, the topographic feature data could give valuable information determining the type of irrigation system, crops, agricultural activities and other interventions. Description of the topographic features of the project area should be undertaken to determine the type of irrigation system and corresponding suitable crops. For instance, the land with slopes of ≤ 3%, ≤

16% and ≤ 8% are taken as limited requirement for surface, sprinkler and drip irrigation systems respectively.

6.6 Existing settlement patterns and land holding of the beneficiaries

Experiences indicated that existing settlement patterns and size of holding have direct impact on development of irrigation as they have implications on irrigation water scheduling, land redistribution and distribution of water between the farms. Therefore it is important that the agricultural development plan considers analysis of the existing settlement patterns;

6.7 Soil and land suitability of the command area

Irrigation Agronomy takes the feasibility study of soil survey study data especially soil physical and chemical properties of the command area for computing of selection and development of appropriate cropping pattern for the proposed small scale irrigation schemes

6.8Existing Agricultural practices (rainfall and irrigation) of command area

Analysis of existing agricultural practices must be one of important elements in agricultural development planning. This may include: land preparation, seed bed preparation, planting methods and date of planting, transplanting (if any especially for horticultural crops), thinning and pruning, irrigation (if there is traditional irrigation), application of fertilizer and/or manure, weeding time and methods, cultivation, disease and pest control, crop rotation and cover crops, harvesting, threshing and winnowing, transport, storage (types of storage facilities used, storage capacity, storage disease and pests including cares to be taken), marketing and prices and harvest residues management etc.

Assessment of the existing irrigation activities in the project area and in the wereda is essential to share the experience to combat the problems have been encountered during implementation. Major issues to be considered in experience sharing are:

- Type of crops grown under traditional and modern irrigation schemes;
- Production and yield per hectare;
- Type of inputs utilized and specify the crop varieties
- Number of beneficiaries
- Beneficiary attitude to the irrigated agriculture intervention
- Constraints and measures taken to resolve the problems

Pest is one of the major causes of postharvest loses of the harvested product. Therefore, agricultural planning has to take into consideration pest problems, which might occur in the field as well at the postharvest in the storage. Methodologies for scouting and identification of weeds, diseases, pests, rodents, storage disease and pests and corresponding control measures have to be planned by an irrigation agronomist.

6.9 Accesses and availability of Agricultural inputs in the command area

The discussions should be focused on essential agricultural inputs including fertilizer, seed, agro-chemicals and farm labor (draught and human labour). The data could be collected from kebele development center and wereda agricultural office. The input utilization experiences are very important to identify the appropriateness of the inputs to be proposed for the project and to identify the skill gaps need to be addressed for implementation. Usually the smallholders are applying fertilizer lower than the recommended rates and this trend should be improved through training. In order to assess the level of input utilization in the given area the following issues need to be considered:

- Type of fertilizer utilized and rate of application
- Type of seeds sown and varieties adopted to the area
- Type of agro-chemicals applied in the project area and surroundings
- Labor allocation by activities per hectare
- If the farmers around the project area are experienced in using of machineries then the agricultural activities, machineries and rental costs per hectare information should be collected from the farmers or development agents

6.10 The current constraints in Agricultural development (rainfall and irrigated)

It's a priority task of the agronomist to identify and analyze the constraints of the agricultural production system in the project area to come-up with tangible and effective recommendations. The constraints intend to be either of agronomic, social, institutional and environmental. Most importantly, if the area has experienced in irrigation agriculture, the agronomist should give more focus on investigation of constraints limiting the crop production in irrigated farming system.

6.11 Existing extension services, research and farmers linkages

- the current extension services,

- extension methods and approach,

- available irrigation technologies,

- skill and knowledge gap of the Development agent and the farmers

- linkage among research, extension and farmers in the command area, and

- best practices has to be identified.

Farmers' research Groups (FREGs) research focus areas must be indicated in the agricultural development plan and this will be further discussed with the community.

6.12 Issues in Farmers' Livelihood Analysis

The socioeconomic condition and farmers livelihood strategies are directly linked to the agricultural planning. A good example, in this case, could be availability of labor and off farm activities in the project areas. This has strong implication for types of crop to be considered in the cropping pattern. Thus, it is suggested that the agricultural planning considers the following points:

- Characterize the household profile including: land holding (irrigable and rain fed) total, and percentage changes in last 10 years, main sources of livelihood (farming and non-farming) man/woman headed, farm family size, age structure, level of education;
- Leased and shared cropped land, titles to land and water, fragmentation, social contexts, land sales, land prices;
- Examine village settlement pattern (along the road), with house gardens, cluster, isolated, etc;
- Identify potential marketing and production problems such as seed, fertilizer, credit, pests and diseases and communicate this information to the agronomist;
- Investigate existing sources of income and employment opportunities (e.g. on and off the farm);
- Propose mechanisms and modality for irrigable land redistribution (if required);
- Identify storage, processing and marketing facilities in the project areas;
- Identify informal and formal (e.g. community based) institutions such as cooperatives, farmer associations, other joint or group activities, changes over time and also comment on how those institution can support the intervention process and outcomes;
- Identify farm labor, employment, wage rates, systems of wage payment, changes over time;
- Investigate prices of major produce, their temporal and spatial variations, data on price differentials between local and major markets;
- Costs of all inputs, yields and value of produce and estimate profitability of the intervention. Note that this exercise can be linked to scenario analysis indicated in agronomy section;
- Develop clear picture on the disadvantaged groups and mechanisms of engaging them in the different components (e.g. water harvesting and home garden development etc…).

6.13 Development Opportunities for Irrigated Agriculture

The main purpose of identifying the potentials and opportunities of the project area is to support the process of determining the type of crops to be proposed for irrigated agriculture. The selection of the crops should be based on agronomic, social and institutional potentials of the area, besides the existing and future opportunities need to be taken into consideration for the success of the project.

6.14 Assessment of Development Strategy for Irrigated Agriculture

Identifying the local project level development strategy or the means to achieve the goals of the project will help the agronomist to concentrate on appropriate and potential crops. As an option the following development strategies are briefed for consideration, but there could be a number of options that the experts could develop from the project area context, and they should be consistent to the national long-term development strategies. Specialization, Cropdiversification, Domestic market oriented, Exportoriented,Crop-livestock mixed,Supply for agro-processing andCombined options

Agricultural development scenarios and options should give the choice of possible crop mix and farming enterprise available. Justifications for those scenarios and options have to be in place and finally the most promising development options must be selected;

6.15 Proposed future agricultural development plan

Before the start of the selection of potential crops for the irrigated agriculture, list of a range of crops growing in the project area should be prepared. The crop basket not necessarily include only the list of crops currently growing in the project area rather based on the agro-climatic and soil conditions all possible crops could be incorporated in the crop lists. Because there are potential and suitable crops

After the identification of suitable crops those could be grown in the given agro-ecology and farming systems, the next step is screening the most appropriate crops meet the objective of the projects. The selection criteria should be set to make more appropriate list of crops, further briefing is required why the crops are incorporated in the cropping pattern. This information will give a highlight for implementers to use the products accordingly for desirable purposes.

6.16. Crop selection criteria and selection process

6.16.1 Selection of proposed cropping pattern

In crop planning for irrigation, it is necessary to identify all types of potential crops, which can possibly grow in the project area (from climate, soil, and environmental aspects to make a wide ‘crop basket’;

After having a basket of crops on the desk, the next stage is selection of best crops and establishing of cropping patterns for the proposed irrigation projects. The choice of crops and cropping pattern for a proposed irrigation projects depends on: climate, availability of water both in quantity and quality, type and method of irrigation, socio-economic and policy and strategies, dietary habit and nutritional requirement of the local people;

Once crops have been selected, one or more cropping patterns must be proposed. If conditions are markedly different, in different parts of the project area, the proposal of more than one cropping pattern may be justified;

The cropping pattern has to be divided into dry season and wet season in areas where there is marked rainfall exists. All cropping patterns may be for irrigation or there may be a combination of irrigation on one part of the project and improved rain fed cropping on another. The cropping patterns must clearly show what crops are grown, cropping intensity and percentage of each crop grown, when it is planted and when it is harvested;

The smallholders would have two major objectives to carry out irrigation agriculture on their plots of land; attaining the food demand of the family members is the primary objective, while growing cash crops to generate household income is the second important objective. In some cases, irrigation projects planned to attain maximum return by growing only cash crops in both supplementary and full irrigation cropping seasons. Under small-scale irrigation the crops selection should taking into account the optimum utilization of water, land and labor to attain the objective of the project.

Crop selection is a main and determinant process to ensure the sustainable development of irrigation projects, because the overall goals of the irrigation project are screwing to the improvement of crop outputs. Besides all other sector studies are relying on the recommendations of this process. Therefore adequate emphasis and time should be given to crop selection process and in some cases that might need consultation with the study team members for optimum output.

During community consultation and household survey, the preferences of the respondents should be addressed to capture the need of the beneficiaries it must be clear that the expertise should not apply all the proposed crops from the community. The proposal further should analyze from different perspectives to meet the project goals and realize irrigation development.

In the new schemes, the design of the **cropping systems** will follow consecutive steps:

a) Community mapping of the command area to identify fertile and less fertile lands, erosion prone fields from less erosion fields, rain-fed fields from irrigable fields, potential niches for growing trees, forages, fruit trees, communal and private plots for livestock keeping and other related niches;
b) Identify the most important food and market crops from the perspective of communities and local market demands to be integrated into home gardens and command areas. In this case, identification of enterprises should consider the food, feed and market value of the enterprise, its yield response to water and related inputs,

experience and interest of the community for the identified enterprises, water requirement of the enterprise and its adaptability to the environment; and

c) Once the enterprise is identified, experts should locate the source of improved seed locally or from other sources.

If a variety is new to the area, there is a need to establish a demonstration field where communities can learn about the agronomic management and productivity of the crop. If it is a common crop, lead farmers will be encouraged to grow the crop with improved water and nutrient management without going through formal demonstrations. Successful farms should be used as a learning ground for other community members.

Since low soil fertility dictates yield as much as water, there is a need to identify key nutrients limiting crop yield in the area and develop a soil fertility management strategy for the various crops and landscape positions.

6.16.2 Selection criteria

The criteria for selecting the potential crops should follow multidimensional approach to cover various issues. The criteria could categorize into agronomic, social, environmental, cultural, and business sectors to simplify the determination of the selection criteria. Most importantly, the criteria should not be complex to exercise rather need to be simple and sensitive to the desired project objectives. Three measure targets of the criteria are increased crop production, high income generation and restoration of soil fertility.

Accordingly hereby briefed possible criteria are listed and apply where appropriate. Brief explanation is stated to describe the selection factors for better understanding. It is believed that there could be other factors to be consider for better crop identification for specific project areas.

- Agro-climate of the command area
- Length of growing period of the crops growing in the command area
- Potential of the irrigation water source/ availability of water in the area
- Soil type of the command area
- Availability of high yielding variety and other improved inputs in the area
- High market value and potential for export market
- Potential for agro-processing
- Suitability to irrigation technology
- Potential for maintenance of soil fertility
- Growers' preference and experience
- Cropping intensity:
- Recurrent prevalence of pest infestation
- Consumption habit of the community
- Higher crop margin

- Potential for small-scale processing:
- Government policy and development strategies**:**

6.16.3 Farm inputs and support service requirements

Having selected the best crops and adopting a combination of alternative cropping pattern, the next critical step is to identify irrigated farm inputs and support service requirements. This includes estimating quantity required and identifying sources (organic and inorganic fertilizer, seeds, insecticide and herbicides);

6.17 How we could establish different alternative cropping pattern

For this purpose the agronomist in consultation with the economist should calculate indicative crop margin (farm return) for potential crops. Rate of profitability per hectare basis of each crop would be the basis for development of appropriate project farm models. The following relevant development issues could be taken in to consideration to formulate the farm models' cropping patterns suitable for particular irrigation project.

These are:

- Favourable agricultural resource availability to practice the identified farm model; (like climate, land, soils, irrigation water)
- Market opportunities and encouraging price trends in domestic and export markets;
- Suitable policy and development strategy to realize the farm models;
- Farmers experience in implementing the proposed farm models;
- Agricultural input and output demands in the region and the country;
- Readiness of the agricultural offices and community based organizations like Union and Cooperatives (if any) to support the overall agricultural activities of the project; and
- Commercial nature of the farm models and capacity to reimburse the project costs (if the project expected to recover some project costs).

Among the alternative project cropping patterns the beneficiaries can pick one or more based on the market conditions and demand of the commodity. All farm models with different cropping patterns need to be commercial oriented targeting different potential buyers or business partners.

- Crops with highest gross return
- Crops with 2nd rank in their gross return
- Non-perishable annual crop with tropical fruits
- Seed production focused
- Mix of seed production and High value crops (agri-business and agro-processing)
- Crops for agro-processing and export
- Crop production mainly for export market
- Crop production for agro-processing

Applying the farm model approach for cropping pattern development would have many advantages:

- Has flexible nature to adjust according to the dynamics of the production demand;
- Provide numbers of options for the project implementer to choose more appropriate patterns;
- Allows to involve in many agricultural enterprise in collaboration with partners including the private investors, government enterprise, and exporters; and others

6.18. Proposed agronomic practices and crop requirement for selected crops grown under irrigation

What is the need of knowing the farming system for irrigation agronomy study? It is because to develop the knowledge about the agricultural practices and the whole agro-ecosystem experienced in the project area. Maintaining the existing farming system by introducing more advanced and productive crops which is the most reliable and sustainable intervention for the betterment of the beneficiaries and the environment. The experience, constraints, opportunities of the project area and the beneficiaries would be easily identified from general characteristics of the farming system

Since transforming agriculture from extensive cereal farming to intensive market-oriented agriculture demands the creation of a strong local capacity and commitment, there will need to be a detailed training plan for communities, farmers, DAs and if necessary, at Woreda level subject matter specialists on knowledge gaps and scheme priorities.

The plan will also include the identification of all necessary production inputs, their source of supply and a schedule for their delivery to coincide with seasonal considerations and proposed scheme completion dates.

The Agricultural Plan will include estimates of the current production levels in the command area for each enterprise and of the increases in production that can be expected from its implementation under improved irrigated conditions.

The plan will include detailed cost estimates and identification of the source of funding for each item – beneficiary or government.

The initial interventions will mainly involve training and capacity building for DAs and Woreda staff in key agricultural disciplines, followed by training of lead farmers across gender, social group, landscape, position and community hierarchy.

Training of communities will be strengthened by active research through establishment and promotion of farmers' research groups.

There is a need to estimate the amount and type of seed required for key new crop enterprises and their potential sources even before the scheme is commenced.

The plan will include the time, space and budget of training farmers in various agricultural disciplines. There is also a need to identify and train local traders who could access market information and create market linkages with nearby towns and beyond. This process will help to establish a feedback mechanism so that farmers produce quality products fulfilling the market demands.

6.19 Yield estimates and assumptions

Yield projection of the project shows the trends of the crop productivity over the project period. The estimation is based on multiple growing factors that determine the crop productivity of the project.

Yield estimate could be determined by considering the proposed interventions and improved growing factors which vary between projects. The initial step is identifying major assumptions to be considered to set the yield at the first cropping year and for further projections.

Some of common assumptions are:

- Current yield under existing cropping system in the project area or similar ecologies to set the first year yield
- Yield potential of suggested crop varieties from research outputs proven on farmer's plot
- Yield obtained by model and progressive farmers.
- Regional and National average yields (can be fro CSA agricultural reports)
- Farmers' experience in irrigated agriculture and their potential to use the proposed agricultural inputs
- The anticipated commitment of the technical support from wereda and kebele agricultural offices
- Comparative advantage of the project area for input distribution and marketing

Intensive follow up and adequate extension service to be undertaken

6.20Computing of crop budget for the scheme

The crop budget shows all input requirements in quantity and value terms with the expected benefits of a given crop per ha. In other words crop budget shows the financial cost of producing on one hectare of land; and the gross and net returns obtained from the production of the respective crops. Net return per hectares is calculated by deducting cost of production from gross return.

The annual based crop budget calculation is presented as follows:

Data required for calculation:

- Labour requirement for each operation per hectare
- Farm machinery cost if the project planned to use tractor drawn machineries
- Oxen-power requirement per hectare
- Rate of inputs application per hectare
- Unit cost of inputs including the human and oxen-power
- Current price of the crop products

6.21. Proposedextension services and linkage among research, extension and farmers within the command area

The irrigation development can be realized with the support of other associated interventions to the main irrigation application and drainage components. It is required to consider the importance of subsidiary development activities those could have a vital role in realization of the irrigation development in any development areas. Then major agricultural supportive services or interventions should be identified and consider during project implementation. In order, to come up with most relevant recommendations, the planning must be consistent with the anticipated and existing limiting factors of irrigated agriculture in the context of the project area.

The identification of the activities required to support the implementation of the irrigated agriculture will be rely on the constraints identified during the field survey considering the future perspective of the project.

Some of the activities are:

- Extension, training on irrigation practices
- Problem identification of extension approaches
- Identifying demonstration subjects based on available irrigation technologies
- Problems in delivering practical training to water users on irrigated farming
- Establishment of demonstration site in the project area
- Improvement of the extension service
- Improving the research-farmers linkage
- Farmers and stakeholders organization and capacity building
- Commercialization and Market linkage

EXTENSION AND RELATED ACTIVITIES

The measure of success of irrigation will be its ability to meet its objectives and targets. Extension supports to achieve it, by.

- Increasing the agricultural returns form irrigated agriculture and thereby increase living standard and alleviate poverty.

- Improving the farmers' capacity to develop agricultural production so that schemes achieve their economic potential.

The achievement of successful schemes and viable project therefore achieved with the beneficiaries and should not end on completion of the irrigation infrastructure. For the farmers to be able to increase the total value of their input, they need not only regular access to markets, credit and on farm inputs but also exposure to technological improvements and an opportunity to learn new skills.

It is necessary to ensure that, the intensity of the extension input developed remains especially high during the first years of cropping as this the time when farmers will need to adapt to the considerable changes in the cropping pattern, increasing intensity and agricultural practices that can be expected with the introduction of irrigated agriculture for the first time.

Therefore, it is important that the extension services are in place and prepared prior to the onset of the irrigation.

POSSIBLE EXTENSION DELIVERY ACTIVITIES.

Below are methods by which extension messages can be delivered to farmers:-

Diagnostic visits: regular visits by extension agents will be carried out on a predetermined date agreed with the farmers (as need arises). The purpose of the visit is to identify farmer's current problem.

On farm practical and demonstration plots: The purpose of these plots is for farmers to practice the skills relevant to a particular crop or land practice and observe the results. Plots will be established with cooperating farmers on a portion of the land that they are themselves planting to the same crop. The advantage of this is that farmers will be aware that the plot has been farmer managed and that any benefits are therefore capable of being replicated on their own farms.

Prior to setting up the demonstration plot, plan would be drown up. This will describe the plot objective, include a sketch and will detail the activities and key observations that are to be carried out. Results will be recorded and cost benefits calculated. Tasks on the plots will be demonstrated where possible with farmer practice. The observable and quantifiable results will make available to other farmers physically and in photographs.

Pilot trials: any agronomic, soil, irrigation and drainage problems anticipated in feasibility and design study should be tested and resolved prior to operation of the project. If there is research station in the project area there is a possibility of integrating the pilot issues in to the existing research program.

Field days: - Field days will be needed when scheme awareness is required of a particular topic or theme and will generally be focused around demonstration plots and successful farmers. The

activity may range, from modest demonstrations with short technical talks, to a campaign with several presenters, audiovisual, aids and displays.

In certain cases, the event will permit the inclusion of some social activities which will usually encourage attendance and help foster community spirit. It also is encouraging to prepare an award for merit jobs.

Farmers meeting: - farmers meeting and making open discussion on different development agendas are a traditional way of disseminating extension messages. Information is often exchanged among farmers, and among IRDA and farmers. Farmers are usually enthusiastic to get on with it the best way they can. This is not appropriate at early time, where new practices are being introduced.

Farmers meetings will play an important role as the discussion forum for seeking opinions and consensus, on programs and future plans, marketing, credit and repayment, farm inputs and provision of services.

Farmers group visits: visits could be arranged when it is of particular advantage for farmers to see and discuss the activities with other farmers or of particular benefit to visit farms, research and field stations.

Audio-cassette tapes and radios: a recorded newsletter, case histories, interviews, made available for circulation to the irrigation schemes and beneficiaries. It is intended that the content should include a mix of technical subjects, timely reminders, women features, music and other agricultural and socio-economic affairs.

Exhibitions and Promotion Fair: concerned agencies have to collaborate to prepare exhibitions of different irrigation schemes and encourage farmers to visit. Each section of the exhibits has to be explained to farmers in a simple, preferably in local language.

Schools and Youth Students: liaison activities with schools should be encouraging, as farmer sons and daughters are the major source of disseminating the information's and skills to their parents. This can be including the practice as in puts in to the classroom subject or facilitate to involve as school project.

Adaptive Research: the irrigation extension agent will only be giving advice and information on proven recommendations. There are occasionally new practices, new crops and varieties, which require testing and experiencing under local (farmers) conditions.

TRAINING OF IRRIGATION EXTENSION STAFF

Training of DA will be aimed at ensuring that all staff are capable of carrying out their duties in a manner which will meet the objectives of the agricultural extension sector. The major functions of extension staff are dissemination of information, advice, training and evaluation and monitoring of its effect. To do this effectively the DAs will have to know or acquire:-

On Planning of **gender sensitive irrigation extension programme and implementation**

- The technical knowledge and skills that have to be transferred to farmers.
- The skills that is necessary to be able to transfer this knowledge and its associated skills.
- An understanding of the working procedures and the organizational skills, necessary to perform the duties effectively and correctly.
- Ability to define gender-sensitive irrigation extension strategies, key features, approaches, functionality, targets and aspects of irrigation extension
- Ability to undertake farmers' information needs assessment for participatory planning
- Sufficient knowledge on irrigation extension planning and implementation to transfer skills to farmers
- Basic understanding on farmers' problem identification
- Ability to organize and maintain documents and timely reporting
- Ability to effectively deliver extension services that matches with irrigation extension guidelines

On demand-led irrigation extension approaches, linkages and coordination.

- Ability to understand monitoring & evaluation of irrigation extension
- Ability to plan and effectively deploy the available resources (pumps, inputs, and other material) in SSI/MI schemes
- Strong communication skills to communicate well with farmers for technology adoption
- ability to operate irrigation equipment
- Ability to manage farmers and resolve water disputes as and when they arise
- Ability to create a sense of trust with farmers
- Ability to understand and take instructions from Woreda extension experts
- Ability to undertake operations and maintenance activities
- Coordination with multiple irrigation service agencies and vendors
- Ability to mobilize resources when required
- Ability to handle complaints of farmers, ensure timely resolution and keep track of complaints

On Capacity Training in Irrigation Extension, demonstration and communication methods,

- Ability to effectively conduct training needs assessment of farmers
- Basic understanding of identification and preparation of training lesson plans (modules)
- Ability to prepare training budget and training handouts for water users
- Capacity/ training techniques skills to run irrigation modular courses
- Strong ability to effectively choose suitable training methods
- Training techniques skills to perform as effective resource trainer
- Knowledge of irrigation drip system, siphons, pumps, geo-membrane and their functions and the ability to ensure that the equipment are properly maintained as per standards
- Good written/ oral communication skills

- Understanding of legal issues associated with the equitable water distribution
- Knowledge and ability to undertake demonstration planning, selection of crop cultivars, demo plots and model farmers and its implementation strategies
- Ability to demonstrate MI technologies
- Ability to link farmers with markets
- Need to understand for estimation of demonstration inputs
- Ability to calculate technology adoption rate
- Planning and organization of field days/FFS