Training material for extension advisors in irrigation water management

Volume 3: Extension Learner Guide
Part 9: Agricultural Extension

JB Stevens

TT 541/12

WATER RESEARCH COMMISSION

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Report to the

Water Research Commission

NQF Level 5

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Volume 2: Technical learner guide
Volume 3: Extension learner guide

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Before we start.....

Dear Learner .....this learner Guide contains information to acquire the basic knowledge and skills leading to the unit standard:

Title: Apply the fundamentals in the practice of agric extension as profession

US No: 252463 NQF Level: 5

Title: Develop and implement an extension programme plan

US No: 252476 NQF Level: 5

Title: Establish suitable extension structures in a community

US No: 252478 NQF Level: 5

Title: Facilitate a group to achieve a stated objective or solve a problem

US No: 252477 NQF Level: 5

Title: Plan and implement interventions and opportunities for transfer of technology

US No: 252464 NQF Level: 5

Title: Apply group dynamic principles in order to guide a group towards independence and sustainability

US No: 252469 NQF Level: 5

Title: Plan a farm and select a site

US No: 116324 NQF Level: 5

The full unit standards are available and can be cited on the SAQA website. Read the unit standards at your own time and if there are any questions or aspects that you do not understand, discuss it with your facilitator.

The unit standards are some of the building blocks in the qualification listed below:

Title	ID no	NQF Level	Credits
National Diploma: Plant Production	49010	5	120
National Certificate: Extension	59550	4	120
National Diploma: Extension	63249	5	120
National Land Care Facilitation	49626	5	120

Assessment.....

You will be assessed during the course of the study (formative assessment) through the expected activities that you are expected to do during the course of the study. At the completion of the unit standard, you will be assessed again (summative assessment).

Assessment therefore takes place at different intervals of the learning process and includes various activities - some will be done before commencement of the program, others during the delivery of the program and others after completion of the program.

How to attend to the activities.....

The activities included in the module should be handed in from time to time on request of the facilitator for the following purposes:

- The activities that are included are designed to help gain the necessary skills, knowledge and attitudes that you as the learner needs in order to become competent in this learning module.
- It is important that you complete all the activities and worksheets, as directed in the learner guide and at the time indicated by the facilitator.
- It is important that you ask questions and participate as much as possible in order to be actively involved in the learning experience.
- When you have completed the activities and worksheets, hand it in so that the assessor can mark it and guide you in areas where additional learning might be required.
- Please do not move to the next activity or step in the assessment process until you have received feedback from the assessor.
- The facilitator will identify from time to time additional information to complete. Please complete these activities.
- Important is that all activities, tasks, worksheets which were assessed must be kept as it becomes part of your Portfolio of Evidence for final assessment.

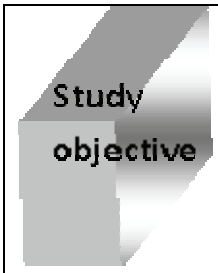
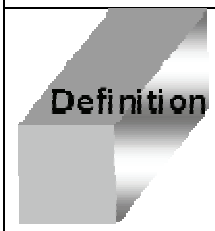
Check your progress.....

Use the following checklist to determine your competency regarding this specific learning module.

Confidence level	**I am sure**	**Still unsure**	**Do not understand and need help**	**Motivate your answer**
Can you identify problems and troubleshoot correctly?				
Are you able to work well in a team?				
Are you able to collect the correct and appropriate information required for decision making?				
Will you be able to perform the observation expected in an organised and systematic way while performing your task as an extensionist?				
Are you able to communicate the information and newly gained knowledge well to experts?				
Can you base your tasks and answers on scientific knowledge that you have learned?				
Are you able to show and perform the activities required in this learning module correctly				
Are you able to link the knowledge, skills and competencies you have learned in this module of learning to specific duties in your job?				

How to use this guide .....

Throughout the learner Guide you will come across certain re-occurring notifications. These notifications each presents a certain aspect of the learning process, containing information, which would help you with the identification and understanding of these aspects. The following will be found in the learning material:

	What are the study objectives for a specific module? This provides an idea of the knowledge, skills and competencies that are envisaged to be
	You will be requested to complete activities, which could either be group or individual activities. Please remember that the completion of these activities is important for the facilitator to assess, as it will become part of your ***Portfolio of Evidence.***
	What does it mean? Each learning field is characterised by unique terminology and concepts. Definitions help to understand these terminology and concepts and to use it correctly. These terminology and concepts are highlighted throughout the learner guide in this manner.

My notes.....

You can use this box to jot down some questions or notes you might have, concepts or words you do not understand, explanations by facilitators or any other remark that will help you to understand the work better.

What are we going to learn?

For each of the learning modules included in this learning area specific learning outcomes were set, which you need to be able to demonstrate a basic knowledge and understanding of.

Contents

Module 1

Principles of agricultural extension

Study objective

After completion of this module, the learner should be able to have a basic understanding of:

- Agriculture and rural development
- What the term "extension" means
- Role of agricultural extension as a knowledge system
- Top-down versus bottom-up approaches of extension delivery
- Agricultural Knowledge Information System and agricultural knowledge triangle
- Role of agricultural extension in rural development
- Principles of agricultural extension delivery
- Main elements of the extension process

Table of contents

Fifty and sixty years ago it took farmers 14 years to adopt an innovation like the use of hybrid seed. Today a farmer usually has only 48-72 hours to make crucial decisions, and this is

where the agricultural extension process and its agents should play a critical role. In this module the concept of rural development and how agricultural development fits into it, various meanings to the concept “extension” as well as the paradigm shift over time regarding the development of the understanding of extension approaches are discussed.

1. Agriculture and rural development[1)]

Agricultural extension is primarily concerned with rural extension and with the livelihoods of farmers and their families. The concept of rural development must therefore be considered with particular reference to agriculture, since agriculture is the basis of the livelihood of most rural families. The last decade in South Africa is earmarked with an increasing emphasis on rural development programmes and projects, and recognition that the development of rural areas is just as important as the building up of urban areas. Poor people living in these areas are depending on agriculture, and because of isolation often have little access to the resources they need to improve their agriculture. Agriculture is also vital for the economy of this country, both of food for rural and the urban population and for the export market, to earn foreign currency. This concern to improve the country’s agricultural base and thus the livelihood of the majority of its inhabitants is usually expressed in terms of programs and projects of rural development. Although agriculture is rightly the most important objective in the development of rural areas, rural development should embrace the non-agricultural aspects of rural life.

The broad nature of rural development is illustrated in the following statement by the United Nations sponsored Second Development Decade in the 1970s:

...rural development embraces the far reaching transformation of the social and economic structures, institutions, relationships and processes in any rural area. It conceives the goals of rural development not simply as agricultural and economic growth in the narrow sense but as balanced social and economic development.”

Rural development is therefore a process of analysis, problem identification and the proposal of relevant solutions to provide and secure the livelihood for rural people. It is clear from this perception of rural development that the problems rural developments programs attempt to solve are not only agricultural in nature, but these programs should also tackle the social and institutional problems found in the rural areas. These problems found in rural areas are related to physical environment of a particular rural area like for instance lack of water, poor quality of irrigation water, etc. Non-physical problems which farmers face are more related to the social and political conditions of the region in which the farmers live like for instance access to land, poor contact with government services, etc.

Activity 1

Group activity

Discuss the potential role that agricultural development could play within the rural development programme of an area of your choice. Elaborate on the potential "spin offs" that agriculture development could have with regard to job creation in the specific area.

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2. Meaning of the concept "agricultural extension"[2)]

Extension, in general terms, is a function that can be applied to various areas of society. It operates in the industrial, health and education sectors, as well as agricultural and rural development. Originally derived from university extension, the term extension is therefore applicable to various areas of development. As Figure 1 illustrates, extension functions in various sectors of society.

Education	Agriculture	Rural Development	Health	Industry
University Extension (Continuing Education)	Agricultural Extension	Rural Development Extension	Health Extension Services	Industrial Extension

Figure 1. Extension as a function in various sectors of society

Agricultural extension is a concept which is open to a wide variety of interpretations. Each extension agent probably has its own understanding of what extension is. The following table shows the words used for and the traditional interpretations of "extension" in some of the countries in the world.

Table 1. Interpretation of the terminology "extension" internationally[3)]

Country	Term	English translation
France	Vulgarisation	Simplify the message for the common man
Spain	Capacitation	To improve people's skills
Germany	Aufklärung Erziehung	Enlightenment Education
The Netherlands	Voorlichting	To light the pathway
South Africa	Voorligting Extension	To light the path way A variety of meanings
Indonesia	Penyuluhan	Lighting the way
United States	Extension education	A form of adult education

The meaning of the French word for extension is much in line with the traditional perception of extension. If the "message" must be "simplified for the common man" as it suggests, it implies:

- Extension does have the answer to farmers problems
- Extension is of a "higher" standing than farmers
- The answers is too difficult for the farmer himself to understand

The Spanish version does not really tell us much, but implies that capacity building should take place and extension should help them to do this. The "Aufklärung" of the Germans could mean to give understanding to, or it could mean to free from prejudice. Both imply that extension knows the answers and understands farmer's problems better than they themselves do. The Dutch term is very similar to the Afrikaans term "Voorligting". To "light the pathway" as well as the very similar Indonesian interpretation of extension implies.

So, the different international interpretations of the term "extension" imply that extension is mainly seen as a function that foster and exchange knowledge between farmers, researchers and extension agents. The outcome of extension in today's parlance would be described as "capacity building in individuals and communities" so that people are more able to deal with issues affecting them and opportunities open to them[3)]. In other word what is clear from above mentioned is that there is no single definition for agricultural extension which is universally accepted to all situations.

3. Agricultural extension as a knowledge system

Traditionally extension got its name from the idea of "extending" agricultural knowledge through a process that has become known as "extension". The use of the word "extension" derives from an educational development in England during the second half of the nineteenth century. Around 1850, discussions began in the two ancient universities of Oxford and Cambridge, about how they could serve the educational needs, near to their homes, of the rapidly growing populations in the industrial, urban area. The agricultural knowledge was assumed to stem from the results of agricultural research. Agricultural extension therefore became known as playing the role of an intermediary, by seeking for results from the agricultural research and then "extending" it to the farmers through appropriate modes of communication**.** Many people still see agricultural extension in this role, which is called "Transfer of Technology" (ToT) or "Top-down".

RESEARCH → EXTENSION → FARMERS

Today this view is regarded as an oversimplification and the equation does not do justice to the dynamics of the extension process. In this approach the extension agent has the power and the farmer none as indicated above, and it implies a one way direction of communication. This is a very narrow interpretation that leans on the notion that extension means "to advise".

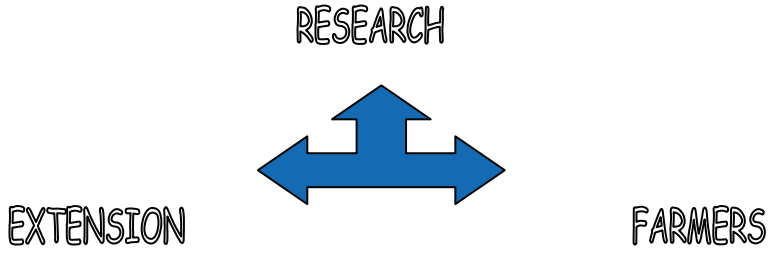
A later interpretation of "extension" builds on the Transfer of Technology view and is as follows:

RESEARCH ⟺ EXTENSION ⟺ FARMERS

This interpretation is an improvement on the previous TOT view in that there is a slight shift in power towards the farmers. In the late 80's this approach changed again with the important aspects of counselling and deliberation included. "To council" means and implies that:

- Two or more people meet in a small group
- The person who acts as the counsellor "helps" the others
- The person who helps usually knows better than the recipients
- Relationships are essentially based on confidence

This has led to the true relationship between agricultural research, extension agent and the farmers expressed as follow:



This approach (bottom-up) implies that agricultural extension operates within a broader knowledge system that includes role players like institutions involved with research and agricultural education (adult learning), farmers, and agribusiness. This collection of role players is referred to as Agriculture Knowledge and Information System (AKIS)[4,5]. The Organisation for Economic Cooperation and Development (OECD) refers to it simply as the Agricultural Knowledge System (AKS). Others describe the three pillars of this system – research, extension and agricultural education – as the *agricultural knowledge triangle* (Figure 2) and suggest that since the three pillars involve complementary investments they should be planned and sequenced as a system rather than as separate entities[6]. The boundaries between extension, research and education are not always clear-cut. For example, participatory extension contains elements of adult education and action research, while participatory research again contains elements of adult education and extension. Linking the triangle's institutions with their common clientele, namely the farmers, and with each other, also requires systematic planning.

The agricultural knowledge and information system (AKIS) is described as a *"set of agricultural organisations and /or persons, and the links and the interactions between them, engaged in such processes as the generation, transformation, transmission, storage, retrieval, integration, diffusion and utilisation of knowledge and information, with the purpose of working synergistically to support decision-making, problem solving and innovation in a given country's agriculture or domain thereof."*[7]

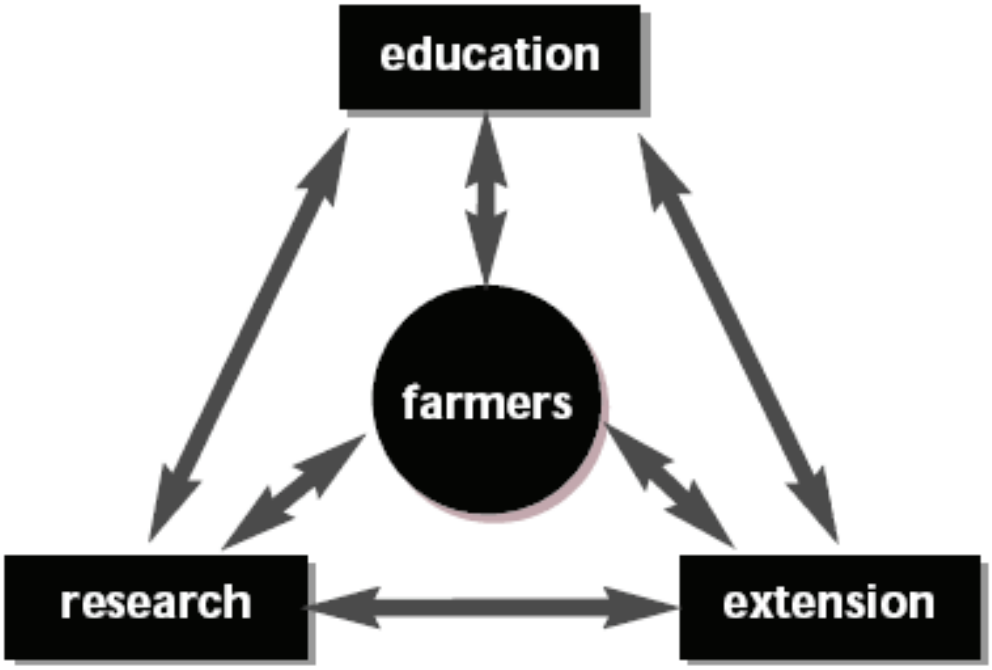


Figure 2. Agricultural Knowledge Triangle[5)]

The agricultural knowledge triangle illustrates that agricultural information systems for rural and agricultural development link people and institutions to promote learning and to generate, share and use agriculture-related technology, knowledge and information. According to the AKIS/RD *Strategic vision and guiding principles* the system integrates farmers, agricultural educators, researchers and extensionists, enabling them to harness knowledge and information from various sources to improve farming and livelihoods[5)]. It has been widely used by the World Bank, FAO and other organizations to guide policy planning and investment in these three areas[8)]. The assumption is that given the opportunity and interactive framework, individuals and communities will, and can, best improve their situation.

It is suggested that the concept and practice of agricultural extension should be redesigned in the developing countries as education for rural development and food security[9)]. Indeed, many needs are rapidly emerging such as trade-related education on agro-health (plant and animal health and food safety), value-added agro-processing, and agro-market competitiveness. These needs arise from the obligations that countries take on as members of the World Trade Organization (WTO) and the increasing urgency to build competitive advantages aimed at global agricultural market niche opportunities. In principle, agricultural extension receives relevant information from the agricultural education system and feeds backfield observations to this system. Extension is also professionally linked to the agricultural vocational and higher education systems (universities) in the sense that these systems also produce the agents who work in extension.

The relationship between agricultural extension and agricultural research is even closer, because the knowledge that agricultural extension transfers is usually generated by agricultural research through applied and adaptive agricultural research development. Within the agricultural sector, however, agricultural extension may be interpreted narrowly or broadly, which complicates the debate[10]:

- In a strict interpretation, the only purpose of agricultural extension is to disseminate information to raise the production and profitability of the farmers (agricultural production performance).
- In a broader interpretation, the purpose of agricultural extension is to advance not alone production knowledge but the whole range of agricultural development tasks, such as credit, supplies, marketing and markets (agricultural process development).
- In the broadest interpretation, agricultural extension provides non-formal – agriculturally related continuing adult education – for multiple audiences: farmers, spouses, youth, community, urban horticulturalists (continuing agricultural education and community development) and for various purposes (including agricultural development, community resource development, group promotion and cooperative organizational development).

In some countries all three of the above interpretations operate, e.g. the U.S. Cooperative Extension System. Such extension systems encourage the empowerment of farmers in various ways, including participation in programme planning and decision-making. By contrast, in many countries (e.g. India, Tunisia, Zimbabwe and Zambia) agricultural extension is linked to agricultural production services. The common points however is that extension are a process which occurs over a period of time, and not a single, one-time activity. Also extension is perceived as an educational process which works with rural people, supports them and prepares them to confront their problems more successfully.

4. Extension principles

Over the many years of practising agricultural extension it became clear that there are non-negotiable principles that underline a specific extension approach applied. The focus point of the extension agent is the farmer, and therefore out of this focus point developed the philosophy of Extension namely:

"Helping farmers to help themselves"

With this in mind, the following non negotiable extension principles should be part of any extension system and organisation providing extension services to farmers and rural dwellers:

1. Extension works with people and not for them	Extension works with people – since only the people themselves can make decisions about the way they will farm or live and extensionists should not try to take these decisions for them.
2. Interrelationship between agricultural development and human development	There is a very important relationship between agricultural development and human development. Several examples exist of failed projects where development failed because both aspects were not addressed on equal level. Capacity development entails the development of humans within the agricultural development field, and therefore requires a balanced approach to these two aspects. It is imperative that specific clear goals be formulised and account given of their achievements through regular evaluation. If a farmer or community is provided with on-farm infrastructure (equipment/starter packs), they need to be empowered to manage it and to take responsibility for the proper utilising, caring, maintaining of it and therefore taking ownership. To bring empowerment in a situation where the beneficiaries do not really feel part, or perceive that their needs are not properly addressed, is difficult. The challenge for extension is to change the attitude of the farmer and community , and the golden rule to bring about change is:
3. Need based development	A development focus based only on felt needs of the client is discouraged – and therefore there should be conciliation between felt and unfelt needs. The conceptualisation (breakdown into causes and effects) of the felt needs to reconcile with unfelt needs is an essential skill required by every extension agent.
4. Extension work with different target groups	Extension recognises that not all farmers in a specific area will have the same problems and needs. Some will have more land than others and will be keen to experiment and try new ideas, while others will have fewer resources, and be probably more cautious.
5. Community participation	Importance of community participation in all aspects of agricultural development cannot be overestimated. An effective linkage structure for purposeful participation and coordination at all levels starting at community/client level is required. No one is better positioned than the extension agent to form these linkages with the farming community. Remember the farmer is the extension agents' object of concern. Furthermore it essential that the extension agent should make sure that he/she has a message to the farmer! The extension agent and his organisation must identify and give recognition to local structures for participation and the forming of linkages. It is the extension agents' responsibility to open up channels of communication and negotiation between structures to improve participation.

6. Extension is accountable to its clients	Extension services and agents have two sets of masters. On the one hand, they are accountable to their senior managers and to the organisation they are representing; on the other hand they are the servant of the rural people. Therefore their responsibilities are to fulfil the needs of the people in the area.
7. Extension is a two way flow between extensionists and farmers	Extensionists are responsible to transfer knowledge and ideas to farmers and their families. This advice is often based upon findings from research stations, but the flow from farmers to extension and research is as important. Extension should create the opportunity for this dialogue between farmers and extension.
8. Behaviour Change	The philosophy of extension –"to help people to help themselves" include the principle of human behaviour change. Community development and extension imply the will and desire to change. Any intervention program applied by extension should take the following principles into account: • Focus on the adoption behaviour regarding the recommended practices and variables like knowledge, needs and perceptions will play a key role • The vision of the program should be clear to all participants • Ensure participation by all stakeholders • Identify and train community members as peer educators to strengthen the team and to build trust and honesty (farmers more prepared to listen to fellow farmers) • Determine beforehand the knowledge, attitude, beliefs of the farmers about a specific problem before addressing of the problem is initiated. Start at a point where he people are currently and take local knowledge into consideration. • An intervention program should consist of a well planned communication and training strategy (with clear and specific goals and objectives) • Qualified and well trained extension agents should oversee the program • Regular monitoring and evaluation of the program is imperative
9. Extension cooperates with other role players and rural development organisations	In the rural area the extensionist should work closely with other organisations and role players that provide a service to farmers and their families. Extension is only one aspect of the many economic, social and political activities that seek to produce change for the better in a rural society.

5. Main elements in the extension process[1)]

Four main elements can be identified within the process of extension:

- Knowledge and skills
- Technical advice and information
- Mobilising farmers into farmer organisations
- Motivation and self confidence

Knowledge and skills	Although farmers have a lot of experience and knowledge about their environment and farming system, extension can bring new knowledge and information which they do not have and require for decision making. The application of such knowledge often means that farmers need to acquire new skills of various kinds (like technical, farm management or organisation skills). The transfer of knowledge and skills to farmers and their families is an important extension activity.
Technical advice and information	Extension should also provide advice and information to assist farmers in making decisions and enable them to take action. Therefore extensionists could provide information about prices, markets, availability of credit and inputs. Technical advice will most probably reflect the production possibilities of the farm and to the action required to improve or sustain this production.
Farmer organisations	Extension should also be able to support and help farmers with mobilising, structure and developing of organisations of local farmers. This should be a joint venture between extension and the farmers.
Motivation and self confidence	It is important for extension to help farmers and their families to take up the initiative and become involved in extension activities. Equally important is help farmers to believe that they can do things for themselves that they are able to make decisions and to break with the poverty trap.

Activity 2

Group activity

1. Why is it important for extensionists to have adequate “technical knowledge”?

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2. What kind of opportunities are provided for you as extensionist to up-scale your technical knowledge and to maintain it?

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My notes.....

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Developer: Joe Stevens **Authenticator:** Dr SE Terblanche

Module 2

The extension advisor or extensionist

Study objective

After completion of this module, the learner should be able to have a basic understanding of:

- Role of the extensionist
- Innovation
- Four areas of knowledge that are required from extensionist
- Personal skills and qualities of an effective extensionist
- Role of extension policy in the delivery of extension
- Extension manager and extension management

The whole extension process is dependent on the extension agent or extensionist, who is a critical element in all the extension activities. The extensionist has to work with people in a variety of different ways. It often requires an intimate relationship and one which requires

much tact and resourcefulness. He is an educated, trained professional working with farmers, many of whom have little formal education and lead a way of life that may quite different from his. Some authors in the field of extension studies are of the opinion that the notion "extension worker" should be replaced with "communication specialist"[6] or "change agent" [7]. In this module we will use the term extensionist and change agent interchangeably, which also reflects that professional identify and organisational environment of the "extension worker or advisor" is changing.

1. Role of the extension advisor

The extensionist is a change agent, who intervenes to bring about change in order to help improve the lives of farmers and their families. This is not an easy task and a series of issues arise from this intervention. There is no model that is applicable to all situations, and an agent must consider each situation individually and adopt a position suitable for the specific situation[8].

When funded by government or donors, extensionists often find themselves in a broker position where they are placed in a difficult position in having to marry, and mediate between, different interests. On the one hand, they are paid by government or a donor, which typically is interested in stimulating a particular policy or type of development, change or innovation like for instance the increasing of cash crop production or strengthening the position of women in agriculture. They have to somehow show they are doing a good job. On the other hand, they have to work and maintain credibility with their immediate clients namely the farmers, who may have totally different priorities. The extensionists are then squeezed in the middle. To illustrate the range of views, a number of different statements on the extensionists' role, taken from extension practices from different parts of the world can be examined[9]:

- The extensionist tries to arouse the farmers to recognise and take an interest in their problems, to overcome these problems, to persuade them to act on the learning, so that they ultimately achieve a sense of satisfaction and pride in their achievements.
- The extension agent is a person whose primary role is to achieve a transformation of attitudes, perceptions, behaviour and social organisation – understands human behaviour.
- A change agent is a person who sets in motion a process of change after realising that certain changes are necessary for the rural society.
- A change agent is an activist/catalyse whose main role is to help people to organise themselves in order to be able to tackle the problems.
- A change agent is a professional who influences the innovation /decision making process in a direction deemed desirable by the change agency.
- Establishment of effective linkages between research and extension, extension and the client and acceptable linkages between input supply and extension.

These statements capture the wide ranging views that exist on the role of extension agent. As an extensionist the skills required can be assembled into two very broad categories namely[8]:

a. Knowledge broker/communicator/innovator: the extensionist is responsible for providing the knowledge and information that will enable a farmer to understand and make a decision about a particular innovation. In this role the extensionists is seen as a vehicle of knowledge, usually of a technical nature, and as a teacher who help farmers to use the knowledge. The extensionist is formally trained for this position and is provided with the technical knowledge and information which he must then communicate to the farmers.

Innovation Different people define and understand the word innovation differently. It can be confusing, all the more so that an "innovation" refers commonly either to the outcome or to the process by which this outcome has been achieved, or to both. Innovations are new and promising ways that specific people (usually referred to as "actors" or "stakeholders") in a specific place come up with for doing things (such as producing a crop, or tending to their animals, or transforming a primary product, or for organizing and exchanging human, material and intellectual resources such as sharing water for irrigation, or accessing communal grazing areas). More generally, innovations can be defined as whatever it requires in technical, organizational and institutional terms for dealing with a problematic or challenging situation (such as fighting against soil degradation, or achieving food security or obtaining more equal terms of trades within a supply-chain)[11].

b. Educator/facilitator/catalysts: in the role of an educator, facilitator or catalyst, which the extensionists may need to perform in the course of his duties, the agent is associated less with knowledge/communication aspect and more with farmers' personal development. The extensionist's role is mainly to help support and actively encourage farmers to develop their own initiatives and to begin to take care of their own problems.

The following key words are often used to describe the role of the extensionist[7,8]. The list is not intended to suggest that an extensionist should be all of these things; it however underlines the importance of the extensionist in the agricultural development process and their important role to play as communicators to stimulate change.

Teacher	Facilitator	Activist	Arbiter
Educator	Broker	Enabler	Advocate
Leader	Consultant	Administrator	Catalyst
Communicator	Intermediary	Organiser	Friend
Motivator	Listener	Provider	Stimulator

The above list shows us the diversity of the roles that the extensionist can play, but the role will depend on the specific situation. It is therefore important that the extensionists should be able to analyse the situation, adopt a position which is relevant for a specific situation.

"Licence to talk..."

More important however is the fact that the extension worker must become part of the community to fulfil any one of the possible roles he/she can and sometimes need to play. To be successful the extensionist needs to receive "citizen ship" from the community, a "passport" to be part of them[10]. "Citizenship and a "passport" is however not yet a "license" to talk or to fulfil any role in the community. "A license can only be earned. How?

i) Be there when they need you
ii) Listen carefully to what they say
iii) Be prepared to dirty your hands in the soil
iv) Take of the white laboratory jacket and put on a working overall
v) Be on time
vi) Be honest
vii) Become a technical expert in at least one field of agriculture.

(More detailed discussion of the roles of extensionists in Module 5: Community development and mentorship)

2. Knowledge and personal skills

With respect to agricultural education, an effective innovation system requires a *cadre* of professionals with a new skill set and mindset. Technical expertise needs to be complemented with functional expertise in (for example) markets, agribusiness, intellectual property law, rural institutions, and rural finance - which will place strong demands on educational systems. Two important issues are the types of knowledge that an extensionists must have, and the personal skills required from him to do the job effectively. There is throughout the world a considerable diversity on these two issues, reflecting the variety of situations in which extensionist work[8,9,10].

a. Knowledge[2,3,7,10]

There are mainly four areas of knowledge that are important for the extensionists and which forms the basis of extension training:

- Technical: the extensionist must be adequately trained in technical aspects of his work and must exist of a good working knowledge of the main elements of the agricultural system in which he is working.

- Rural life: this includes sociological and anthropological studies of the rural area where he is working, local traditions, practices, culture, values and community development.

- Policy: The extensionist should be familiar with the main legislation of government or other institutional policies which affect the rural areas, development programmes, credit programmes and administrative procedures.

- Adult education: Since agricultural extension is an n educational process, the extensionist should be familiar with the main approaches to adult education and group dynamics, the techniques of developing farmer participation and the methods to apply in effective communication.

b. Personal skills [2,7,10)]

It is more challenging to determine the personal skills of effective extensionists, and to train an extension agent in these skills since many of the skills that will be mentioned here cannot be trained. A vast range of skills have been grouped together to present the following list of main areas required from an extensionist:

- Organising and planning: the extensionist should be able to plan the extension work, to organise its implementation and generally to manage and effectively control an extension office and its activities.

- Communication: The extensionists must above all be an effective communicator, both verbally and non-verbally, as this skill is the basis of all extension activity.

- Analysis and diagnosis: the extensionist must be able to have the ability to examine situations which confront him recognise and understand the problem that exists and if possible propose course of action (trouble-shooter),

- Leadership: The extensionists should inspire confidence and trust in the farmers he serves, set them an example and take the lead in initiating activities.

- Initiative: the extensionist may often have to work in isolation and unsupervised. He must therefore have the initiative and confidence to do so without depending upon guidance and support from his superiors.

- Enlist the support of local farmers: seek out and enlist the support of local people who have leadership qualities or influence within the area.

c. Personal qualities [2,3,7,10)]

The personal qualities required of an effective extensionist are those to look for when selecting extensionists. Some of these qualities to look for when selecting extensionists are personal characteristics, which is important to assess whether an extensionist possesses them before appointing him to an extension post:

- Commitment: to extension work and the client, even in rural areas, with a sense of dedication and determination to get some extension activities underway. Commitment can easily outweigh competence, and is probably the major contributing factor to achievement.

- Reliability: both in terms of carrying out extension work and also in relation with farmers. An extension manager must be able to rely on him/her to carry out his/her tasks without close supervision, and the farmers must have confidence in his/her advice and support.

- Humility: in his work with farmers. The extensionists must be sensitive to the wishes and feelings of the farmers and work with them in a way that respects them as people who have knowledge and ideas to contribute.

- Confidence: in his own abilities and determination to achieve something. The extensionist is often left to work in isolation with little supervision and needs therefore the self-confidence and courage to do so.

- Purposefulness: directly achievement related and one of the major causes of success in extension. This is particularly the case where the objectives are priority oriented, and which potentially finds its ultimate implementation in programmed extension.

The above areas of knowledge, personal skills and qualities are not exhaustive, and are not presented as a check-list against which to judge the competence of an individual to do extension work, but rather to show the very demanding nature of work.

Activity 1

Individual activity

Which areas of knowledge, personal skills and qualities do you think could be added to this list? Motivate your answer.

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3. Role of extension policy

In many countries the problems related to the establishment and maintaining of an effective agricultural extension service can be traced back to the lack of a realistic or useable policy framework for chartering the mission of the extension system. Lack of agreement on the function of extension, the clientele to be served, how extension will be financed, frequent changes in organisational structure and programme priorities, rapid turnover of extension staff and the lack of coordination between different organisations that undertake extension work is some of the common problems that highlight the issue of extension policy[3,4,5)].

The following issues should be addressed by an extension policy:[3,4,5)]

- Extension mission and goals
- Extension approach and functions
- Subject matter coverage of extension
- Geographical coverage
- Clientele and target beneficiaries
- Organisational issues
- Extension staffing issues
- Extension funding
- Stability- a good extension policy promotes stability yet it allows enough flexibility to reflect the dynamic nature of the agricultural sector.

To extension managers, policy makers and professionals involved in the writing of extension policy, the following checklist should direct the initiatives:

- Is the extension policy development with a long term vision?
- Does it foster innovativeness and creativity on the part of extension staff, and does it has more provision for the facilitating rather than the controlling of their extension work?
- Does it foster stakeholder participation and confidence in the extension system?
- Does it follow appropriate procedures and methods to perform its responsibilities efficiently and effectively?
- Does it have reasonably provisions for accountability through periodic reviews?

Activity 2

Group activity

1. Discuss the possibilities how an extension agent can become part of a farming community and gain credibility or a "license to talk to farmers"?

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2. How effective is the extension policy of your organisation in addressing the needs of your clientele? Does it ensure that there is appropriate opportunity and support for the extensionist to grow and develop as a professional?

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My notes.....

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Extension Learner Guide

Agricultural Extension

Level 5

Module 3

Communication as the basis for extension

Study objective

After completion of this module, the learner should be able to have a basic understanding of:

- What is communication?
- Key elements of the communication process
- Communication channels
- Elements of a good message
- What makes a good communicator?
- What is “noise”
- Communication settings
- Perception and how it influence communication
- Active listening
- Inefficient listening
- How to plan a communication strategy for intervention

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The communication of extension messages are usually based on farmer experiences and /or agricultural research findings. In South Africa governmental extensionists also communicate governmental policies that are important for farmer decision-making. We think of marketing and labour policies, as well policies related to the use of irrigation water and prevention of soil erosion.

For many years we thought that farmers' conservatism was the reason for the poor adoption of new technologies developed by agricultural researchers. However, research has shown that this is not correct, and that farmers make use of a network of knowledge and information supporters. The concept Agricultural Knowledge and Information System (AKIS) is useful in analysing ways in which farmers increasingly are supported by knowledge and information. The underlying idea is that farmers are using a variety of sources to obtain knowledge and information they need to manage their farms and that new knowledge is developed not only by agricultural researchers but by many different actors. These sources include: other farmers, government extension organisations, private companies selling inputs, offering credit and buying products, farmer organisations and private consultants. However it is important that we understand the process used by people to exchange experiences and ideas, and which is a vital trigger for altering knowledge and perceptions of various kinds (learning). It is a vital ingredient of the extensionist's strategies for inducing change.

1. What is communication?

The Oxford dictionary defines communication as simply sending and receiving messages, or the transmission of messages from one person to another. So communication is used for a specific purpose (why), and there is usually certain reaction expected (what happens when there is communication?).

A second more complex definition of communication is that, in addition to the transmission of messages, it also involves interpretation and meaning. Therefore communication is seen as a process by which two or more people exchange ideas, facts, feelings or impressions in ways that each gains a common understanding of the meaning, intent and use of the message. Communication is essential to all human association. One's ability to influence others is closely linked with one's ability to

communicate one's ideas. For two or more people to engage in a common co-operative effort they must be able to communicate in a way of being human.

There are important ingredients and different perspective on communication[8)]:

- *Communication is about using symbolic signals:* To exchange meanings, human beings use a variety of devices: words and language, pictures, diagrams and drawings, music, letters of the alphabet, body language, etc. These devices are symbolic, which means they refer to something else.
- *Communication can be through verbal and intentional messages:* Human beings can also make deliberate attempts to communicate meanings to others. In such cases, several signals are combined into a message (i.e. information). The extensionists may for instance say: I really think you should attend to the taking of a representative soil sample". While verbal and written forms of communication are often intentional, we also use less conscious and deliberate forms of non-verbal communication (body language). Non-verbal communication include:
    - Appearance (e.g. the wearing of a particular style of clothes)
    - Posture
    - Gestures (like standing tall or "shrinking")
    - Spatial position (like standing close to someone or keeping a distance)
- *Symbolic signals and transferred through channels and media:* when we speak to someone, our vocal cords cause vibrations in the air, which "transport" the sounds we make to another persons' eardrum, and which triggers the listener's brain. This combination of brain, vocal cords, sound waves and eardrums are called the communication channel. A variety of channels exits for the transport of a message namely auditive, visual, tactile and olfactory signals. Communication media are composite devices, which incorporate various channels at once.
- *Communication can be interactive to various degrees:* although communication is a form of human interaction and that sense "interactive", different degrees of interactivity occur. The communicative exchange can either be where people make an effort to understand and listen to each other (interactive). When people exchange messages which do not refer to each other that is called "non-interactive" communication, and therefore people do not react to earlier statements.
- *Synchronical or asynchronical:* communication can either be immediate to a greater or lesser extent, regardless of the level of interactivity. When people meet face-to-face, or talk to each other on the cell phone, they respond to each straight away. This is called *synchronical communication*. However, communication forms where the response is delayed, because communication takes place in the form of letters, e-mails, and articles is called asynchronical communication.
- *Communication messages have different levels and layers:* messages do not only have a literal meaning, but can also be imbued with more implicit meanings and

connotations. The language philosopher Austin (1971) argues that language expressions have "descriptive" and "performative" dimensions, sentences do not only make statements about the world, but they also do things to the world [9)].

- *Communication involves selection processes:* it is impossible to tell someone everything one could tell, and neither is it possible to recall everything another person tries to convey. Therefore communicating parties make all sorts of selections when sending and interpreting messages. The specific selections are shapes by the people's culture, goals, aspirations and interest in a specific context.

Activity 1

Small group activity

1. Write down your own definition of communication.

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2. Monitor the different types of communication you use for one day and determine which is more effective.

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2. Key elements of the communication process

The following essential elements are required for the *communication process*. Successful communication requires a skilful *communicator* sending a useful *message*, through *proper channels*, effectively *treated*, to an *appropriate receiver* (audience) that *responds* as desired.

The communication task thus consists of the skilful handling of six key elements:

2.1 Communicator

This is the person who normally starts the communication process and is sometimes referred to as the message source. Credibility of a communicator as perceived by the audience is a powerful determinant in communication.

i. Who is he?

ii. What are his motives?

iii. What does he know?

iv. What does he look like?

v. What are his skills and attitudes?

Fortunately the communicator can enable him to become a more effective communicator in the eyes of the audience.

What makes a good communicator?[7,10,11,9]

a. Knowledge of:

- Objectives: specifically designed
- Audience: needs, interest, abilities
- Message: content, usefulness, importance, validity
- Channels that will reach the audience
- How to organise and treat the message

b. Interested in:

- Audience and its welfare
- Message and how it can help people
- Results of communication and their evaluation
- Communication channels and the proper use of it

c. Prepares:

- A communication plan or strategy
- Communication material and equipment
- A plan for the evaluation of results

d. Skills in:

- Selecting and treating of messages
- Selection of useful channels
- Understanding the audience

2.2 Messages

Communication takes place through the sending and receiving of messages. The message has the content that is conveyed during the communication encounter. A message is the information a communicator wishes his audience to receive, understand, accept and act upon.

A good message must be.....[10,11)

- In line with the objective to be attained clear understandable by the audience
- In line with the mental, social, economic and physical capabilities of the audience
- Significant economically, socially to the needs, interest and values of the audience
- Specific – no irrelevant material of facts
- Simply stated: cover only one point at time
- Accurate: scientifically sound, factual and current
- Timely: especially when seasonal factors are important
- Appropriate to the channel selected
- Applicable: audience can apply recommendations
- Appealing and attractive to the audience :has utility and immediate use
- Manageable" communicator can handle with high professional skill and within the limits imposed by time

2.3 Medium and channels of communication[7,9,10,11)]

The *medium* is the physical means by which messages are transmitted or transported between people in communication. Your voice and body movements, as well as technological and electronic means of communication such as telephone, newspaper, or television are all mediums of communication. The *channel or the route by which the message travels.* The light waves that carry the television image or the airwaves that carry the sound of your voice are channels of communication, as your five senses: hearing, sight, touch, taste and smell. Both of these can be regarded as links between the communicator and recipient.

The following communication channels are used in extension:

a. Individual methods of extension or face-to-face Individual or face-to-face methods are probably the most universally used extension methods in both developed and developing countries. The extensionist meets the farmer at home or on the farm and discusses issues of mutual interest, giving the farmer both information and advice. The atmosphere of the meeting is usually informal and relaxed, and the farmer is able to benefit from the extensionist's individual attention. The personal influence of the extensionist can be critical in helping a farmer through difficult decisions, and can also be instrumental in getting farmers to participate in extension activities. The individual contact between the extension agent and the farmer can take a number of forms:	
i. Farm visits	Most common form of personal contacts between extensionist and farmer and constitute over 50% of extensionists' activities. Because it takes up so much time of an agent, it is important to be clear about the purpose of such a visit and to plan it carefully. Advantages of farm visits : ▪ Familiarise the extensionist with the farmer and his family, enabling him to give specific advice or information to the farmer ▪ Build up the extensionists' knowledge of the area and of the spectrum of challenges and problems farmers experience ▪ Permit him to explain a new recommended practice or follow up and observe results to date ▪ Arouse general interest among farmers and stimulate their involvement in extension activities
ii. Office calls	From time to time the farmer may visit the extensionists in his office. Such a visit is often a reflection of the interest which the extension agent may have aroused among local farmers. The more confidence farmers have in the extension agent, the more likely they are to visit him. Such office visits are less time consuming for the extension worker. As with farm visits, the extension agent should prepare for these visits.

iii. Other individual methods	• *Telephone calls/use of SMS:* serve a very similar purpose than office visits. It is improbable that the extensionist will deal with many farmers in his area by telephone. The telephone or cell phone is used to pass on specific advice or information. Important is to speak clearly, to note the main points discussed and to enter them on farmer records. • *E-mails or letter:* occasionally the extensionist needs to correspond with farmers by letter. • *Informal contacts:* informal contacts will occur continually during the extensionists' stay in a particular area. Market days, holiday celebrations or religious events will bring him in contact with the farmers with who he is working and inevitably they will talk about agriculture and perhaps some specific problems faced on the farm.
b. Group methods The extensionists also use farmer groups, as groups have the advantage that new ideas often emerged from group discussions. The cost of individual extension methods in terms of time and scarce extension resources forced extension services worldwide to invest in group extension methods. There is also the danger that too much emphasis is placed upon a few individual farmers which can lead to a situation where there is only focused on the progressive farmers to the detriment of the poorer farmers. The following group extension methods exist:	
i. Demonstration	Farmers like to see how new ideas work, and also what effect it can have on increasing farm production. Both purposes can be achieved by means of farm demonstrations. A good practical demonstration is an invaluable method in extension work. There are two types of demonstration used by extension agents namely method demonstration and result demonstration: ▪ Method demonstration: basically show farmers how to do something. In this demonstration the farmer is showed step-by-step how for example to plant seed in a field, or to calibrate a planter. ▪ Result demonstration is where farmers are shown that a particular practice or recommendation is practical under local conditions.

ii. Field days	Opportunities to hold method or result demonstrations on a slightly larger scale, and are usually run in a more informal and less structured manner. The purpose is often to introduce a new idea and a new crop or technology, to stimulate interest, to as many farmers as possible. Field days can range in size –from a very small group of farmers to annual events like NAMPO or seed company annual field events where thousands of farmers are visiting. A few points to keep in mind with the arranging of a field day: • Limit the numbers to the capacity of the field, to avoid over crowding • Ensure a good lay out of the field day activities, with easy access and facility of movement around the field • Encourage the demonstrator farmer to take most of the initiative, give him support but do not take over the field day form him • Provide suitably large visual material and also, if necessary, a loudspeaker to ensure that all can hear. • Conclude the field day by bringing all participants together, reviewing the days proceedings and the main items seen and discussed, and explain any future extension activities.
iii. Farm Tours	Farmers like to visit farms in other districts to see how they farm, what they grow and what kind of challenges these farmers are facing. A tour is a series of field demonstrations on different farms, or at different centres, and often attracts a lot of interest from local farmers. It is important to take note of the following points: • Encourage the host farmer to do all the explaining and to take charge of the tour • Visit an area that farmers can associate with, the farms to be visited and the farming systems • Limit the tour to what is possible. It is better to do a short tour in which visitors can have a good look than an extensive tour where there is always limit time available for interaction and learning

What is "NOISE"?[8,10,11)]

Any stimulus that interferes with the transmission and reception of messages is called "noise". Noise emerges from a wide range of sources and causes:

- Failure of a channel to reach the intended audience
- Failure on the part of the communicator to handle a channel skilfully
- Failure to select channels appropriate to the objectives of a communicator
- Failure to use channels in accordance with the abilities of the audience
- Failure to avoid physical distraction (external noise)
- Failure of an audience to listen or look carefully
- Failure to use enough channels in parallel
- Use of many channels in a series

Good selection and use of communication channels considers:

- Specific objective of the message
- Nature of the message: degree of directness, abstractness, level of difficulty, scope and timing
- Audience: size, needs, interest and knowledge of subject
- Channels which are available that is likely to reach the audience, or parts of it How channels can be combined and use in parallel
- How channels must be used in series
- Time available
- Extent of seeing , hearing or doing that is likely necessary to get the message through

2.4 Treatment of messages

How can messages being treated so that they can be sent through or over channels with a maximum probability of reaching the intended audience. Treatment is concerned with the way it is handled in order to get the information across to the audience. It relates

technique, or details of procedures or manner of performance essential to expertise in presenting messages.

The purpose of treatment is to make messages clear, understandable and realistic to the audience. The task of designing treatment usually requires original thinking; deep insight into the principles of human behaviour, and skill in creating and using refined techniques of message presentation.

Treatment of messages can be varied in almost infinite number of ways, but there are three categories useful for varying treatment:

- Matters of general organisation: repetition or frequency with which ideas and concepts are mentioned, emotional appeals compared to logical appeals, etc.
- Matters of speaking and acting: being yourself rather than trying to imitate someone else; knowing the fact *versus* knowing only about the facts; reading a speech compared to following notes; knowing the audience versus lack of knowledge about characteristics of the audience like needs, interest and personality.
- Symbol variation and devices for presenting ideas: Communicators should realise that the ability to present messages to ensure maximum audience impact is a highly professional task and that the formula for success cannot be learned from a book. Treatment of a message has to be 'tailor-made' for each situation of communication.

2.5 Audience

The audience is the intended receiver of messages. Success in communication is dependent on how the audience responds to messages received. A communicator must accept an audience the way it is. He then proceeds with attempts to move people toward his objectives. Therefore both the audience and the objectives must be precisely identified. In an attempt to identify an audience it is advisable to find the potential audience, the available audience and the active audience.

2.6 Audience response

Communication is a two way process and feedback means that the message is "fed-back" by the receiver to the source. Sending messages is only one third of the job; the other two thirds consist of determining the effect that the advice given and the recommendations made had on the receivers. In other words, the response by an audience to a particular message received is in the form of some kind of action, either mental or physical.

Activity 2

Small group activity

1. What makes a good communicator?

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2. What makes a good message?

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3. Which channels are usually being selected for the transferring of extension messages?

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4. How will you obtain the required information from an audience to ensure that the message is appropriate for the specific audience?

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3. Critical communication barriers for effective communication to farmers[10,11)]

Since communication is defined as a process, there are certain critical factors and problems that influence the effectiveness thereof:

Communication is limited by one's concept of the communication process	A common mistake made by various groups is the identification of the part with the whole, or "parts" fallacy. Successful communication is not a single unit act, but requires a series of unit acts planned to assure effective sequence and integration.
Communication is a two way process always involving Interaction between those who aspiring to communicate	Communication is not "unloading" of ideas on another person or group (one way affair). Questions and comments made by the receiver and observation of his behaviour are good ways to tell if one has really communicated effectively. Two-way communication is necessary to assure that information presented is interpreted as intended.

One must have ideas before one can communicate with others	The communicator must communicate about things that exist, that are real, as the audience sees them. Not only must one have ideas, he must know how to organise them and present them clearly, forcefully, accurately and adequately.
The symbols used to present ideas, objects or concepts must be accurate and used skilfully	Practically all communication is done by the use of symbols. The use of symbols is necessary because of: • The inconvenience, impracticability of having real objectives always available when one wishes to convey ideas • Many abstract ideas can hardly be made clear except by the use of symbols. The crucial point in the use of symbols to convey ideas is to select those that accurately represent the idea to be conveyed and are understood by the receiver.
Cultural values and social organisation are determinants of communication	Values tend to differ between culture groups but also within a specific culture group. Hence, knowledge of ideas and action which the value system will accept, and which it will likely reject, along with channels of communication established by the particular social organisation are essential for effective communication.
The environment created by the communicator influences his effectiveness	The physical facilitates, air friendliness, respect for other's views, recognition of accomplishments of others, permissiveness and rapport in general are all important ingredients of a climate conducive to effective communication.
To make sense, communication effort must be organised according to some specific form or pattern	Organisation can be informal as conversation or discussion, or as formal in a speech or lecture. Whatever form chosen the facts to be presented must be organised so as to enable the receiver to gain a unified understanding of the message. The following ways can be used for the organising of a presentation: • Chronological • Logical • Physiological
Cooperation and participation essential for communication	There must be interaction between individuals involved. Both the communicator and receiver must be brought into the act. Hence the receiver must work a little too. It is what he does mentally or physically in the form of reaction to the content presented that he will learn, not what the communicator does.

Evaluation is necessary to improve communication	Without information about whether the receivers received the message, understood it, accepted it, and took the correct action one cannot know "how he is doing" or take intelligent action to improve the effectiveness of his communication.
Differences in perception	Our perception of people is the starting point for how we communicate with others. Understanding perceptual behaviour is the first step on the way to become an effective communicator. *Perception* is defined as the way that we take information about our world, and because each person gathers information differently, problems arise in the way each individual perceives people and things.

Standard of communication influences its success.....[10,11)]

- Standard of correctness: use of correct words, symbols, correct logic and facts
- Standard of effectiveness: relates to the interaction, understanding, meaning, behavioural changes, achievement of objectives that result from communication
- Standard of good taste: keeping content and method compatible with social code or the receiver
- Standard of social responsibility: assumes responsibility for the effect of his communication on the receiver and the society

Activity 3

This is a small group activity followed by reporting back to the whole group.

1. Have you ever talked to someone and they misunderstood what you were saying? Why do you think this happen? (Give learners the chance to express their experiences)

Points to keep in mind:

Learners should keep in mind the internal and external barriers that may affect communication. Examples of internal barriers are: fatigue, poor listening skills, attitude towards the sender of the information, lack of interest,

in the message, fear, mistrust, past experiences and a lack of common experiences, emotions, etc.

External barriers: noise, distractions, e-mail not working, bad phone connections, time of the day, sender used too much technical language for the audience and environment.

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4. Settings of communication

Settings are different types of communication situations classified according the number of people involved in them and the degree to which they interact. The settings are:

- Intrapersonal communication
- Interpersonal communication
- Small group communication
- Public speaking
- Mass communication

These settings are not jointly exclusive and the distinctions among them are not clear cut.

a. Intrapersonal communication

In this kind of communication – communication with oneself **–** the person is transacting with himself. It may be that communicator is seeking for a solution to a problem or thinking about what he is going to do the next day. The distinguishing characteristic of intrapersonal communication is that you are the only participant.

b. Interpersonal communication

The term “inter” means “between”. Interpersonal communication occurs between people in a face-to-face situation. They also are able to see each other and observe facial expressions and other non-verbal behaviour while exchanging verbal messages. A characteristic of interpersonal communication is that participants continually provide feedback or respond to each others’ message. In interpersonal communication settings meaningful relationships are formed and maintained.

c. Small group communication

Small group communication is usually where a small number of people, usually about five to ten, engage in mutual conversation and interaction. The word *mutual* is important in this type of communication, because it rules out gatherings of people where individual conversations go on but no group communication takes place. The fact that people are in close proximity to each other does not necessarily mean that they engage in group communication. Like dyadic communication, small group communication can be *formal* – as in the case of a panel discussion, or it could be *informal* – as it is when a number of people have dinner together and communicate as a group.

d. Public speaking

When the group becomes too large for direct interaction between members, we talk about the public speaking setting or an oral presentation. In public speaking one person usually addresses an audience in a public setting. In a public setting the speaker may the focus of attention, but the receivers are aware of one another’s presence. Public speaking is more formal than interpersonal or small group communication. This form of communication includes a lecture, a presentation by a salesperson to promote a company’s products or a speech at the agricultural show. Participants are still face-to-face, but the audience does not usually participate directly until the end of the speech when questions are invited. However, they can send non-verbal messages or feedback. When an audience is not enjoying a speech for instance, they often become restless and stops paying attention. It is also possible for them to provide positive feedback by for instance laughing or applauding.

e. Mass communication

Mass communication is communication to large masses of people who do not know each other and who are usually not in the same place. A characteristic of mass communication is that it is mediated. That means the message reaches the audience through a mechanical or electronic medium such a print or television. Mass communication differs from interpersonal communication and group

communication in many ways. One of the main features is that it provides very little or no opportunity for you to interact directly with the person or people conveying the message due to difficulty of providing feedback.

5. Function of communication

A function can be defined as the way in which a phenomenon like communication acts to fulfil its purpose. The outcome of a function has consequences or effects which may be intentional or unintentional. It is therefore evident that the functions of communication are associated with its purposes and effects. The most important function of communication – or the purpose that communication serves – is to satisfy a need[1,5,8,10,11)].

a. Purpose and needs of communication[1,5,8,10,11)]

The following are purposes of communication:

- *Physical and physiological needs*

  We communicate with others to fulfil physical needs in order to survive. These include aspects such as food, water, air and shelter. You communicate also to satisfy various physiological needs like the need to have contact with other people just as they need food, water, air and shelter. Without contact most of us will suffer serious consequences.

- *Relationships*

  You communicate to share the world with others. One of the prime purposes of communication is to develop and maintain relationships with other people. Relationship in this context means any connection involvement or association between two people. Whether it is linking yourself to a family, to friends, to groups, another communication purpose you can recognise is establishing and maintaining contact with others – to be recognised, to love and to be loved. You set up an important relationship when you talk with others about themselves, when you show interest and affection to others.

  You communicate to learn more about yourself, to discover who you are. You also communicate to establish who you should be in relation to others. Our relationships help us construct some ideas about ourselves.

- *Information*

  You communicate to learn more about the world around you. You can discover your world as it is now, as it was, and as it will be. We cannot function in our society without information. We obtain some of our information from observations, some in conversation, and some through

mass media. A very important purpose for which we require information is the decision making process.

- *Decision making process*

  Some of our decisions are made unconsciously – most of us do not go through an internal debate about whether to stop at a stop street or avoid an oncoming vehicle in the road. Other decisions are made in conjunction with others. Whatever the context, we communicate to obtain and share information that enables us to make informed decisions. In some instances, however, specialised information is required to arrive at a decision.

- *Persuasion*

  One communicates to persuade or influence others, whether you are trying to convince a friend to accompany you to a movie or whether the President of South Africa promotes a new labour law – communication is clearly at the centre of the activity. In today's world of high technology, the mass media are used extensively for persuasive purposes. We are often bombarded with persuasive messages on a daily basis by advertisers who make a determined effort to persuade us to change our buying habits through constant exposure of their goods or services.

b. Communication and perception[6,8,11)]

Perception is the filter through which we take stimuli and understand the world. Perception is one persons' view of reality. Because people perceive the same phenomenon in different ways, different people prescribe different meanings to the same stimulus. As we receive information, we evaluate it in terms of our frame of reference and either reject it because it is not compatible with our frame of reference (culture or attitude) or we make use of it to support our present frame of reference, or we expand our existing frame of reference[8].

To illustrate that our sense organs can create perceptual inaccuracies, look at the figure below (Figure 1).

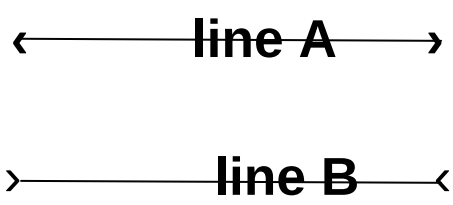


Figure 1. Műller–Lyer illusion

This well known phenomenon is called the Műller–Lyer illusion. At first glance you would probably think that line B is longer than line A. If you measure then you will see that they are the same length.

c. Understand the perception process

The perception process takes place in three phases:

- *Perception involves selection*

  How does the mental process work that account for your vision of the world? Selectivity means choosing information. These are sensory stimuli around you all the time – sights, sounds, smells, textures – yet you focus your attention on very few of them. When you pay attention to something, it means that you are not paying attention to something else.

  Why you select what you do is usually the product of several factors, some environmental and others internal.

Environmental factors	Internal factors
Intensity: the more intense a stimulation, the more likely you will perceive it. A loud noise in a silent room, or a very bright light in a dark street, usually attracts your attention.	*Physiological factors:* you are stimulated by what is going on around you through your five senses. However, these five senses are not all powerful. Most of us cannot distinguish between five differences in deliberate taste sensations. Part of your food selection is thus made for you.
Size: the larger something is, the more likely it will capture your attention.	*Motivation:* all of us differ in terms of our needs, motives; interest, desires and each tend to perceive what is in accord with our needs, motives and interest.
Contrast: things that stand out against a highly contrasting background are usually quite noticeable.	*Selective exposure:* A key factor in the way we see the world is the extent to which we are open to stimuli and experiences. From all the sensory stimuli that complete for our attention, we tend to select only those that reaffirm our frame of reference-our existing attitudes, values and beliefs. When we communicate with others we make similar choice, allowing ourselves to be open to some stimuli and also exclude others. Limiting our exposure to some messages or parts thereof may create inaccurate perceptions of what is really happening around us.

Repetition: a repeated stimulus receives more attention than getting a single one. Advertisers know well that a repeated short message is more effective than a longer message with one-time exposure.	*Selective attention:* This describes how we see what we want to see and hear what we want to hear. We tend to pay attention to what interests us and will sometimes even distort things so they will fit what we want. When you are interested in tennis you will follow the game with great interest on the radio sport broadcast, whereas someone not interested in tennis will hear only the sound of the broadcasters' voice. Similar happens during communication. In a meeting you may selectively attend to only those points of discussion that directly concern your work, and switch off when matters are less important to you are discussed.
Motion: You pay more attention to a moving object in your field of vision than to the same object when it is stationary. Flashing or rotating lights of a police car or ambulance are designed to command attention.	

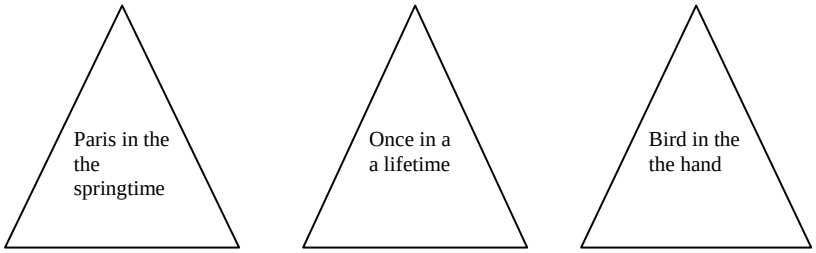
- *Perception involves organisation*

  Once you have selected what to perceive, you usually organise it in some fashion. This is known as perceptual organisation. This organisation helps us to perceive by our expectations and our desire to form a whole image.

Activity 4

Small group activity

The following images will test your perception and will illustrate how expectations affect the organisation of information. What do you read?



Answer: If you read "Paris in the springtime", Once in a lifetime" and "Bird in hand" – you are wrong. Perhaps you need to read it again. You will realise that in two of the triangles the word "the" was repeated and in one the word "a" was repeated. Habit makes us fail to perceive things as they really are, and learning affects your perceptual set by creating expectations to perceive it in a particular way. YOU SEE WHAT YOU EXPECT TO SEE!

- *Perception involves interpretation*

  After sensory stimuli have been selected and organised, we give them meaning in a light of our frame of reference in what is known as perceptual interpretation. Interpretation is the process of explaining and evaluating what have been selected and organised. Owing to the individual nature of people, they are not likely to select the same stimuli or organise them in the same way. They are therefore unlikely to arrive at the same interpretation of events or other people. What do you see or perceive in the following two images?

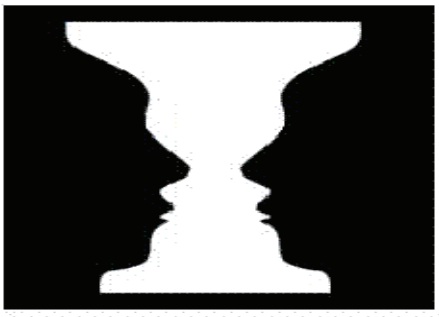


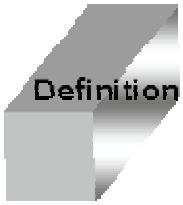
Figure 2. Image of a vase or .....

Figure 3. Perception of a witch or .....

6. Active listening

We spend a great deal of our communication time listening. It is rather obvious that unless someone listens, any effort to communicate will be lost. Communication as a transactional process involves the negotiation of mutual meaning, and how that can be accomplished if interaction remains one-sided. Although so much time is spent in listening, studies showed that the average adult listens at no better than 25% efficiency [8)]. This means that we often do not hear as much as 75% of the message. The reason for that is that probably most of us take the ability of listening for granted and do not perceive it as a skill that should be learnt. So listening is crucial not only in terms of getting the content of a message, which is called "deliberate listening" [4)], but also in terms of understanding the feeling context in which the communication is taking place , called "*active listening"* [1,2,3,4,5,8)].

Listening is often explained by distinguishing it from hearing. Unlike hearing, which is a *passive process*, listening is a mental skill which can be developed. Listening occurs when the signals or sounds sent to the brain are processed and used. Listening is therefore considered as an active process which requires effort and concentration by the listener.



Active listening is to pay attention both to *what* is said (the verbal or information element of the message) and the *manner* in which is conveyed (the non-verbal or rotational element of the message). Therefore it is important to listen to the words that are being spoken, and at the same time "listen" to the non-verbal cues or signs that accompany words.[1,2)]

6.1 Active listening stages[4)]

Message
Stage 1: Sensing and attention: physical part of the listening process
Stage 2: Understanding and interpreting: important stage in the process because it enables you to evaluate the meaning of the message
Stage 3: Remembering: the process of storing the meanings that have been received so that they may be recalled later as required.
Stage 4: Responding: this represents the taking action stage of the listening process by providing feedback.

A listener can show that they are attending to what the speaker is saying through:

- Appropriate body language:
  - leaning forward slightly to show interest
  - keeping eye contact
  - nodding their head in agreement
- Non-verbal reactions like "mm" and "uh-huh"
- Verbal reinforcements such as:
  - "I see";

- Yes go on";
- empathetic statements like "I can understand how you felt"

- Verbal techniques:
  - Asking questions to clarify or gain greater understanding
  - Summarising what has been said
  - Paraphrasing what has been said with phrases like: "So what are you saying is....." or "If I have understood you correctly...."
- Focus your attention
- Listen to retain information (anticipate what is coming)

6.2 Inefficient listening behaviour[1,2,3)]

The following are some of the behaviours which may you may not be aware of but which adversely affect listening:

- Lack of concentration
- Inaccurate listening
- External factors like background sounds or physical discomfort (also called noise)
- Internal barriers are physical and physiological conditions we bring to the communication situation

Activity 5

Small group activity

1. Define active listening, and give an example of how it might be used in your relationship with the irrigation farmer,

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2. List at least four ways how the extensionist can improve his/her listening skills.

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7. Communication strategies for effective extension[6,7)]

It is important to plan communication with your farmer groups, and for this it is important to find balance between the following:

1. Purpose of the activity (in the context of the wider goals and strategies)
2. Stakeholder/target audiences (characteristics of the participants involved)
3. Content (What is being discussed and presented)
4. Media and methods (the media, methods and techniques used in this activity)
5. Organisation (location, time management, venue, materials, budget, etc).

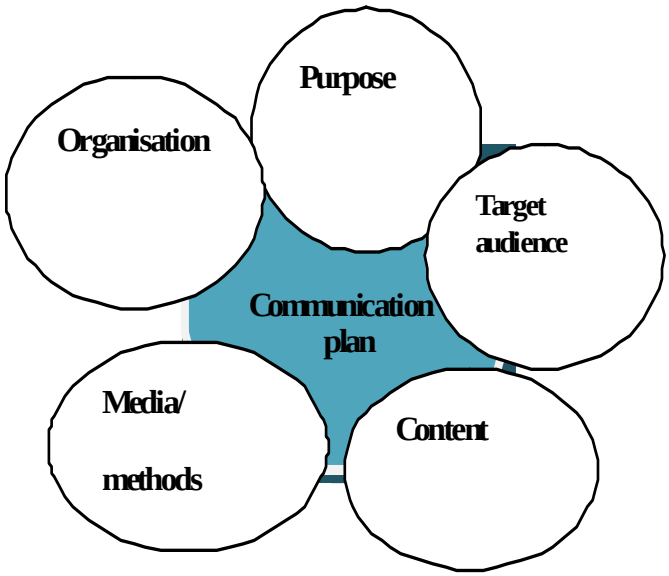

Figure 4. Critical factors influencing the planning of a communication strategy

This process is an iterative process of thinking about these elements, and one will find it necessary to adapt and make provisional choices. Clearly the process should not stop with the unfolding of the elements, but requires a process of *facilitation* and not only about "implementation". In order to plan for the activities, the extensionist should have a variety of knowledge and information originating from different sources in relation to the different elements[6)]. For the implementation of appropriate methods and media, the extensionist may not only need knowledge of media potentials, methods and facilitation, but also information on the media use and preference of the stakeholders. Thus planning of a communication strategy must be accompanied or preceded by considerable investigation and exploratory activities.

Activity 6

Small group activity

Identify a specific situation with farmers that you will like to intervene. Plan your communication strategy (in detail) to intervene according to the framework that was discussed in the previous section (Section 7).

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My notes.....

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Extension Learner Guide

Agricultural Extension

Level 5

Module 4

Extension approaches

Study objective

After completion of this module, the learner should be able to have a basic understanding of:

- Extension approaches versus extension methodology
- Characteristics of an extension approach
- Characteristics of various extension approaches
- Transfer of Technology extension approach (TOT)
- Farming system Research and Extension model (FSR/E)
- Participatory extension approaches
- Difference between TOT and farmer first extension approaches
- Farmer Field schools (FFS) and how to establish it
- Participatory Technology Development (PTD)
- How to establish PTD in your work area
- Adult learning principles

Table of contents

An ideal or universal extension approach or model does not exist. Different options are available, and choices depend upon a great number of variables. It is for instance important to have a clear definition of who plans, for whom (the potential beneficiaries), who takes the initiative, what the goals are, what the means are, what the time frame is and what the socio-political environment is. The extension approaches that we found can be categorised into two main categories[1)]:

- Production technology approach
- Problem solving approach

1. Extension approaches

Different approaches of extension are found in many types of extension organisations, using a variety of strategies and a large variety of methods and techniques. In this module, some extension approaches are presented in terms of their most important organizational forms and respective goals. The goal of a system reflects the power positions of various groups of actors. Therefore, without an understanding of the historical development and of the interest groups involved, present achievements and shortcomings of extension approaches cannot be evaluated. It is assumed that different forms of organizing extension are *per se* neither "good" nor "bad." Therefore, extension services must be judged against their proper goals. The one universal yardstick is their *service function to their clientele*. Extension, which is not in touch with and does not significantly contribute to improving the life situation of its clientele, has lost its' legitimates.

The terms *approach* and *methodology* when referring to extension is often used interchangeably, and it would be hair-splitting to try to separate them and their respective conceptual meanings in this module. Agricultural extension is usually identified with activities related where extension workers interact with farmers, and inform them about improved farming practices, new techniques and more productive technologies. The goals of extension organisation may vary, and is a reflection of a particular purpose in its own setting. Extension systems can either be centrally directed or controlled or locally directed or controlled. Some employ extension a basic strategy of technology delivery while other has more of a rural development strategy. Important is that all extension systems follow a certain kind of approach in their extension delivery. In this respect, Axinn's principal observation is of particular importance: "*The success of an agricultural extension programme tends to be directly related to the extent to which its approach fits the programme goals for which it was established*"[2)].

The alternatives to organizing extension demand choices on various levels:

- Public *versus* private
- Government *versus* non government (NGO)
- Top-down (bureaucratic) *versus* bottom-up (participatory)
- Profit *versus* non profit
- Free *versus* cost-recovery
- General *versus* sector

- Multipurpose *versus* single purpose
- Technology driven *versus* need oriented

2. What is an "approach"?

The approach is the essence of an agricultural extension system. Each system also has an organisational structure, leadership, resources of personnel, equipment's and facilities, its programme with the goals and objectives as well as the methods and techniques for implementation, and its linkages with other organisations and various publics as well as its particular clientele[2)].

The approach is therefore the style of action within a system. The approach embodies the philosophy of the system. It is like the *beat of a drummer*, which sets the pace for all the activities of the system. It is not merely like one of the components of the system, but it is more like the doctrine for the system, which informs, stimulates, and guides such aspects of the system as its structure, its leadership, its programme and resources, as well as the linkages needed.

Each approach can be characterised by the following seven dimensions[2)]:

- ***The dominant identified problem to which the approach is to be applied as a strategic solution***
- ***The purpose it is designed to achieve***
- ***The way in which the control of the programme planning is carried on, and the relation of those who control programme planning to those who are the main target audience for the programme***
- ***The nature of the field personnel including such aspects as their density in relation to the clientele (ratio of field staff to the farmers)***
- ***The resources required and various cost factors***
- ***The typical implementation techniques used***
- ***How it measures its success***

The Extension, Education and Communication Service (SDRE) issued a valuable overview of extension approaches and methodologies in 1988 authored by George Axinn and entitled *Guide on Alternative Extension Approaches*. This overview is still a valid reference work and

provides a basic examination of the various extension approaches current at that time. The guide distinguishes between eight different approaches[2)]:

Extension approach	Characteristics
(1) The general agricultural extension approach.	Success is measured in terms of the rate of take-up of the recommendations, and increases in national production.
(2) The commodity specialized approach	The measure of success is usually the total production of the particular crop.
(3) The training and visit (T&V) approach.	Success is measured in terms of production increases of the particular crops covered by the extension program.
(4) The agricultural extension participatory approach.	The numbers of farmers actively participating and benefiting, and the continuity of local extension organizations measure success.
(5) The project approach.	Short-run change is the measure of success.
(6) The farming systems development approach.	Success is measured by the extent to which farming people adopt the technologies developed by the extension programme and continue using them over time.
(7) The cost sharing approach.	Success is measured in terms of farm people's willingness and ability to share some of the cost, individually or through their local government units e.g. Netherlands United Kingdom, Australia, and New Zealand.
(8) The educational institution approach.	The measure of success is the farming people's attendance at and participation in the agricultural extension activities offered by the educational institution e.g. Land Grant System.

Clearly, agricultural extension involves many different approaches and methodologies. It is also directed towards very distinct content areas. And it is managed and delivered through a variety of institutional arrangements. It can therefore reasonably be argued that ***no single approach best suits extension development in all circumstances, just as there is no***

one single approach that best suits development. Otherwise the problems of extension and, for that matter, of development, would have been solved long ago.

Activity 1

Small group activity

1. What are the characteristics of an extension approach?

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2. Identify the extension approaches that you apply in your work.

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3. How successful are you in practising the specific extension approaches? What are the main constraints that prevent you from practising the specific extension approaches adopted?

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3. Linear model of technology transfer (Top-down)

For a long time extension (1950-1990) was only seen as transferring and disseminating ready-made knowledge from research to the farmers, or from “early adopters” to other farmers. It was quite common in development circles to think of change and innovation as something that could be planned [3)]. It was thought useful to define in advance clear goals and

outcomes for the future, and possible to organise rationally a series of steps that would eventually lead to the desired outcomes *("blueprint planning" and problem solving)* [7,22)].

The traditional extension system has a long and distinguished history of non-formal education focused on enhancing the well being of individuals, families and communities [4)]. In developed countries where extension is linked to the research institutions (Land Grant system as been practised in USA) the research-extension base is unparallel in its strength. It is not surprising therefore, that extension has developed a strong track record in extending university-based knowledge to the agricultural industry, families and communities (Education Extension Approach). It was from these roots that the common association of extension with such terms as "knowledge extended" or "knowledge applied" and "knowledge transferred" emerged each narrowly limiting the role of extension to that of identifying new research agendas and extending research knowledge. Extension thus defined is consistent with what if someone asks any agricultural researcher how extension works; the likely response would be "extension transfers the findings of agricultural research to 'users'[22)].

This *top-down approach* is based on the assumption that transfer of technology and knowledge from scientists to farmers will trigger development. This model assumes that scientists and institutions that have the modern knowledge can solve farmers' problems. The basic assumption with this approach is that technology and information are available at the research stations, which farmers are not using, and if the knowledge of these could be communicated to the farmers' through extension workers, farm practices would be improved. The transfer of technology model assumed that scientist knows best, new technology is better than old, technology is needed, and innovators will transfer information to laggards. There is no feedback mechanism in this model. It creates dependency and does not address constraints to adoption. These technologies are disseminated through mass communication channels and extension education to the intended clients. This is called the *"the linear model of innovation"* as it draws a straight and one-directional line between science and practice[5)].

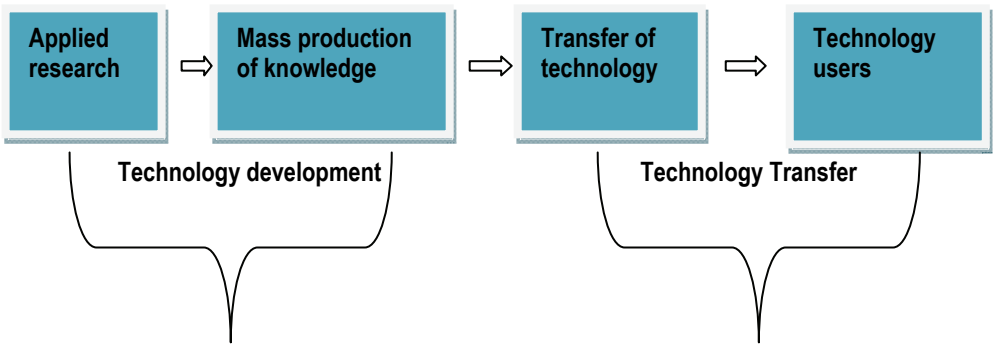

Figure 1. General technology development and transfer model (TOT)

This model is appropriate for situations where simple technology is required for problems clearly defined and where the viewpoint of farmers is favourable. The major strengths and weaknesses of this model are summarised:

Major features of Transfer of Technology approach

- Positive paradigm and reductionist approach to research
- It is a linear model with little feedback
- Extension uses "trickle down" approach – from innovators to late adopters to laggards
- Single innovation focus
- Helped achieve green revolution /increased production

4. Approaches focusing on farmers rather than starting from research and technology

As some of the technologies were not suitable to all farmers, the *"Farmer First"* approach was advocated[12)]. This approach is that much of the problem with the conventional agricultural research and extension has been in the processes of generating and transferring technology, and that much of the solution lies in farmers' own capacities and priorities. The interest and support that this philosophy has received since the late 1980s has led to a virtual revolution in the agricultural science. As a result, the conventional approaches to agricultural research and extension have come under increasing scrutiny. There is a growing acceptance of the need to involve local people as active partners in all aspects of the research and the development process. The focus is on bridging gaps between development professionals and resource-poor farmers and on finding new ways to understand local knowledge, strengthen local capacities and meet local needs[6)].

Compared with the TOT model, the alternative models envisage a more developed and decentralised arrangement, focussed on farmers' identified needs and led by local demands, rather than external supply. Farming System Research and Extension, Participatory Extension Approach and Farmer Field Schools are alternatives that address these issues.

4.1 Farming System Research and Extension (FSR/E) model[7,8,10)]

The model emerged in the late 1970s in reaction to the prevailing transfer of technology model. It recognised that constraints at farm level limited the adoption of new

technologies coming from outside the system[7]. Advocates of this model agued that research should be determined by explicitly identified farmer needs, rather than according to the preconceptions of researchers. Accordingly, applied agricultural research was relocated from the research stations to the farm[8].Researchers and extensionists were encouraged to work with farmers to design, test and modify improved technologies to suit the local conditions.

Although FSR/E has developed in many different directions, making generalisation difficult, three common key principles can be identified:

- Joint effort by researchers, extensionists and farmers to design, test and modify improved agricultural technologies appropriate for local conditions.
- Agriculture is seen as holistic systems in which all important interactions that affect performance should be considered: a multi-disciplinary perspective to problem analysis, technology design, trail implementation and evaluation.
- Activities include basic research, research station trials, on-farm trials and extension and production programs. The majority of work is done through on-farm trails and multi-location trails, under farm conditions, to learn about farmers' constraints. Thee results are then communicated to experimental stations, usually by researchers or extensionists.

The following figure illustrates the various components and processes of the FSR/E approach.

Farming system research and extension model *(researchers, extensionists, and farmer involvement)*		
Mainly researcher	⇒	***Research agenda (problems)***
Researcher and extensionist (solutions)	⇒	***Diagnosis***
Researcher, extensionist and farmer	⇒	***On farm trial***
Researcher, extensionist and farmer	⇒	***Evaluation and recommendation***

Figure 2. A generic model of farming systems research and extension

The FSR-methodology generally consists of **4 essential activities** (although many variations on this concept exist[8)]:

1.Descriptive and diagnostic stage	o Where the actual farming system is examined in the context of the "total environment". o Target group orientation: groups or regions of **farming** families with the same **farming** system are identified ("recommendation domains"). o To identify constraints farmers face and possible solutions through consultation
2.*Priorities and Design stage*	o Where several strategies are identified and ranked together with the farmers in order dealing with constraints determined. o This stage involves evaluation of: o *Technical feasibility:* whether physical or technical relationships established elsewhere is valid and thereby contributes to the solution o *Economic viability:* proposed solution is economically viable o *Social acceptability*: proposed solution acceptable to farming family
3.*On-farm testing and implementation*	Based on the diagnosis an experimental field programme is designed, which concentrates on experimental work inside the farmer's fields.
4.*Evaluation and recommendation*	Where identified solutions are disseminated to farmers

FSR presupposes that farmers with the same farming system have the same constraints and thus the same possibilities for improvement. The farming households are divided on the basis of certain essential indicators of their practices[9)]:

- Which are the most important crops that are produced and consumed?
- Which are the most important cash-sources (cattle, crops, off-farm employment)?
- Are there labour constraints? Is there use of labour from outside the family?
- Are there large differences in land-property?
- Is there use of modern inputs such as fertilizers, pesticides, etc.?

✓ Key principles of FSRE

The following key principles apply[8,9,10)]:

- Is an approach for development and is based on active farmer participation. Farmers are active in the analysing of natural and socio-economic environments in which farmer households operate.
- Utilises existing farmer organisations

- Regards the farm family/household as an integral part of the farming system
- Recognises that development of farming systems depend on the availability of support services that cater for farmers needs and desires
- Is enhanced where farming systems research activities exist
- Requires effective mechanism for transferring and extending identified technologies and production alternatives to farmers. It is essential that a good extension network exists or is built up. The proper training of extensionists to an awareness of the complexity of the farming systems and farm-level profitability will result in successful extension achievements
- Envisages substantial training in the farming systems approach in order to strengthen national institutions and increase their effectiveness
- Aims at being a sustainable approach

4.2 Participatory extension approaches

Starting from the critique of the Transfer of Technology or linear model of innovation, a range of extension approaches that are classified as participatory have been developed since the late 1970s, with emphasis on the active role that farmers cold play regarding dissemination of information and the generating of knowledge (research). Participatory approaches are guided by the *Farmer-First* philosophy of Chambers (Table 1)[1,2]. The participatory extension approaches move beyond the FSR/E contracting or consulting with farmers. It views the context of agricultural production as interactions between on-farm and off-farm resource management strategies.

Table 1. Comparison of technology transfer with farmer first approach[14]

Indicator	"Technology-transfer"	"Farmer-first"
Analysis of needs and priorities by	Outsiders	Farmers assisted by outsiders
Transferred by outsiders to farmers	Precepts Messages Package of practices	Principles Methods Basket of choices
The "menu"	Fixed	*A la carte*
Farmers' behaviour	Hear messages Act on precepts Adopt, adapt or reject package	Use methods Apply principles Choose from basket and experiment
Outsiders' desired	Widespread adoption of technology	Wider choices for farmers Farmers' enhanced adaptability
Main mode of extension	Agent-to-farmer	Farmer-to-farmer
Roles of extension agent	Teacher Trainer	Facilitator, Searcher for and provider of choice

4.2.1 Guiding principles in participatory extension approaches

The following guiding principles are quite different from those of top-down perspective[15,16]:

- Development is regarded a long-term effort and process requiring continued commitment and collective responsibility
- The extensionist should act as partners and facilitators rather than experts
- Participation of local actors is emphasized
- More time should be spent on needs identification and project preparation, with active involvement of the intended beneficiaries
- The ultimate goal of the development programme should be to increase the power of the local actors to plan and implement their own improvements

4.2.2 Basic steps in applying participatory approaches[11)]

The demand for participation by the target audience in the planning and implementation of development programs and extension projects become a matter of course, especially if extension work is by its nature partnership and presupposes the active involvement of target audiences in decision-making processes. The basic steps in applying of any of these participatory approaches are:

Step 1: Understanding the situation	Sit and listen and learn form the group People, resources and problems prospects
Step 2: Identify problems/opportunities	Conduct participatory meetings (using PRA principles) and identify problems/opportunities
Step 3: Develop solutions	Prioritise issues/opportunities through group discussions Identify possible solutions and opportunities
Step 4: Develop an action plan	Use participative planning techniques Adapt programs to suit group needs/resources Establish group support through task groups
Step 5: Implement the plan	Make sure subgroups perform their roles and responsibilities Help monitor for possible solutions
Step 6: Review and reflect on the program	Members share views and reflect Adapt the program from feedback Learn to manage better from experience

The following participatory extension and research approaches will be discussed:

- "On Farm Research" or Participatory Technology Development (PTD)
- Farmer Field Schools (FFS)

4.2.3 Farmer Field Schools (FFS)

The classical FFS is based on Integrated Pest Management (IPM) for rice in Indonesia and dates back to 1986. During this time the food security situation in Asia was threatened by an outbreak of brown plant hopper. Technical recommendations made by formal research had limited applicability in farmer's fields and while research products such as resistant varieties had the potential for managing pests these were not fully exploited [17)]. There was a need to find alternative solutions to control losses in rice production.

Later the FFS was also used with a focus on other crops and topics. Around 1995 the FFS was introduced in Eastern and Southern Africa and is now used in countries such as Zambia, Zimbabwe, Uganda, and Tanzania. One example of the use of the FFS in Tanzania is the Mkindo farmer-training centre in Mvomero District, Morogoro. The FFS with its innovative, participatory learning by discovery approach is often described as the success story of the 1990s. Although originally developed for IPM purposes it has provided a people centred learning approach whereby farmers can learn about and investigate for themselves the costs and benefits of alternative technologies for enhancing farm productivity. Among other things FFS's were designed to improve farmers' analytical and decision-making skills so that in the long run they could influence policy makers.

a. Key FFS principles[17,18,19)]

The training methodology is based on learning by doing, through discovery, comparison and non-hierarchical relationship among learners and trainers and is carried out almost entirely in the field.

The key principles of Farmer Field Schools across many countries are the following:

- **Adult non-formal education:** Farmer groups and NGO's initiate the Farmer Field School with the facilitation of the extension staff. The farmer group decides what, where, and how they want to learn, and how often to meet. Farmer Field Schools assume that farmers already have a wealth of experience, and knowledge. It also assumes that there may be misconceptions and bad habits learned during intensification programmes (e.g. little knowledge of natural enemies, basic fear of any insect that is seen in the field, etc.). Therefore the FFSs are oriented to providing basic agro-ecological knowledge and skills, but in a participatory manner so that farmer experience is integrated into the programme.

- **Technically strong facilitator:** an extension staff member of the government, farmers' organization, or NGO usually initiates. But in all cases the person must have certain skills. Most important is that the person is skilled at growing the crop concerned. Most IPM programmes have begun with training field staff in season-long

courses which provide basic technical skills for growing and managing an IPM crop. Some people have called this the *"Farmer respect course"* in that field staff comes to realise how difficult farming is, and why farmers do not immediately "adopt" their "extension messages".

- **Based on crop phenology and time limited:** The Farmer Field Schools and season long training for trainers are based on the crop phenology; seedling issues are studied during the seedling stage, fertiliser issues are discussed during high nutrient demand stages, and so on. This method allows to use the crop as a teacher, and to ensure that farmers can immediately use and practice what is being learned. The Field School tries to focus on field observations, seasonal long research, and hands-on approach. All learning activities take place in the field, based on what is happening there.

- **Group study:** Most FFs are organised for groups of about 25 persons with common interests can support each other, both with their individual experience and strengths, and to create a "critical mass". As individuals, trying something new is often socially inappropriate (e.g. reducing sprays, cover crops), but with group support, trying something new becomes acceptable. The number of 25 is roughly the number that can comfortably work together with one facilitator.

- **Field School Site:** The FFSs are always held in the community where farmers live so that they can easily attend weekly and maintain the Field School studies. The extension officer travels to the site on the day of the Field School.

- **Mobilising groups:** One of the jobs of the facilitator is to assist the Field School to develop as a support group so that participants can support one another after the Field School is over. This is done by having elected officers (head, treasurer, and secretary), and group identity

- **Basic science:** Field Schools try to focus on basic processes through field observations, season-long research studies, and hands-on activities. It has been found that when farmers have learned about basics, combined with their own experiences and needs, they make decisions that are effective. When farmers have this basic knowledge they are better clients for extension and research systems because they have more specific questions and demands.

- **Study fields [non-risk]:** The Field School has a small (usually about 1000 m^2) field for group study. This is the core of the Field Schools. This field is essential for a Field School because farmers can carry out studies without personal risk allowing them to take management decisions that they might not otherwise attempt in trials on their own farm.

- **Test and validate:** The Field School method proposes that no technology will necessarily work in a new location, and therefore must be tested, validated, and

adapted locally. Thus, IPM methods are always tested in comparison with conventional practices.

- **Hands-on learning activities:** Beside season-long field studies, the Field School also uses other hands on learning activities to focus on specific concepts.

- **A process, not a goal:** It must be remembered that Field Schools are a method to provide farmers with a learning environment so that they can achieve the goal of reducing inputs, and increasing yields and profits. In some programmes the number of Field Schools, or expansion of programmes becomes the overwhelming target and success criteria that quality suffers and the initial goals are not met.

- **Follow-up:** All Field Schools normally have at least one follow-up season, the intensity of which will be determined by the motivation of the Field School participants, time constraints of participants and facilitator, and to some extent – funding. Follow-up has been known to be a little as monthly support sessions for farmers to discuss their own problems in implementing IPM. After the field school is over: the groups of the field school develop into independent support groups or the FFS can be repeated

Activity 2

Small group activity

1. What are the principles that apply to the practising of FFS?

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2. Discuss the potential application of FFS in your work. What are the challenges that you need to overcome.

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4.2.4 Participatory Technology Development (PTD)

Participatory Technology Development (PTD) is a creative process of joint experimentation and research by farmers and extensionists in discovering ways of improving farmers' livelihoods. It has been recognized that research is effective in improving farmers' livelihoods if farmers play a vital role in the process.

4.2.4.1 What is PTD?

PTD means all relevant stakeholders (farmers, extensionists and researchers) do what only researchers usually do. It can be seen as primarily a learning strategy for empowering participants and secondarily as producing research results in conventional sense. PTD as a learning process empower in three ways:

- It empowers because of the specific insight, new understandings and new possibilities that participants discover in creating better explanations about the social world.
- Participants learn how to learn FROM EACH OTHER
- It liberates when participants learn how to create new possibilities for action

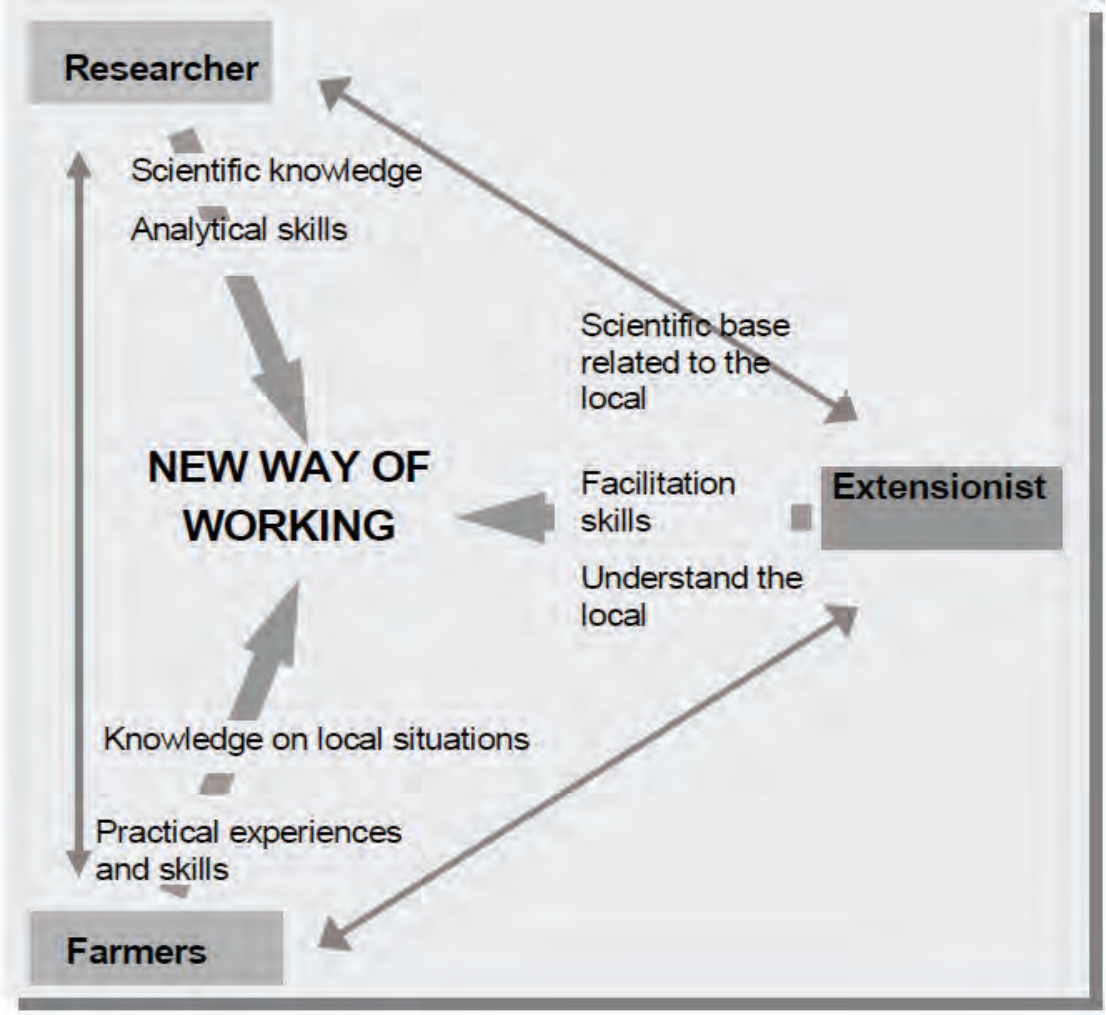


Figure 3. Role of extensionists, farmers and researchers in the PTD process

4.2.4.2. Responsibilities of the various actors in the PTD approach[19]:

a. Responsibility of farmers and community

- Actively manage, implement and monitor experiments
- Use labour and available resources to conduct experiments
- Closely link with extension and researchers in the process
- Share their experiences with other farmers

b. Responsibilities of extensionists

- Directly and regularly participate in the process from providing practical experiences to farmers, facilitating to select experiments to monitoring and evaluating experiments
- Provide input services and related information to farmers, share experiences with farmers
- Link farmers with researchers to conduct experiments
- Carry out extended extension activities such as organising farmer to farmer experience exchange, extension materials based on experiment results and disseminating experimental results

c. Responsibilities of researchers

- Researchers have the responsibilities to implement research and technology development in realty, through PTD, instead of holding all the power in research
- Study local knowledge, analyse issues of farmers in order together with them identify prioritised experiments
- Participate in PTD process with farmers and extensionists; provide technology information, scientific knowledge to support the implementation of farmers

4.2.4.3 Farmers' Research and Innovation

Experimentation and innovation are natural and necessary to farmers. Before formal research and extension services existed, farmers' own experimentation allowed adaptation to new situations, to survive and to improve their livelihoods, where conditions were favourable. Worldwide, there are countless cases of farmers adapting extension recommendations to fit particular situations, or extracting components from otherwise seemingly useless packages. This is still the case today, even where farmers have access to external support. Scientists who develop technology packages for extension seldom realize the extent to which farmers conduct informal experimentation with components of these packages (Kolb experiential learning)[24,25).]

In Malawi, for example, high-yielding maize varieties were promoted in a package of seeds, fertilizer, instructions and credit. Most smallholder farmers continued to plant local varieties using the fertilizer intended for the new seeds. A few farmers carried out small, informal experiments to determine the best timing and amounts of fertilizer application on local maize. PTD happens wherever there are extension workers encouraging farmers to experiment, innovate and adapt new ways of managing agricultural and natural resources. Instead of transferring a "best bet" technology pre-selected by scientists on behalf of farmers, extension workers can choose from the following approaches in PTD (Table 2).

Table 2. Participatory Technology Development Approaches to Farmer Experimentation[24)]

PTD Approach	Role of Development Agent	Benefit to Farmers
1. Learning from farmers	• Identifying farmer-innovators • Understanding farmers' experiments • Getting insights into farmers' priorities	• Sharing of experiments among farmers
2. Testing new options	• Suggesting options and ideas to farmers • Encouraging farmers to compare options and ideas with current practices	• Farmers are free to test, adapt or reject technologies without pressure from development agent
3. Filling local knowledge gaps	• Enhancing farmers' awareness on resource management principles • Providing information on phenomena that farmers cannot observe on their own	• Local ways of applying principles to farming
4. Facilitating mutual learning	• Facilitating the generation of insights and options within the community	• Critical exchange of ideas among farmers • Minimal dependence on technology from outsiders
5. Improved experimental design	• Studying current methods of informal experimentation with farmers • Reaching an agreement with farmers on more systematic forms of experimentation	• Ways of experimenting and learning improved • Position and confidence of development agents and farmers strengthened

The first biggest challenge of development agents in farmer-led research is not choosing among the PTD approaches but increasing their awareness and knowledge on farmer innovation and experimentation.

4.2.4.4 Challenges in promoting PTD

There are four major challenges in promoting and institutionalising of PTD, where extension workers serve as bridges between research and farmers:

- Need to spread new ways of exchanging knowledge on sustainable agriculture practices among farmers and households
- The wide gap that exist between researchers and extensionists in such complex problems like proper use of resources, conservation, processing and marketing created challenges. These challenges to research and extension despite the large investments has not led to more effective systems
- The need to develop structures that could marshal resources to carry out the constructivist , farmer-to-farmer exchange
- The need to organise a way of learn and interact with each other across cultural hierarchies in a field where there are no teachers

Experiential learning is important since:

- People remember 20% of what they hear
- They remember 40% of what they hear and see
- But they remember 80% what they discover themselves

4.2.5 Adult learning principles

One of the key principles in the practising of FFS and PTD is that it is based on non formal adult education, which implies "problem posing" Mao Zedong once said: "...*the role of the facilitator is to present to the community in a challenging way the issues they are already discussing in a confused way".* The whole emphasis is on learning, and not teaching. This means that *traditional teachers* need to be re-educated to understand the role of the *facilitator*[23)]:

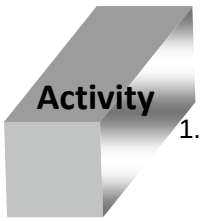
- Creating a learning climate
- Posing problems
- Encouraging a process of search for causes and solutions
- Assisting the group to discover as much as possible for themselves
- Setting up a process for planning action

The adult learning psychology as described by Malcolm Knowles entails the following[23)]

1. Adults have a wider experience and have learnt much from life. They learn most from their peers. So facilitators help them to share their own dialogue with one another.
2. Adults are interested to learn quickly about the things that they are relevant to their lives. So the facilitator needs to create a situation in which they can share in the planning, choose the topics and participate in regular evaluation of what they are doing.
3. Adults have a sense of personal dignity. Hey must be treated with respect at all times and never feel humiliated or laughed at before others.
4. As adults grow older, their memories may get weaker but their powers of observation and reasoning often grow stronger.

In *conclusion*, the participatory extension approaches illustrated above comprises various principles that are important for agricultural development in South Africa:

- A system approach
- Inclusion of stakeholders (stakeholders' environment)
- Empowerment
- Individual rights and responsibilities in a democracy
- Building empowering structures
- Networking
- Encouraging action learning
- Building group management capacities



Activity 3

Small group activity

1. Why do you as extensionist need to involve farmers in the generation and dissemination of irrigation technology?

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2. How will you practice PTD with your farmers? Elaborate on the process you will follow.

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My notes.....

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Extension Learner Guide

Agricultural Extension

Level 5

Module 5

Community development and mentorship

Study objective

After completion of this module, the learner should be able to have a basic understanding of:

- The development environment
- Aim of community development
- Local development environment (political, social, cultural, and economic)
- Agricultural program supporting development
- Sustainable community development
- Identification of stakeholders in community development
- How to coordinate community development
- Principles of community development
- Attributes of community development projects
- Role of the community in community development
- Role of the extensionists in community development
- Role of the mentor in community development

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1. The development environment

The term or concept “community development was adopted in 1948 and consist of two main factors namely education and social work. In South Africa community work originated in 1977 and has been implemented since 1984. Community development is a widely divergent concept and is regarded as community education or community organization or community participation, but each one of these terms refers to the active involvement of people at local community level. In 1956the United Nations defined community development as: [11)] *“the process by which the efforts of the people themselves are united with those of governmental authorities to improve the economic,*

social and cultural condition of communities, to integrate these communities into the life of the nation, and to enable them to contribute fully to national progress".

Definition

For the purpose of this training module community development is described as:*"A process, a method, a program, a movement aimed at enabling and encouraging communities to become involved, with the necessary support from the private and government sectors, in improving and managing their own living conditions in all areas of development"* [11)].

2. Aim of community development

The aim of community development is the improvement of the quality of life of the individual and the community on the physical, social, economic and political terrains of development, to help establish a balanced growth, resulting in social stability, prosperity and progress in the community [11)].

Community development becomes the vehicle not only for physical outputs but for empowering the community members. It includes capacity building of the people to be able to take full responsibility and ownership for their own development. Sustainable development also requires the empowerment of the people and to be responsible for their own development.

Empowerment consists of two elements namely a person must be willing and able. Willingness is a characteristic within the human being and if a person is willing then it is possible to enable him/her by means of capacity building to become an empowered person[11)].

The existing situation within a community is very important for development projects and the following aspects need attention because they either strengthen or hinder development:

- The local development environment;
- The global context of policy formulation for development and
- Sustainable development [13)]

3. The local development environment

The following types of environment are present within a community and these environments should not be over or under estimated at the expense of the other[11)].

These environments are[13]:

- Political
- Social
- Cultural
- Economic
- Psychological environments
- Physical environment [11].

3.1 The political environment

A democratic society consists of different political parties, political leaders, groupings, political activities, meetings, etc. Political forces are at work in all communities and this could easily lead to conflict and disagreement. An orderly political structure, in which the elected leaders of the community should play an active role, is necessary for the establishment of stability and orderliness in a community [11]. Elected political leaders should not only have the political expertise, but should always be aware of what the community expects from them. The Imbizo program of the government is a structured program and forms a platform where communities can communicate with the political leaders at the highest level. The aim of Imbizo is to build a partnership between government and the people for development and growth. There are a number of important political inspired national development programs namely Land Reform, Household Food Security Letsema), Broad-based Black Economic Empowerment and the Expanded Public Works Programs. The agricultural extension worker or community worker must have a clear understanding of these programs to link the different role players in the community and to achieve a common goal. Other important supportive programs for agricultural development are the Comprehensive Agricultural Support Program (CASP) and Land Redistribution for Agricultural Development (LRAD).

The Vision for the agricultural sector is, according to the Strategic Plan for South African Agriculture (2001): **"A united and prosperous agricultural sector".** The following essential supporting and enabling strategies have been identified[6]:

- Good governance
- Integrated and sustainable rural development
- Knowledge and innovation
- International cooperation
- Safety and security.

The strategic intention of the Integrated and Sustainable Rural Development Strategy (ISRDS) is to transform rural S A into an economically viable, socially stable and harmonious sector that makes a significant contribution to the nation's GDP. The following areas are vital to agriculture[2]:

- Local economic development, attention focused on rural towns, service centres and villages strengthening the profile and role of agriculture and related industries;
- Special attention be given to the promotion of income generation and livelihood activities by women, the youth and disabled;
- Rural development nodes and

- Rural settlement planning to accommodate new settlement patterns.

In rural areas traditional leaders still play an important role in activities and events within the community and to ignore them and the traditional leader structures will be a disaster. The political environment is one of the most challenging factors to be addressed by extension/community workers, community leaders and other role players, to successfully implement community development programs.

The following agricultural programs support development of communities.

i) Comprehensive Agricultural Support Program (CASP)

The core focus of the program is for development in six priority areas:

- Information and technology management
- Technical and advisory assistance, and regulatory services
- Marketing and business development
- Training and capacity building
- On/off farm infrastructure and product inputs
- Financial support
  (For more information: http://www.nda.agric.za)

ii) The Land Redistribution for Agricultural Development (LRAD)

The LRAD program is there to help African, Coloured and Indian communities to buy land or agricultural implements for agricultural purposes. The LRAD grant is a non-refundable form of funding or financial contribution to help prospective farmers to purchase land. (For more information: http://www.nda.agric.za)

There are a number of Acts which have an influence on agricultural development.Extension workers should take cognizance of these Acts when planning an agricultural development project. *More detailed discussion in Part 6: Irrigation legislative context (Module 1)*

3.2 The social environment

Social development is aimed at the welfare of the total community. The focus of social development is primarily aimed at human development and secondary at the development of services[11)]. Social development refers to health, social welfare services, education and training, recreation, culture and religion. The social environment consists of institutions such as the school, church, clubs and other interest groups but the primary institution is the family while friendships can be described as an informal structure. Communication channels exist between families and friendship structures. Communities are organized and different structures exist such as power structures and a variety of interest groups (Stokvel; Burial societies, Traditional Healers, etc.).This is an indication that communities are already involved with development [13)] and the Agricultural extension worker need to identify and collaborate with the existing structures to implement and or support agricultural development projects in the community.

Other important role players are Department of Public Works; Provincial and Local government; Department of Social Welfare; Human Science Research Council; Council for Industrial and Scientific Research (CSIR); Agricultural Research Council (ARC) and the Development Bank of South Africa (DBSA).

3.3 The cultural environment

According to Coertze [3)] " a culture group is a relatively independent and self sufficient, human, social unit, which is not organized on an ad hoc basis, but comes into being through a process of growth and which consist of a number of people, of both sexes and all ages" and who:

i) Have lived in a specific geographical area for a number of generations;
ii) Have created and developed a unique and distinctive cultural pattern which unites them;
iii) Regard themselves as a separate unit (group) as opposed to other similar groups;
iv) Are also recognized as such by other groups and
v) Have over time created a distinctive identity, and will protect this identity.

The following aspects are universally apparent in the culture of each separate culture group:

Table 1. Cultural aspects universally apparent in the culture of all cultural groups [4,13]

1. A value system	2. A social system	3. A political system
4. A juridical system	5. A judicial system	6. A religious system
7. A reproductive system	8. An economic system	9. A system of technology
10. An own language	11. A system of education	12. A military system
13. An own system of knowledge	14. A health system	15. An artistic system
16. A system of sport and relaxation		

The cultural environment therefore consists of the values and norms or customs of a society and people often speak of it as the tradition of the people [13)]. Another important element of culture is beliefs namely, what is real and what not; what is true and what not. Related to beliefs are attitudes that represent our feelings and evaluation of the world around us and are generally indicative of how people will behave[1)]. Culture creates or has specific taboos but also provides a framework according to which people act and react to in daily life. Culture is not necessarily a stumbling block, or creates stumbling blocks for development. In fact, in some situations it may be even beneficial for development projects[9)]. It is important for the Agricultural extension worker to acknowledge, understand and respect a community's culture.

3.4 The economic environment

Economic development is primarily aimed at agriculture, mining, industry and trade. In developing countries agriculture is perceived as the most important economic sector and the majority of development programs should be in line with this. The more developed a country the less important becomes agriculture as an economic sector. For some countries their agricultural sector is so important that they even subsidized the farmers in different ways to enable them to stay on the farm.

Every community has its own economy and it consist of two components namely the informal and the formal component. Indications or measurements of economic activities are the rate of employment, the scope of commerce and industry as well as the scope of informal economic activities[13)]. The presence of infrastructure is also an indication of the level of economic activity. Several Local Economic Development (LED) projects have been implemented by government at local municipality level. The aim is to strengthen local government structures and Integrated Development Plans. While the Labour's Job Creation Trust support small-scale projects that will help employment and skills development. I t is the based and that it will be sustainable.

3.5 The psychological environment

Every human being experience life in his/her own peculiar way and this is known as the psychological make-up of people[13)]. Their livings conditions, to a great extend, determine their make-up for instance people living under stress will in most cases disclose a negative make-up. People's psychological make-up will to a large extent influence their participation and the extent to which they will be prepared to take responsibility. Although the psychological environment is something abstract, it should not be ignored. It also consists of people's attitude and will have an influence on people's self-esteem. People caught up in poverty situations often show a lack of self-esteem and they often believe that they do not have the ability to do something. Instead people become more and more dependent on aid from government and other welfare role players. They tend to not to take any risks and they do not easily trust strangers.

3.6 The influence of global village on policy formulation for development

South Africa is today fully part of the global village we call the world. Because of globalization S A is affected by whatever is happening or taking place elsewhere in the world. Whether it is the launching of a missile, a drought, floods, wars, good climatic conditions, the oil price, subsidies to farmers, etc., each one of these happenings when it occurs has a ripple effect on our economy, like when one throws a stone in a dam of water. The smaller the stone, the smaller the ripple effect on the water. The larger the stone, the bigger the ripples and it even becomes waves and for some countries it can become a tsunami and the outcome a disaster. South Africa cannot escape the effect of global warming and climate change (droughts and floods), an international food shortage and crisis (in January 2009 there was only enough rice in store for 54 days) and/or an international financial crisis.

Activity 1

Small group activity

1. Think about the communities that you are serving or plan to work with. How will you introduce yourself and explain your presence in the community?

   .....
   .....
   .....

2. Define the various environments described above in this community (natural, cultural, political, social, economic and psychological).

   .....
   .....
   .....

3. Describe how these environments affect your position as an extensionist in the community?

   .....
   .....
   .....
   .....

4. Sustainable community development [8)]

Sustainability is a characteristic of a process or state that can be maintained indefinitely. Sustainable development is development that meets the needs of the present without compromising the ability of the future to meet their own needs. It contains of two concepts:

- the concept of need
- the idea of limitation

The severity of poverty in the developing world is forcing people to abuse and over-exploit the natural resources they depend on [13).] However the developed world is as guilty because of large-scale industrialization where pollution and the wasteful way resources are used have a negative effect on the ability to achieve the ideal of sustainable development. In South Africa today we are facing and heading not only towards a serious water shortage, but also towards the total pollution of our already limited water sources.

A sustainable living must:

- Respect and care for the community life
- Improve the quality of human life
- Conserve the earth's vitality and diversity
- Minimize the depletion of non-renewable resources
- Keep within the earth's carrying capacity
- Change personal attitude and practice
- Enable communities to care for their own environment
- Provide a national framework for integrating development and conservation
- Create a global alliance.

4.1 Requirements for attaining sustainable development

The World Commission on Environment and Development has listed the following requirements for sustainable development[8)]:

- a political system that secures effective citizen participation in decision making
- an economic system that provide for solutions for the tensions arising from disharmonious development
- a productive system that respects the obligation to preserve the ecological base for development
- a technological system that fosters sustainable patterns of trade and finance
- an international system that fosters sustainable patterns of trade and finance
- an administrative system that is flexible and has the capacity for self-correction mechanisms.

The question is what does it mean at grassroots level? It can best be described by means of the definition of sustainable development[8, 13)] namely:

- Help the very poor because they are left with no option than to destroy the environment.
- Maintain the idea of self-reliant development, within natural resource constrains.
- Maintain the idea of cost-effective development using differing economic criteria to the traditional approach; that is to say development should not degrade environmental quality, nor should it reduce productivity in the long run.
- Attend to the great issues of health control, appropriate technologies, food, self-reliance, clean water and shelter for all.

- Exercise the notion that people-centred initiatives are needed; human beings, in other words, are the resources of the concept.

5. Stakeholders and role players in community development – a key element for participation, forming of linkages and collaboration

It is a known fact that people in a community interact in different ways with one another and they belong to different organizations and or structures in the community. It is also known that there are a number of different stakeholders and role players present within the community each one with its own agenda, expertise and resources, but also limitations to support development. These role players can be identified at the "levels of government, private sector, non-governmental organizations and community sector stakeholders". It is important to know and understand their interaction with one another to be able to coordinate development projects[13)].

5.1 Identifying stakeholders and role players for community development

A stakeholder or role player can be an individual, a group, an organization or institution that performs a task or can deliver a service, within the community. Some of the stakeholders might be actively doing something or might have the potential to play a role and or fulfil a task. Active stakeholders are for instance a school, church groups, civic organizations, etc. To some outsiders it might seem as if these organizations are not doing something worthwhile but some like the Stokvels have the potential for action. It is the task and responsibility of the agricultural extension worker, to identify all possible agricultural related role players within the community, as well as other stakeholders and or role players that might have the potential to support development activities.

Stakeholders are classified into four main groups[13)]:

i) Public sector

- **National departments**
  With regard to agricultural development projects there are various departments playing an essential role.
  - Department of Agriculture
  - Department of Land Affairs
  - Department of Water Affairs and Forestry
  - Department of Environmental Affairs and Tourism
  - Department of Social Development (www.welfare.gov.za)
  - Department of Labour (www.labour.gov.za)
  - Department of Public Works

- **Provincial departments**
  - Agriculture
  - Tourism
  - Environmental Affairs
  - Economic Affairs
  - Land Administration
  - Social Services
  - Education – Agricultural Schools
  - Agricultural colleges, FET colleges

Local government

- District Municipalities
- Local Municipalities
- Agric. Extension Wards/Service centres, etc.

- **Parastatals providing services**
  - ► Eskom – electricity
  - ► The Agricultural Research Council (ARC) (www.arc.agric.za)
  - ► AgriSETA (www.agriseta.co.za)
  - ► Industrial Development Corporation (IDC) (www.idc.co.za)
  - ► Water Research Commission (www.wrc.org.za)

ii) Private sector

Stakeholders in commerce and industry like Agricultural Business Chamber, Private agricultural consultants, Commercial Bank and financial sector, agribusinesses and tertiary training institutions: Universities, Technology Universities and private training institutions/providers

iii) Non-government (civil society) stakeholders

iv) Popular or community-based sector stakeholders

Organisations founded and run by individuals or groups within the community like Women's clubs, youth clubs, ratepayers', burial societies, sport clubs and Stokvels

The next important step for the agricultural extension worker will be:

- to bring the identified stakeholders together,
- promote participation,
- focus energy,
- form linkages and collaboration structures and systems,
- and coordinate all efforts and activities.

5.2 How to coordinate community development?

For the extensionist to successfully coordinate community development projects three questions need to be asked and answered if one wants to namely[13]:

1. Who are the stakeholders that need to be coordinated?
2. Who are the owners of the envisaged development?
3. What is community development?

If agreement has been reached on the three answers, only then systems can be identified and put in place to coordinate community development. It is important to note that coordination cannot be enforced and it needs a structure or structures. The following constraints prevent coordination:[10]

- Organisations and institutions are kept apart to maintain fair play
- An ethos exists in which competition and independence are the rule
- It takes so much time and effort to establish coordination that it is regarded by many a not worth the trouble
- Institutions survive because they maintain their turf
- In society emphasis is put on the individual's rights and a strong ego is built
- The idea of negotiation and compromise is seen as negative
- The bad name of the "committee" is a way to express distrust in coordination.[13]

Another very important constraint is **communication,** the one factor that makes coordination succeed or fail. Coordination is one of the most difficult goals to achieve and it needs a special effort to be successful. Without coordination one cannot even think about community development. It is for that reason that the following six-step process to establish coordination and collaboration is proposed: [10]

Six-step process to establish collaboration

Step one: Establishing the preconditions for collaboration
Collaboration begins with a vision or idea how something will be better if two or more organizations work together. Without this vision collaboration will not materialize. The initiation of collaborative activity is both a highly personal and idiosyncratic event with structural determinants.

Step two: Testing the collaborative waters
Four tests are suggested: 1. Assuring that the proposed collaboration does not threaten organizational domain 2. Assuring that the proposed collaboration does not threaten organizational autonomy 3. Sketching an image of potential domain consensus 4. Checking limits of pre-existing collaborative networks
Step three: Initiating the idea of collaboration
From the first discussion about the possible idea of collaboration, stakeholders and role players need to see it as a necessary way of solving a problem.
Step four: Defining the collaborative venture
• Collaboration will work best if a clearly identified team can be developed. • Clear definitions of member and team roles need to be developed. • The newly established team must act independently of the several organizations it represents. • As the team learns to trust and work together, the team begins to draw a social contract of their collaborative venture.
Step five: Invigorating (strengthening) the collaborative process
There are two aspects to strengthen collaboration and to address low points and pitfalls: 1. The greater the complementary of functions between the collaborative venture and the individual members, the greater the likelihood of coordinated action. 2. the larger the collaborating group, the more likely it is that an uncooperative coalition will develop within it.
Step six: Evaluating the collaborative experience
Collaborative ventures need to be evaluated frequently and even more than established organizational ventures. A collaborative venture requires frequent review and renewal.

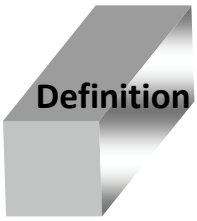
To summarize:

- the ground for coordination must be carefully prepared;
- the coordination venture must be nurtured all the time;
- the venture should not be a threat to any participating organization;
- coordination must be absolutely necessary before it is attempted;
- ownership of community development is turned around so that it rests with the community;
- stakeholders and role players need to work together as a team;
- if ownership of projects is in the hands of the community, the community will be the initiator of coordination.
-

6. Principles of community development

Development "can never take place in isolation; it is an integral part of the comprehensive socio-political, psychological and economical changes Southern Africa is undergoing."[11] Development is for the people who are in need of it, for nobody else. People are therefore the target and the instrument of development and their needs and expertise should be addressed and being taken in consideration in any development activity.

6.1 What is community development?



From the view point that man is an integral part of development community development is a process by which the disguised, unexpected, latent characteristics or potential of people are developed, made available, are utilized or transformed for the enhancement of their quality of life, the stimulation of modernization and the improvement of the social functioning of those people.[10]

OR

Community development is regarded as a process, a method, a program, a movement aimed at enabling and encouraging communities to become involved, with the necessary support from the private sectors, in improving and managing their own living conditions in all areas of development[10].

6.2 Principles of community development [13]

- **Ethical principles**

i) The principle of human orientation

People have *physical needs*: food; clean water; clothing and shelter. People have *abstract needs*: happiness; fulfilment; self-reliance and human dignity. The physical and abstract human needs cannot be separated. They must go hand in hand otherwise there will be no development. Projects should be planned and formulated in such a way that by addressing the physical and concrete needs it will naturally flow over in addressing the abstract human needs.

Human dignity is the most important abstract human need. How does one promote and enhance human dignity? Dignity is promoted by:

- Giving people recognition
- Recognizing them as capable of making their own decisions and accepting responsibility for their decisions.
- People become capable of organizing themselves and maintaining a friendly and farsighted leadership.

The uniqueness of each human being is taken into account as well as his/her ability and responsibility to deal with his/her own problems according to his/her own convictions, expectations and resources. Human dignity includes aspects such as: individuality (every person is unique); self-determination (leads to responsibility); self-help (leads to self-respect); community needs (starting point for development); partnership (joint actions); change (in attitude, behaviour); development of local leadership (a basic objective of any project) and justice (equity)[13].

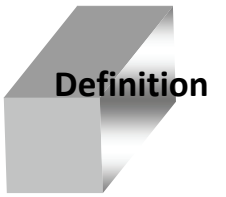
ii) Participation

It is essential to have a clear view of what participation really means. It does not only mean involvement. When people are involved in projects, they are only allowing in under certain conditions and to take part in certain actions, but in a prescribed way. Participatory development is defined as "involving users and communities in all stages of the development process"[7].

When people are mobilized to participate, they do so in all aspects of the project namely:

- planning,
- decision making,
- implementation and
- evaluation of the project.

iii) Empowerment



Empowerment is a mixture between the right to make decisions and the ability to make decisions. To make decisions people also need to have the correct information. What is absolutely important to empower a person, is a willingness by that person to be empowered[13].

Willingness is a personal characteristic within a person and you cannot teach anyone willingness.

EMPOWERMENT = WILLINGNESS + ABILITY

iv) Ownership

People involved in a project should not be treated as guests on someone else's property. People must have the power to make decisions; it is their destiny, their future, their development. They are the owners and the main role players. Other role players are there to support and assist them. They need to be activated to take up the responsibilities of ownership and mange their own future. People must be the owners of their situation and they must take ownership of their needs and they must decide that they are going to do something about it.

v) Release

Development efforts are to free people for example from poverty. Development efforts are not an effort to bring some relief to poor people or to improve their situation somewhat. Such efforts often make the people increasingly more dependent on their benefactors. Development becomes an effort at releasing the whole person for example from the jaws of poverty. These efforts are long-term activities that bring about radical change to people's lives over a period of time.

• Practical principles

It is important to follow and respect certain practical principles in order to carry out the ethical principles.

Learning	Participation in a project brings about learning and all role players learn as they go along. All involved are students and the circumstances will dictate who the teacher will be. It is therefore essential that community workers should approach their task with humility. Extensionists or community workers should go to the community with an empty agenda.
Adaptability (Adaptiveness)	The principle of adaptability requires a change of mindset and that is to avoid the blueprint approach. Management should be flexible, changeable and adaptable. Structures should give space for manoeuvring and should be flexible. The situation will dictate the actions.
Simplicity	The principle of simplicity is the direct opposite of the notion that "bigger is better". Be careful for too big and complex projects. Break large and complex projects in smaller parts to enhance the learning process. The smaller and simpler the project the easier it is to get long-lasting results.

6.3 The outcomes of community development

Although not all community development projects are successful the process of community development has all the attributes needed for positive results[1)].

Awareness creation	✓ Community development encourages a specific kind of awareness namely people become aware of themselves in terms of their environment, needs and resources. ✓ They become aware of objectives that will positively change their situation. ✓ The community see themselves as an active entity that is able to change their negative situation into a positive reality.

Further development	✓ The successful attainment of objectives, by the community, spark off further activities. ✓ Community members become aware of further needs and because of their successes they set new objectives. ✓ They gain confidence and become enthusiastic to tackle further problems and the problems become challenges. One successful project can easily lead to another project. ✓ Most important however is that what was establish through a project must be managed and maintain.
Demonstration effect	✓ A successful project has a positive influence and it broadcast its effects much wider to such an extent that other communities become aware of it. ✓ A successful project demonstrates to other people that, by standing together and working together, can bring about change that makes a difference. Successful projects leads to similar projects and it becomes a tsunami
Community building	✓ Successful community development strengthens the community and people become more self-sufficient and self-reliant and it boosts their dignity. ✓ People learn to organize more effectively and they learn to be successful in many other aspects of live. ✓ The community organization becomes more efficient and effective and the leadership structures developed accordingly. Leadership is enhanced specifically through skills attainment. ✓ Because of better organization new linkages are formed between the community and institutions as well as between individuals, while existing linkages are consequently strengthened. ✓ The end result: sustainable development.

7. The role of the agricultural extensionist in community development

The following possible roles that a community worker (or the extensionists in our case) should play in community development were identified:[12] and were already partially discussed in Module 2: The extensionist or extension agent.

Guide	Researcher
Agitator	Public relations officer
Enabler or facilitator role	Administrator
Expert role	Negotiator
Social therapy role	Mediator
Role of a planner	Activist
Educator/trainer	Encourager/motivator
Organizer	Role of coordinator

It is that it is not always possible to separate the various roles clearly. These roles should not compete with one another rather support one another[11)]. In 2007 it was indicated that more and more organizations/institutions are busy to develop and structure mentorship programs for their staff [14)]. It is therefore important to clearly understand the role of a mentor in the development of humans in community development specifically in land reform projects, but also the necessity and possibility for that extension staff to play the role of a mentor.

According to the above research it is clear that the extensionist needs to understand these roles in order to choose the role or combination of roles to support communities in development. It also depends on the specific situation within the community and only a thorough knowledge and understanding of the situation will enable the extension worker to make the right choice. For the purpose of this training module the following possible roles that the agricultural extension worker needs to play regarding community development:

- The role of an expert/advisor/researcher
- The role of a trainer/educator
- The role of the facilitator (enabler)
- The role of a guide
- The role of a mentor

7.1 The role of an expert/advisor/researcher

The Strategic Plan for South African Agriculture identified a “support service to farmers” as one of the Core Strategies and one of the key initiatives that need to be undertaken is: “Improve the ability and efficiency of the extension personnel within the private and sector and Provincial Departments of Agriculture.”

It is expected from an expert to speak with authority[12]. An expert offers knowledge, but does not prescribe the goals[13]. The agricultural extension worker therefore is in a position to provide agricultural research data. He/she should also be experienced in technical agricultural aspects and should therefore be in position of an agricultural qualification (certificate, diploma, degree or specific agricultural skills and knowledge obtained through in-service training and or skills programs or leaner ships.

Agricultural knowledge and skills are a prerequisite to support communities in agricultural development programs. *One reminder, it is not necessary a qualification (a degree) that makes one an expert, more important is the relevance of the knowledge and skills and the ability to transfer it to the farmers.*

This brings us to the second most important expertise expected from an agricultural extension worker namely, the skills and knowledge. The agricultural extension worker who is technically and extension competent is an empowered person. An empowered person is willing and able to deliver a professional service to the community.

It is important for a community worker to be linked and plugged into a reliable source of information[13]. The continuous professional development (CPD) of every extension worker is becoming a necessity[14].

7.2 The role of a trainer/educator

Who or what is a trainer/educator? The answer is very easy, it is a teacher and all of us do know teachers from our school experience. According to the dictionary a teacher is "*one who teaches or instructs"* while a trainer is: *"a professional who trains men and women"* and an educator is: "*a person who educates*". Education according to the dictionary is "the instruction and discipline employed to educate someone" and teaching is "the act or profession of instructing the young or ignorant" while training means "the act of acquiring the necessary qualification for the performance of a career or occupation". The main audience of the agricultural extension worker is however adult people and for that reason we talk today of the role of the extension worker as a trainer (the buzz word today is a coach) or an educator. Adult education has been defined as *"all activities with an educational purpose carried on by people in the ordinary business of life that use only part of their time and energy to acquire intellectual equipment"*[11].

The *trainer /educator* will assist the community in group forming, teach them how to use different techniques such as how to conduct a meeting, draw up agendas, keeping minutes, etc. He/she will also teach/train them how to identify and become aware of their own needs and responsibilities.

What are the essential elements of a good trainer/educator/teacher?

- Before the training session start asks yourself: “Did I arrive? Concentrate for one moment on yourself. Will I be understood by the learners; are we on the same level?
- Be there on time – start on time. It is an act of politeness.
- The first word (what do you say in the beginning?). Identify with your learners and make contact with them. Do you care about them?
- Is the learning environment chaotic or perfect? (Compare a classroom situation versus a learning environment underneath a tree!). You want to make a PowerPoint presentation and there is no electricity!
- Does the devices/equipment/tools that you will use during the training program work? Do not make a circus and become a clown.
- Inform the students what they are in for, what you are going to present and what do you expect from them.
- What does your body language express? Your attitude, the way you look and express yourself, remember you communicate with your whole body!

7.3 The role of an enabler/ facilitator

One of the main aims of the agricultural extension worker is simply to facilitate the community organization process. It simply means the extension should work directly with the community – with those who are to benefit from the project or program implemented within the community[11)]. It is stated that the primary concern is to help the people to make decisions, enable them to participate fully. As an enabler/facilitator the task is also to enhance the learning processes and to help the community members to be empowered, therefore becoming willing and able to except responsibility for their development actions[13)]. To be successful and to have a better understanding of the role, the following aspects were identified[13)]:

- *Focusing on discontent/unease*

The agricultural extension worker task is to enable the community to focus on those problems or discontent that blocks development in the community. The extension worker needs to help the community members to verbalize their discontent help them and teach them to distinguish between personal and the broader social problems. The extension worker strives by means of communication to focus the attention of the community on problems which seem to be common to the community. For example a farming community experiencing a problem with low maize production but according to their discontent the problem is not enough land to

cultivate, while the real problem is ineffective maize production practices. The extension worker creates a feeing of unease within the community, aiming to get the community to become aware of the reasons for their problem, and to understand the stumbling blocks in the way of resolving the problem. The community is enabled to face the reality of their problems.

The facilitator assists the community members in taking initiative, help them to make rational decisions and enable them to discover their resources and help them to plan and implement.*(More detail in Module 8: Situation analysis)*

- *Encourage them to organize*

One of the most important tasks of the extension worker as enabler/facilitator is to help people feel and identify the problems for themselves and he/she must be prepared to move slowly in most situations. The extension worker should assist the community to become organized. It is further essential to establish meaningful communication for community members to discuss the discontent and to rank it and to begin to organize to deal with it. Individuals and groups will move only if the new situation promises a more comfortable and pleasant one than the present situation. The community must be strongly motivated to and be well prepared for movement towards the new situation. Do not hesitate to review previous discussions, ask the same questions again and encourage discussion of the issues again. It is fatal for the extension worker to push, or to accelerate the pace or to urge action. To move a community before it is ready to organize, plan and act will only increase withdrawal and lack of confidence. The responsibility for action must lie with the community through its own structures and linkages. The community must recognise the possibility of failure and it must accept responsibility for their actions and for failures if it occurs.

- *Nourishing good interpersonal relations*

As a facilitator or enabler the agricultural extension worker needs to strive to establish and maintain sound interpersonal relationships within the community. To be successful he/she should be a warm and friendly person, sensitive to the inner feelings of others (the other person always comes first) but on the other hand he/she must show and reveals a sincere interest in what is of importance to the community[11)]. The agricultural extension worker should know how to ask questions that focus on the interests of the community and he/she therefore facilitate cooperation in the community. He /she will never attempt is to manipulate the process but only to help and remove stumbling blocks to cooperative work.

As a facilitator he/she should be skilled in developing relationships with the community members and helping them to identify their needs and to develop the capacity to solve their problems, helping them to gain meaningful empowerment.

The role of the facilitator/enabler is aimed directly to free the community not only to realize their own potential, but also to realize the value of cooperation[11)]. The facilitator does not guide, but facilitates the process of community development.

He/she does not supply answers, but asks questions to stimulate insight; he/she encourages and supports those who are concerned.

7.4 The role of a guide

The primary role of the professional community worker in community development is that of a guide, who helps the community establish, and find means of achieving its own goals. The agricultural extension worker in the role of a guide should have an extensive knowledge of the existing resources, as well as the functioning of these resources in the community to ensure effective liaison[11)]. A guide is a person devoted to help the community to move effectively in the direction the community has chosen to move. The guide has also play a vital role helping the community to choose the direction. The choice of direction and method of movement must be that of the community. The guide will always respect the rights, traditions and desires of the community.

Activity 2

Individual activity: Self assessment

The agricultural extensionist as a trainer determines the outcome of the agricultural training? On a 3- point semantic scale rate to what extent you as a trainer take the following elements of training into consideration when offering training to farmers? Calculate your score.

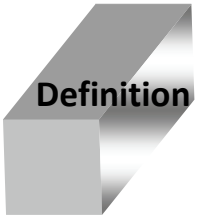
Negotiated expectations and objectives?	1	2	3
Use of a variety of useful methods and materials?	1	2	3
Encouraged the use of examples to illustrate concepts or practices?	1	2	3
Given step-by-step instructions?	1	2	3
Summarized the material presented?	1	2	3
Related theory to practice?	1	2	3
Showed concern about learners as human beings?	1	2	3
Encourage silent learners to participate?	1	2	3

Respected racial, ethnic, and gender differences and their unique contribution to learning?	1	2	3
Appreciated learning handicaps and disabilities?	1	2	3
Helped learners reflect critically on how they learn?	1	2	3
Appreciate local knowledge of learners and made use of it?	1	2	3
Help learners learn from each other during learning activities?			
Total score			

7.5 The role of a mentor

Mentorship today is a word of fashion and in many instances it is being visualized as a magic stick that can bring about change by swinging the stick and uttering a few magic words. The Bible is full of examples of mentors and protégés (mentees). The majority of people today can recall a time when someone acted as a mentor for him/her and where he/she today is acts as a mentor for someone else. In the agricultural sector in South Africa and more specifically in respect of land reform projects there is an outcry by land reform beneficiaries to be supported by mentors. More and more organisations/institutions are busy to develop and structure mentorship programs. What then is mentorship or mentoring? What do one wants to achieve with a mentorship program? How can we structure, implement and manage a mentorship program to be beneficial for the protégé, mentor and the organisation?

- **What is mentoring or mentorship?**



"Mentoring is a structure and series of processes designed to create effective mentoring relationships, guide the desired behaviour change of those involved, and evaluate the results for the protégés, the mentors and the organisation with the primary purpose of systematically developing the skills and leadership abilities of the less experienced members of the organisation".

A more simplified but descriptive definition of mentoring is[5,12)]:

"Mentoring is simply someone who helps someone else to learn something the learner would otherwise have learned less well, more slowly, or not a tall".

An analysis of these definitions emphasis three elements:

- A reference to individual people, one person interacting with another person (mentor and protégé);
- The involvement of some kind of supportive action – i.e. guidance, support, advice, learning, coaching and counselling; and
- Promoting professional and personal development

Mentoring brings individuals together on a one-on-one basis. It brings people together, real people talking to real people. What then are a mentor and a protégé and what is a mentoring relationship?

What is a mentor?

- A person who guides another (protégé) to avenues of success;
- Knowledgeable and respected;
- A person who listens and is a problem solver;
- People orientated with good people skills; and
- A good motivator:

Essential qualities of an effective mentor

- A desire to help;
- Positive experience;
- A good reputation to develop others;
- Have the time and energy;
- A positive learning attitude;
- Up-to-date knowledge;
- Active listening abilities; and
- Honest and patience.

What is expected from the protégé?

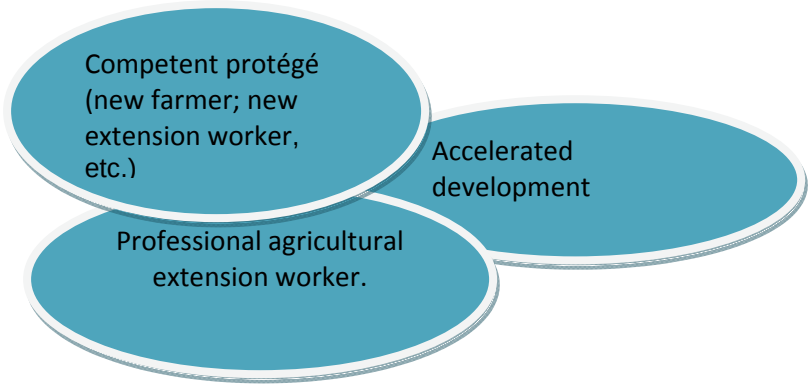
- Respect and trust of the mentor;
- Be willing to enter into a mentoring relationship;
- Listen to advice and react appropriately;
- Be committed and willing to learn;
- Show an eagerness to learn new skills/knowledge;
- Be willing to take risks;
- Reflect a positive attitude; and
- Be committed and hard working.

- **What are the characteristics of a successful mentorship program?**

The successful outcomes of a mentorship program depend on the development of a mentoring relationship between the mentor and the protégé:

- Trust is: communication + availability + predictability + loyalty. Trust is a two-way street: both mentor and protégé are responsible to built trust.
- Respect for one another
- Partnership building and in particular giving attention to the following:
  - the maintenance of good communication
  - fixing obvious problems
  - accurate prognoses of how decisions could affect the goals
  - discussing progress and
  - monitoring change.
- Building self-esteem of the protégé (people have a desire to believe that the yare worthwhile and valuable) and
- Time – setting aside specific time slots and not changing them.

The outcomes of a successful MENTORING relationship are:



- **What are the obstacles that hinder or block mentoring relationships?**

Obstacles that may confront the protégé and hinder relationship:

Obstacles that I might hinder or block the relationship
• The mentor's style does not meet the protégé's needs, and frustration may occur • Insufficient time and a too high expectation by the protégé • A protégé with a hidden agenda • An inappropriate attitude by the protégé expecting too much from the mentor and demanding more time and attention than what is actually needed.

Obstacles that could confront the protégé
• Peer and /or professional jealousy from colleagues who do not have a mentor • Being accused of "holding onto the coat tails of another" • One party overstepping professional boundaries expecting the relationship to become more personal". (Particularly in cross-gender relationships) • The mentor falling from favour when others disapprove the activities of the mentor.

To summarize a mentoring relationship consists of four phases:

PHASE 1: Prescriptive relationship

► The mentor is describing
► The mentor will devote more time to the protégé
► Detail guidance will be provided by the mentor

PHASE 2: Persuasive relationship

► The mentor will actively persuades the protégé to find answers and seek challenges
► The protégé in this stage has some experience
► The mentor push the protégé into discoveries

PHASE 3: Collaborative relationship

► The protégé has enough experience in this stage to work together with the mentor to jointly solve problems
► The protégé actively cooperates with the mentor

PHASE 4: Confirmative relationship

► The protégé now have a lot of experience and have mastered the job requirements, but still require the mentor's insight with regard to broader aspects
► The mentor acts as a sounding board, an empathetic listener

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My notes.....

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Developer:

- Dr S E Terblanché

Authenticator:

- Dr J Stevens

Extension Learner Guide

Agricultural Extension

Level 5

Module 6

Mobilising of farmer groups

Study objective

After completion of this module, the learner should be able to have a basic understanding of:

- The concept of a group as a catalyst for change
- Different types of farmer groups found
- Various roles that group members can play in group functioning
- Group dynamics (internal and external)
- Group goals and norms
- Group cohesiveness and a constitution
- Development stages of group formation
- Internal group dynamic factors
- External group dynamic factors
- Efficiency indicators of farmer groups
- Why farmers form a new farmer group?

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Farmer groups have become very popular in agricultural related activities in both developed and developing countries. Research in agriculture suggests that learning in groups is effective for the majority of farmers, and that participation in education and group activities is linked to the capacity to change[3)].

Well functioning groups do not just fall out of the blue. The mobilisation of farmers into effective groups is a process that takes time to develop to a point where it can be effective and where the members feel connected to it. Several extension roles can be conceptualised to help the farming communities organised. Results and experience suggested that group efficacy is linked to several group dynamic variables, which are developed during the process of group formation. Group efficacy has a strong influence over the characteristics of group life, including the length of time that group members are willing to continue working together.

This module first reviews some of the important principles that determine group formation and function. It proceeds to review the general experience and perception of extension workers regarding group mobilisation by using a lessons learned from the Limpast project.

1. What are the characteristics of a group?

A group may look like simply a number of people coming together to have discussions, or to make plans, or to have a party, or for whatever other reason one might image. But when one looks beneath the surface of just being together as people, many of the *following characteristics* will probably be present:

- The group consists of two or more individuals. One person cannot be a group all by him/herself.
- The members of the group are interdependent. This means that, in some way or other, each group member needs the contributions of the other group members in order to reach their own, or the group's goals.
- The members see themselves, and are seen by other members and outsiders, as belonging to the group. The members talk about the group as "us" and "we".
- The members share norms concerning matters of common interest and participate in a system of interlocking rules.
- The group members influence each other and are therefore in interaction with one another
- Most of the members probably find the group rewarding.
- The group members pursue common goals.
- Group members communicate regularly to be able to build up affective bonds.

There is no consensus among social scientists as to which of these characteristics are most important. It is however generally accepted that a group is a dynamic, social entity, composed of two or more individuals, interacting independently in reaction to one or more goals that are valued by the members such that they influence one another to some degree through interpersonal communication.

2. Group dynamics

Since group members think differently from the other members and perceive life differently, they therefore do things differently. The ups and downs in a group, the active and restful parts of the life of a group and differing at times are very normal group dynamics. It is important to understand group dynamics and the role of effective communication in this dynamism.

Often we think that group activities should go smoothly, and that everything should be in harmony at all times. Not so! That is not how group dynamism work normally works. On the contrary, if group members always agree on everything and always work in harmony, you as a group facilitator should be concerned! The aim with effective group functioning is that the aims and values of the group members, group leaders and the group facilitator move towards a balance and agreement.

A simple way to define *group dynamics* therefore is that it is a study of the way in which individuals behave in a small group. A more elaborate definition of group dynamics, in the internal tradition is: *Group dynamics is the area of social psychology that focuses on advancing our knowledge about the nature of group life.*[10)]

Internal group dynamics include the interest of the individuals, abilities, desires or wishes, as well as the block and frustrations and the adjustments made. The summation and integration of all these forces are labelled as the *internal group dynamics*[10)].

Since no group exist in a vacuum, external factors or forces such as community values, institutional values, community expectations, parent group affiliation and control, intergroup competition and status affect every group. These external forces are reflected largely through beliefs, feelings and actions of members and are referred to as *external group dynamic factors*[10)].

3. Types of farmer groups[5)]

Groups can either be formal or informal, but other classifications can also be made. Sociologists generally refer to smaller groups as informal groups and to larger organisations as formal organisations.

- ***Formal organisations***
  - A member's behaviour is determined by written rules and regulations
  - Higher officials formulate the rules and regulations before s/he even becomes a member.

- ***Informal groups***

    - "Behavioural rules and regulations" are unwritten, often not even verbalised.
    - Members themselves determine the behavioural "rules and regulations."
    - They are easily changed.
    - The expectations emerge spontaneous as members associated with one another over time.
    - Informal groups are usually small.

Farmer groups can be grouped into two types: namely the one is the community-based organisation and the other is the commodity-based organisation.

i. Community- based groups

This type of group functions at village or community level and could include a community-level cooperative or farmer association dealing with the inputs needed by members, the resource–owners, to enhance the productivity of their farming business based on the land, water or animals. These groups have usually well-defined geographical boundaries, and are mainly responsible towards the development of the wider farming community. These groups create the possibility to fully apply the fundamental philosophy of extension "help to self help".

ii. Commodity- based farmer groups

These farmer organisations specialise in a single commodity and opt for value adding through improvement of production and expansion of markets. They are designated as output-dominated farmer organisations. Not specific to a single community, they can obtain members from among the regional growers of that commodity who are interested in investing some share capital to acquire the most recent processing technology and professional manpower. These farmer organisations have to operate in a competitive environment. Research, input supply, extension, credit, collection of produce, processing and marketing is all integrated to maximise the returns on the investment of the members who invested in the collective enterprise. These production aspects are usually addressed through different "study groups" with the emphasis on research, education and agricultural business management. The role of extension with in these farmer groups is integrated with among others aspects of organisation to help farmers to maximise the returns on their investment of the collective enterprise. Several successful study groups are found among the table grape growers, cotton growers, and tobacco growers.

Activity 1

Small group activity

1. What do you understand under the concept *"group dynamics"*?

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2. Identify the different farmer groups in your area.

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3. Discuss the different extension roles that are expected from you to play in the community and commodity farmer groups.

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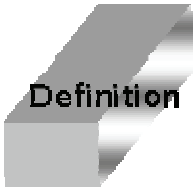
4. Various roles that members can play

Examining the roles assumed by group members is important as group members have distinctive roles in their groups.

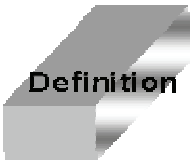


Roles refer to a set of distinctive or expected behaviour patterns attributed to someone occupying a given position in the group. The individual playing different roles in an inconsistent way often complicates the understanding of the role[5)].

A number of diverse roles are filled in this way. The role assumed by an individual within a group will depend on his/her background, ability and needs and on his/her own and other's expectations.

4.1 Categories of member roles

In observing and coding roles as they function in the group process, we can categorise them either as task or maintenance oriented.



Task dimension: roles require actions that direct the group towards their goal achievement: goal setting, defining working procedures, generation of information, processing of information, group decision making, etc.

Maintenance dimension: aim at keeping the group atmosphere "workable and relaxed". These roles include maintain a good learning climate and a good spirit in the group, development of openness, mutual understanding and respect, development of group norms and self-regulating mechanisms, maintaining commitment and contribution to the common task, conflict handling, etc.

All group members must undertake both task and maintenance roles in order to achieve its goals[5,10,7)].

Task roles

- Information and opinion giver: offers facts, opinions, suggestions, ideas, and relevant information
- Information and opinion seeker: asks for facts, information, opinions, ideas and feelings from other members.
- Starter: proposes goals and tasks to initiate action within a group
- Direction giver: develops plans on how to proceed and focuses attention on the task to be done.
- Summariser: pulls together related ideas or suggestions.
- Coordinator: shows relationships among various ideas by drawing them together, harmonises activities of various subgroups and members.
- Energiser: stimulates a higher quality of work from the group
- Reality tester: examines the practicability and workability of ideas, evaluates alternative solutions, and applies them to real situations in order to see how they will work.
- Evaluator: compares group decisions and accomplishments with group standards and goals

Maintenance roles

- Encourager of participation: warmly encourages everyone to participate, giving recognition for contributions and demonstrating acceptance and openness to the ideas of others.
- Harmoniser and compromiser: persuades members to analyse their differences of opinion constructively; searches for common elements in conflicts and tries to reconcile disagreements.
- Tension reliever: eases tensions and increases the enjoyment of the group members by joking.
- Communication helper: shows good communication skills and makes sure that each group member understands what the other members are saying.
- Process observer: watches the process by which the group is working and uses these observations to help examine the group effectiveness.
- Standard setter: expresses standards and goals in order to make members aware of the direction of the work, and the progress being made towards the goal.
- Active listener: listens and serves as an interested audience for other members; is receptive to other's ideas.
- Trust builder: accepts and supports openness of other group members, encouraging risk taking and individuality.
- Interpersonal problem solver: promotes open discussions or conflicts between group members in order to resolve conflicts and increase group cohesion.

Activity 2

Small group activity

Divide the learner group into two sub groups. Give the one group a specific topic to discuss, while the other group should observe the different roles that group members of the discussion group are playing. Use the following checklist to complete the various task and maintenance roles members play in this interaction.

Role	Observation (√)	Identify whether task and/or maintenance (√)
Gives direction/prevent stray offs		
Creates confusion		
Encourages/stimulates others to express their views		

Interrupts/disrespects contribution of others		
Gives information/clarification		
Seeks information/clarification		
Summarises/structures discussion		
Gives opinion		
Asks opinion		
Agrees, accepts		
Disagrees, refuses		
Poses problem		
Proposes action		
Asks suggestion for action		
Creates tension/undermines group climate		
Relaxes tension/makes discussion more pleasant and lively		
Expresses feelings/emotions		
Suggests working procedures/norms		
Summarises or format conclusions		
Check consensus		

5. Goals and functioning of farmer groups

It is clear that the basic functions and objectives of a farmer organisation are determined by the specific development situation and the objectives of the extensionist. What is important is that all these objectives, regardless of their nature, be clearly defined and formulated. This also holds for the group that have a limited aim and thus a shorter lifespan, e.g. research or educational study group. The goals of a group must be reasonable and attainable and should fall within the groups; line of function and within its reach. On reaching their goal, the group

should, unless a new aim has been set, rather dissolve formally. "*A group unaware of its purpose is a rudderless ship"* and will endanger the motivation and enthusiasm of members[9)].

A *group norm* is an idea in the minds of the members of a group, an idea that can be put in the form of a statement specifying what the members and other men *should do*, ought *to do*, are expected *to do*, under given circumstances. A norm has a *to do* character, so it has to do with *behaviour*. Norms provide guidelines and are standards for behaviour in the group. Norms are the group's common beliefs regarding appropriate behaviour for its members.

Not all behaviour is covered by group norms. Norm's deal mostly with the tasks required accomplishing the group's task and maintenance of the group. If a group has a certain norm, it is assumed that the majority of the members have the same idea before it is considered a group norm. It is impossible to say how many group members must have the same idea before it can be considered a group norm[5,10)].

Norms are formed only with respect to matters that have some significance for members and are therefore social products. In some cases all members may adhere to a norm, and in other cases only a slight majority may follow the norm. If there is a norm in a group, one would expect members to do something when a member deviates from the norm. This is called *negative social sanctions.* Sanctions may be mild or severe and are indications of the extent of norm development in the group.

Norms give members the security of knowing what behaviour to expect from other group members[8)]. Norms co-ordinate the interaction among group members in order to maximise the outcomes of the participants. When members accept norms, they in effect agree to place restraints on their relationships. Norms provide a basis for interdependent relationships among members. Some norms are explicitly stated (formal) while other is implicit or unspoken (informal). If the norms are vague, tension may arise over what is appropriate and inappropriate behaviour. Norms become internalised by members, so they act spontaneously to them[7)].

The need for a constitution depends on the nature and the aims of the group. The constitution of a group offers, amongst others, guidelines and standards for behaviour in the group, and thereby a measure of tasks required to accomplish the goals and objectives set by the group. For new members this means a great deal in terms of security, as they then know what is expected of them and how to conduct themselves[1)]. Often the members bring wider societal norms and personal needs, motives and reasons for participating with them into the group. Here a good constitution where the objectives are clearly illustrated will prevent tension, frustration and other problems.

6. How to mobilise farmers into an effective farmer group

The essential characteristics of an effective group are that members need to take ownership for their decisions and planning within a group. Groups like individuals, however pass through several stages or phases as they learn together. These stages may be longer or shorter for each group, or for individual members of the group, but all groups will need to experience them. To be able to form effective groups, it is necessary that the dynamics of group development must be facilitated well in order to get synergy like attitudes of cooperation or combined action, among group members. This is where the extensionist must experience the characteristics of a group, know their goals and tasks and have the necessary support in order to be effective in task completion.

The ultimate goal of the intervention of an extensionist in the formation and maintenance of a farmer group is that the group must be encouraged to develop goals and standards for its performance and then to abide to it. For a group to be successful, members should take responsibility and ownership for decisions and take control of the group functioning.

A *mature group* is defined as "a self-directed, self-controlled body in which every member carries his part of the responsibilities for developing and executing the group's plans"[4].

The following sequential stages of the process that must occur before group members can support each other as they make changes to practices and learn together are summarised in the different stages of group development[6,2].

- **Forming or orientation stage**

When the group is forming, members often go through an orientation phase characterised by mild tensions, uncertainty about the group's purpose, structure and leadership. The situation is further complicated by the absence of specific norms relating to behaviour and the attainment of goals, as well as uncertainty about their role in the group. This is the phase where individuals getting to 'know 'each other (history and future aspirations), and where shared values and trust is developed. This stage can be very stressful and therefore it is a time of "*testing waters*" to determine what type of behaviour is acceptable[5].

- **Storming or the conflict stage**

Storming is characterised by conflicts within the group, as members struggle to define their group goals, their relations with one another, and the role that members will play in the group. This is the stage where members getting to know each other as individuals (history and aspirations). While during the first stage the member will accept the leaders' guidance with

few questions, during this stage the purpose of leadership, individual roles and group norms are challenged. Members may manifest their dissatisfaction in the form of "fight" (against authority of peers) or "flight" (leaving the group). This stage of development is characterised where individual members acquire personal-self confidence in themselves and interpersonal skills and leadership skills are revealed.

- **Norming stage**
  During the third developmental stage inter member conflict is replaced with cohesiveness where the members develop a feeling of group unity, *camera die*. In general there is a strong sense of group identity present and the mutual support, trust and co-operation between members increase, and decisions are reached through consensus. This increased cohesiveness reflects the development of group norms, which stabilise and harmonise the dynamic of the group.

- **Performing or the task performance stage**
  Performing manifests in a fully functioning and accepting the group. This is where the individual group member coming to regard other members as credible sources of support and advice, and a certain commitment to fellow members is illustrated. For a group to reach this stage of development, where group goals and objectives are attained, a certain level of group maturity is expected. Time and considerable change have take place before a group reaches this phase[2)]. Stage four is marked by interdependence in personal relations and problem solving in realm of task functions, and the group is in general focused on its purpose for establishment.

- **Adjourning or dissolution stage**
  With the task near completion, a group will move into what is called the adjourning period or transformation stage, in which finalising of a specific task and a changing of relationships is anticipated. This stage should be planned within farmer groups, and must take place when the goals, as set up by the group, have been accomplished or when the groups' time and resources have been exhausted[6)]. This can also be a stage where farmer groups revisit their focus, and identify a new focus for studying with new goals and objectives set.

  This model of group development is therefore a *successive-stage theory* as it specifies the usual order or phases of group development or maturity level of the group[6)]. This pattern of group formation and development is not universal and groups tend to "skip" particular stages. Unfortunately with relative ineffective study groups it was found that very few developed to a stage of "performance" or a relative stage of "maturity " in the group, and instead they became unmotivated or stagnated at earlier stages of group development.

7. Case study: The LIMPAST Project – Mobilisation of farmer groups[9)]

In 2005, thirteen extension officers from the Limpopo Department of Agriculture were seconded to the LIMPAST (LIMPOPO PROVINCE AGRICULTURAL STRATEGIC TEAM)

PROJECT and participated in a program to determine the effectiveness of their farmer groups and to mobilise the farmer groups to be more effective.

The preceding focus group discussion formed the basis of the program presented to the extension officers and the following represents the findings of their perception with regard to the effectiveness of the groups.

7.1 The existing group

a) Initiating the formation of the group

According to 85% of the respondents extension workers took the initiative for the formation of the group. Only 15% indicated that the farmers did play a role in the forming of the group. During the group discussion the respondents reach consensus, namely that the extension workers took the initiative to form the group and farmers did not really play a role.

Focus discussion:

The fact that the extension worker took the initiative is not a problem. In many cases he/she needs to take the initiative. The challenge is to persuade the members of the group to believe and accept that it is their group and that it is not the extension worker's group. The members are responsible for the activities of the group and not the extension worker. One possible method to do it is by means of problem conceptualisation, whereby one, systematically probe into the possible causes of a problem. To achieve this, it is recommended that with regard to each problem, one should alternatively ask the questions, "What does it entail or comprise?" and "What is the cause or are the causes?"

b) Existence of the group

The analyses of the data indicated that the groups in the survey exist between 1 and 15 years. The majority respondents, namely 77% indicated however that the groups are not older than four (4) years.

Focus discussion:

The number of years a group exist is no indication or criterion of the maturity or effectiveness of the group. However, indications are that how longer the group exist the more difficult it could become to bring about change within the group. What is accepted today is that a group should adjourn or have to refocus when the objectives have been accomplished.

c) Group size

In Table 1 respondents indicates the current size of the group as well as their perception of the ideal size of a group.

Table 1.Current group size and ideal group size as perceived by respondents

Respondents	Current group size	Ideal group size
1	15	12
2	47	50
3	25	-
4	25	30
5	30	10
6	25	17
7	20	20
8	16	30
9	22	12
10	30	25
11	30	30
12	9	10
13	30	20
Average group size	**25**	**22**

Focus discussion:

There is enough evidence today that group size definitely has an effect on the functioning of the group. The smaller the group, the more time is available for discussions and members are direct involved and participate in activities. The larger the group, the less time is available for discussions and the less direct involvement and participation in the group. Group members in smaller groups will change their opinions more toward consensus, while in larger groups there seems to be a tendency toward factionalism. Although research indicated that the ideal or optimum group size ranges between 5 and 7, it could only serves as a guideline. The optimum size must be seen as being dependent on the specific situation and circumstances such as the task, goal, urgency of the problem, etc.

d) General role definition of members

Only 54% of the group members do know their role within the group, namely what can the group expect from them and what do they expect from the group. The respondents clearly indicate that members should define their roles and that they need to know what is being expected from them and what could they expect from the group.

Focus discussion:

The answering of the following questions needs urgent attention:

- *Does each member know what role he/she needs to fulfil in the group?*
- *Does each member understand how his/her role fit into the over-all structure and group objectives attainment?*
- *Do they understand the importance of their roles and how the performance of their roles contributes to group productivity?*

e) Reasons why the group was formed

The respondents mentioned 22 possible reasons why the groups were formed. These reasons are clustered and presented in Table 2.

Table 2. Reasons for group formation according to respondents

Reasons for group formation	Number of times indicated as reason	Percentage %
i. LIMPAST project: improve production, improve profit, increase skills/knowledge	12	55%
ii. To purchase inputs as group	2	9%
iii. To distribute information	2	9%
iv. To become independent	1	4%
v. To create jobs	1	4%
vi. To work together as a group	1	4%
vii. To mobilise the community	3	15%

Focus discussion:

According to Table 2 the most important reason (55%) for the formation of the groups is because of the LIMPAST project. Interesting however is the fact that reasons such as to mobilise the community, to become independent and to work together as a group, were also mentioned. This could be an indication of a group that has already reached a certain level of maturity.

f) Leadership structure (chairperson)

The importance of leadership and the leadership structure in efficient group functioning can't be overestimated. The fact that a farmer member is the chairperson in all the groups is already a positive move. Aspects that need further investigation are to determine the reasons why a certain person has been selected and what can the extension worker do to support him/her.

g) Meeting procedures

According to the respondents the groups do met regularly. It varies between monthly (38%), once a week (31%) and when required to meet (23%). Only one respondent indicated that he/she is uncertain.

Focus discussion

During the group discussion the participants reach consensus namely meetings take place when necessary and dictated by the program. Important however is that meetings do take place regularly. Other aspects that need further research are time of meeting, length of meeting and venue.

Checklist for effective meeting……..

- Do you really need your meeting?
- What are the objectives for the meeting?
- What kind of chairperson is required for the meeting –since the chairperson is responsible for the atmosphere during the meeting
- Select do-able tasks
- Focus on the agenda
- Promote positive thinking amongst members
- Meetings must reach decisions
- Ensure maintaining of healthy relationships (handle conflicts and power struggle in the group)
- Dealing with hidden agendas (where members have personal objectives that are entirely different form the official objectives of the meeting)
- Make meetings interesting
- Develop and apply useful norms through an appropriate constitution

h) Goals and or objectives of the group

The respondents identified 26 objectives that could be clustered into 8 broad objectives. The major problem was that the objectives defined were very broad and therefore totally impossible to measure. The data is presented in Table 3.

Table 3. Objectives of the groups as being presented by extension workers

Objectives	Number of times indicated as an objective	Percentage %
i) To improve maize production	11	42%
ii) To alleviate poverty	6	23%
iii) To form a co-op	3	11%
iv) To undertake trials	2	8%
v) To make farming a business	1	4%
vi) To produce other crops	1	4%
vii) To solve problems	1	4%
viii) To start a broiler project	1	4%
TOTAL	**26**	**100%**

i) Extension worker's involvement in-group activities

All the extension workers indicated that they are involved in the group activities. In describing the specific role or roles the respondents are playing in the group, a total of 25 roles were described. These roles were then clustered into 5 broad roles that the extension workers are playing within the group (Table 4).

Table 4. Specific roles that extension workers play within the groups

Roles	Number of times indicated as a role	Percentage %
Motivating, encouraging mobilising and supporting	6	24%
Giving advice and demonstrating	9	36%
To co-ordinate and link members to other role players	5	20%
To facilitate the process (planning organising and monitoring)	4	16%
To fulfil a mentoring role in the group	1	4%
TOTAL	**25**	**100%**

Focus discussion

According to Table 4 the role to give technical advice and demonstrate technical aspects to the group, were indicated 9 times (36%), while the role to motivate, encourage, mobilise and support the group were indicated 6 times (24%). Interesting however, is that 46% of the respondents indicated that they need to play more than one role. This is not a strange phenomenon because it is often expected from extension workers to play different roles within the same group or community. What is of paramount importance is the fact that you need to be a specialist in at least one field of agricultural skills and knowledge to gain credibility.

j) Aspects/factors important for a group to function efficiently

The 13 respondents identified 23 different aspects that are important for a group to function efficiently. The three aspects that were identified by at least 4 respondents or more are:

- Understanding and knowledge of the goals/objectives
- Members accepting the trials as their trials
- The leader of the group

Other aspects identified include the following:

- Commitment
- Trust and transparency
- Team work

Focus discussion

During the discussion of the question by the two groups the following aspects were identified:

- Cohesiveness and team work
- Common goal
- Commitment
- Interest
- Participation
- Self-reliance
- Ownership

k) Efficiency of the group

In Table 5 the respondent's perception of the degree of efficiency of the group and how farmers (members) would rate the group efficiency are being indicated.

Table 5. Respondent's perception of the efficiency of the groups

Efficiency scale	Extension worker own perception		Extension worker perception of farmers rating	
	n	**%**	**n**	**%**
Not efficient at all	0	0%	1	8%
. To a slight extent	3	23%	1	8%
To a fair extent	9	69%	5	38%
To a great extent	1	8%	4	31%
Do not know	0	0%	2	15%
TOTAL	**13**	**100%**	**13**	**100%**

The majority (92%) of the respondents indicated that according to their perception the groups currently perform only on an average level and even slightly below average. 31% however indicated that farmers would rate the efficiency of the groups higher than their own rating. According to Table 5 there is definitely room for improvement in-group *efficiency.*

Focus discussion

The reasons for the current state of efficiency are the following according to the respondents:

Positive reasons:

- They have a good knowledge of how to successfully produce maize
- The group has stimulated some interest in the community
- Land Bank now support them with finance
- They have open a bank account to purchase inputs together

Negative reasons:

- They still need to get involved in the planning and executing of activities and why they need to do it
- There is a lack of understanding and trust
- Still a need to improve ownership
- Majority of members are elderly people
- Members are afraid to accept new ideas
- Because the trials are on one persons land the others feel that it is only the one person that benefits
- Every one still does not feel free to participate
- Dependency syndrome still in place

During the group discussion the two groups identify mainly two reasons for the current performance:

- Farmers still need more training opportunities
- The dependency syndrome that is still prevalent in the groups

l) Group standards and norms

The respondents unanimously indicated that the groups do have a **constitution.** A total of 42% of the respondents indicated that the constitution is necessary for management purposes, 25 % indicates that it is a guide, 25% indicates that it binds the members while only 8% indicates that it forms the norms/standards and values of the group.

m) Successes achieved by the group

In total the respondents mentioned 26 successes that the groups have achieved. These successes are clustered and presented in Table 6.

Table 6. Successes groups have achieved as perceived by respondents

Successes groups have achieved	Number of times indicated as a success	Percentage %
Knowledge & skills	9	35
Forming linkages	3	11
Be able to do things themselves	7	27
Organise information days	4	15
Learn to work together	2	8
Attend meetings	1	4
TOTAL	**26**	**100%**

n) Needs analysis

According to the respondents, the group members (farmers) identified 28 needs that can be clustered into 7 broad areas. The results are being indicated in Table 7.

Table 7. The needs of group members as being perceived by respondents

Broad areas of members needs	Number of times need being mentioned	Percentage %
Alternative crops/Farming enterprises	6	21
Tractors and equipment	6	21
Inputs available in time	5	18
Market to sell products	3	11
Create employment	3	11
Improve farming	3	11
To form co-op and work together as a team	2	7
TOTAL	**28**	**100%**

o) Utilisation of an existing group

Respondents unanimously indicated that they could utilise the existing group to convey a message/ information/transfer technology/ persuade members to adopt new ideas, etc. Respondents indicate that they will use the group to:

i) meet with the group, identify their needs arrange workshop to address needs
ii) members must demonstrate what they have learned
iii) encourage other farmers to join them
iv) provide a platform for them to express themselves
v) use a participatory approach to get all involved
vi) organise promotions at the project.

7.2 Forming a new group

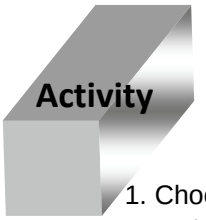
Respondents identified the following aspects to be important with regard to the formation of a new group, evaluated on a 7-point Likert scale (1 = not important at all and 7 = absolutely important).

Table 8. Reasons for the formation of a new group as perceived by respondents

Aspects important for group formation	Scale point	Priority of importance
Size of group	5.76	11
Farm income of members	6.46	4
Needs of member	6.46	4
Gender composition	4.92	14
Level of education	4.46	15
Cultural differences	4.23	17
Farm size	5.58	13
Knowledge and skills	***6.84***	***1***
Commitment of members	6.69	2
Participation by members	6.46	4
Identify leadership structure	6	8
Developing goals and objectives of group members	6.38	5
Group cohesiveness	5.81	10

Addressing possible conflict	5.92	9
Homo/heterogeneous group	4.4	16
Use of experts to address the group	6.46	4
Use own group members to address the group	5.61	12
Use extensionists to address the group	4.15	18
Continuously evaluate activities	6.54	3
Necessity to develop a constitution	6.2	7

Activity 3



Small group activity

1. Choose a farmer group of your choice and use this checklist to determine at which maturity stage the specific farmer group is. Identify possible factors that may hinder the formation and growth development of the group.

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2. It is now your task to identify how you will strengthen those forces that will mobilise the group to function effectively.

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My notes.....

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Developer: Dr Joe Stevens

Authenticator:

- Dr SE Terblanche

Extension Learner Guide

Agricultural Extension

Level 5

Module 7

Leadership and facilitation

Study objective

After completion of this module, the learner should be able to have a basic understanding of:

- Leadership
- Characteristics of leaders
- Leadership styles: autocratic, democratic and liaises faire
- Situational leadership
- Group maturity
- Role of extensionists in improving leadership
- Opinion leadership
- Conflict management styles
- Categories of conflict
- Stages of conflict
- Conflict handling strategies
- Facilitation
- Personal skills and qualities of group facilitator

Table of contents

Leadership is unquestionably the key factor to successful group functioning and to achieve the stated missions for successful agricultural development. The approach to cooperate with farmer groups to link identified needs with practical applications is a method to disseminate but also to generate appropriate agricultural knowledge. The implementation and continued success of farmer groups relies on the ability to identify and nurture farmer leaders. Ignoring the importance of balanced leadership and shared responsibility can damage the future of farmer groups.

"A crucial dimension of sustainable development is the governance style. The way farmer's projects and groups are managed or manage themselves is as important as their goal. It determines the involvement of group members in the process and the decision making. It is part of the social learning process generated by collective dynamics." [4)]

1. What is leadership?

The word "leader" appears as early as the year 1300 but "leadership" did not appear until about 1800. There are as many definitions of these concepts as the persons who have attempted to define them.

Definition

A **leader** is someone who exerts more influence on other members than they exert on him/her. Without followers there can be no leader, and without a leader there can be no followers. The leader and the followers both give something to and receive something from each other[16)].

Leadership refers to the process whereby one individual influences other group members towards the attainment of defined group or organisational goals[5)]. Leadership can be viewed as the process of influencing the activities of a group towards goal setting and goal achievement.

Leadership is also defined as 'a process whereby an individual influences a group of individuals to achieve a common goal." [3)]

2. Characteristics of a leader and a follower

Because the leader and the followers control resources that the other desires, they can each influence the other's behaviour. Influence is directed toward persuading members to co-

operate in setting and achieving goals[18)]. Leadership, then, becomes the art of ensuring that group members work together with the least friction and the most co-operations. This often means that leaders need to persuade and inspire members to follow their views of what needs to be done in order to achieve a group's goals.

Leader:

- The leader receives status, recognition, esteem, and other reinforcement for contributing his/her resources to the accomplishment of the group's goals.
- The leader provides structure, direction, and resources
- The amount of a leader's participation and influence affects members' perceptions of his/her leadership.
- This view of leadership does not mean that leadership is based on domination

Follower:

- The followers receive the leader's resources and ability to structure the group's activities toward the attainment of a goal.
- The followers provide deference and reinforcement.
- The amount of encouragement and support of followers affects the amount of a person's perceived leadership status.

3. The role of leadership in the developing of sustainable agricultural development programs

The buy-in of local leaders into an agricultural development program is very important for the sustainability of it. The involvement of key leaders build trust and respect in the program, and therefore they are instrumental in the carrying out of program functions and transferring capacity building skills to the rest of the farmer group. Obtaining stakeholder participation and commitment ultimately influences the members to become more active in the group functioning.

The following aspects are important for the nurturing of leadership at farmer group level[18)]:

- The use of group leaders is important for the sustainability of the farmer group- the farmers are instrumental in carrying out organisational functions
- Crucial to get group members involved to utilise their local knowledge
- Key stakeholders must be actively involved in the process – it is essential
- Group members must learn to build their own future and maintain dignity by gaining the necessary technical, management and marketing skills
- Leaders should be credible with a world view and should agree to utilise a participatory approach for the functioning of the group

- Put power into the hands of the local members
- Characteristics of effective leaders: ability to communicate, good farmers, willingness and time to participate in the farmer group, respected by the community

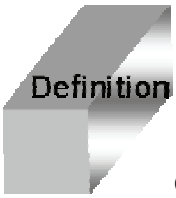
3.1 What is the role of the extensionist in improving of group leadership?

The extensionists must continuously build and develop the capacity of the leader farmers. They must have the ability to identify and collaborate with local farmer leaders who are representative of and respected by the community. Building these partnerships with farmer leaders requires a concentrated effort to understand the farming community lifestyles and cultures in order to facilitate local participation. Extensionists must initial take a grassroots approach to the planning and initiation of the farmer group to address the local needs, but must inspire the farmers to take responsibility for the farmer group and its program.

The following aspects are important for the improving of leadership characteristics and skills in the farmer group[4)]:

- Develop relationships with leader farmer and foster a partnership with them to work together and build the capacities of local farmers
- Extension programs should be designed around the needs of the farmer, which may also mean forming farmer groups comprised of local opinion leaders
- Be visionary about the farmer program and inspire farmers to help develop the vision and make it a reality
- Identify key leaders, nurture them, and discuss ideas , interests, needs, roles and limitations
- Work with local famer leaders to identify someone in the ranks to represent them when a chairperson should be elected for the farmer group.
- You must not take things for granted when working with local farmer leaders and their culture. You must understand their lifestyle and culture to facilitate their participation in the farmer group.[19)]
- Become a “culture broker” by using local resources, contacts, and leaders from within the community who possesses language and culture knowledge to gain access and respect from the faring community.
- Extensionists should be prepared to spend time with the farmer leaders, earn their respect and be honest.

3.2 Opinion leadership



Opinion leadership is the ability to informally influence individuals' attitude or behaviour in a desired way with relative frequency.[7)]

OR

...members of a small social group that influence other members of a group."[6,17)]

So opinion leaders are usually characterised from their followers regarding the following:

i) Technical competence

ii) Act as opinion leader regarding a specific topic or multiple topics

iii) Socially acceptable

iv) Physical accessible – close proximity of opinion leaders

Activity 1

Small group activity

This is a brief self assessment activity done in small groups. Ask each person to place themselves at an appropriate point on the attached continuum, and to explain briefly why they have chosen it.

1	2	3	4	5
Controlling		**Consultative**		**Empowering**

4. Leadership styles

a. The autocratic style[8)]

This style implies that the leader does all the thinking and planning for the group (s)he is leading and that the responsibility to guide and control the group dynamics is mainly on the leader. It is also the leader who has to coordinate the activities of the group members, and to assess its functioning. Group members are expected to provide the information and data that the leader needs to make the right decisions, and they are supposed to consciously implement the tasks given to them.

An autocratic leader does not believe in delegating authority or decision-making power to the members of the group, nor does such a leader share power and influence with them. Communication flows are mostly from the leader to the group members and interactions are centred on the leader, whilst interaction between group members is to be of secondary importance.

Therefore, when an autocratic leader leaves the group chaos may reign, group members lose their guidance, no one really knows what is going on or has the oversight to set priorities, nor does anyone know how to get the mandate from his/her fellow group members to keep the group performing well. [3,18,8,2)]

b. The democratic style[8)]

This style emphasizes the necessity for group members to participate in the process of planning, decision-making, and implementation. It stresses the need for positive human relations and collaboration, and the point of view that any leader to be most effective in her/his leadership when (s)he can inspire the group members to think creatively, and contribute to the group's performance with their best talents, competence, ideas and energy. To be most effective communication is to occur as a free spontaneous exchange of ideas between all members of the group including the leader her/himself as one of them[8)]

c. The laissez-faire style

"Laissez-faire' is the expression in French meaning *"Let it be done"* (without interference). In a positive sense it can be interpreted as a style of leadership by delegation, the leader placing trust in the group member(s) to whom the decision-making and implementation of specific group tasks is delegated. In a negative sense, it can also be seen as a way to let group members act just as it pleases them. In the latter version the leader does not actually exercise any direct influence on the behaviour and actions of the group members. Such a leader is part of the group, allowing group members to carry on as they prefer without trying to interfere or change their course. Many people, appointed in leadership positions lacking the necessary social skills, experience or subject matter know-how adopt this type of leadership – to the detriment of the performance of the group they are supposedly giving guidance to[3)].

d. Situational leadership[1,2)]

Over the last few decades, people in the field of management have been involved in the search for the "best" style of leadership. Yet, evidence showed that clearly there is no single style that fits all-purposes. Successful leaders are where a leadership style is adopted by a group leader that depends to a large extent on the situation in which (s)he finds her/himself. If group members are inexperienced, the leader may find it necessary to act in an autocratic style. However, when group members have got the opportunity to gain skills, knowledge and experience a leader can act in a more democratic way. In case group members are very skilled, with lots of experience, a leader can facilitate the group performance in a more participative way, as the group members apparently know what it takes to keep the group performing well[1,2,3)]

The Situational Leadership Model[1,2)] is based on the amount of direction (task behaviour) and the amount of socio-emotional support (maintenance) a leader must provide given the situation and the level of "readiness" of the follower group.

Task behaviour is defined as the extent to which a leader engages in one-way communication, by explaining what each follower is to do as well when, where, and how tasks are to be accomplished[1,2)].

Relationship behaviour is the extent to which a leader engages in two-way communication by providing emotional support and facilitating behaviours[1,2)].

Group maturity is the capacity to set high but attainable goals, willingness and ability to take responsibility, and the education and/or experience of the group members[1,2).]

Situational leadership is based on the interplay among (i) the amount of direction or task behaviour a leader gives and (2) the amount of socio-emotional (maintenance) behaviour a leader provides and the (3) readiness level (maturity) that followers exhibit on a specific task, function, activity or subjective that the leader is attempting to accomplish through the individual or followers.

Figure 1 relates the readiness (maturity level) of a follower for completing a particular job objective to the "optimum" leadership style for maximising the follower performance and involvement. The readiness level of the individual or group being supervised is depicted below the leadership model as a continuum ranging from low-level to high-level readiness.

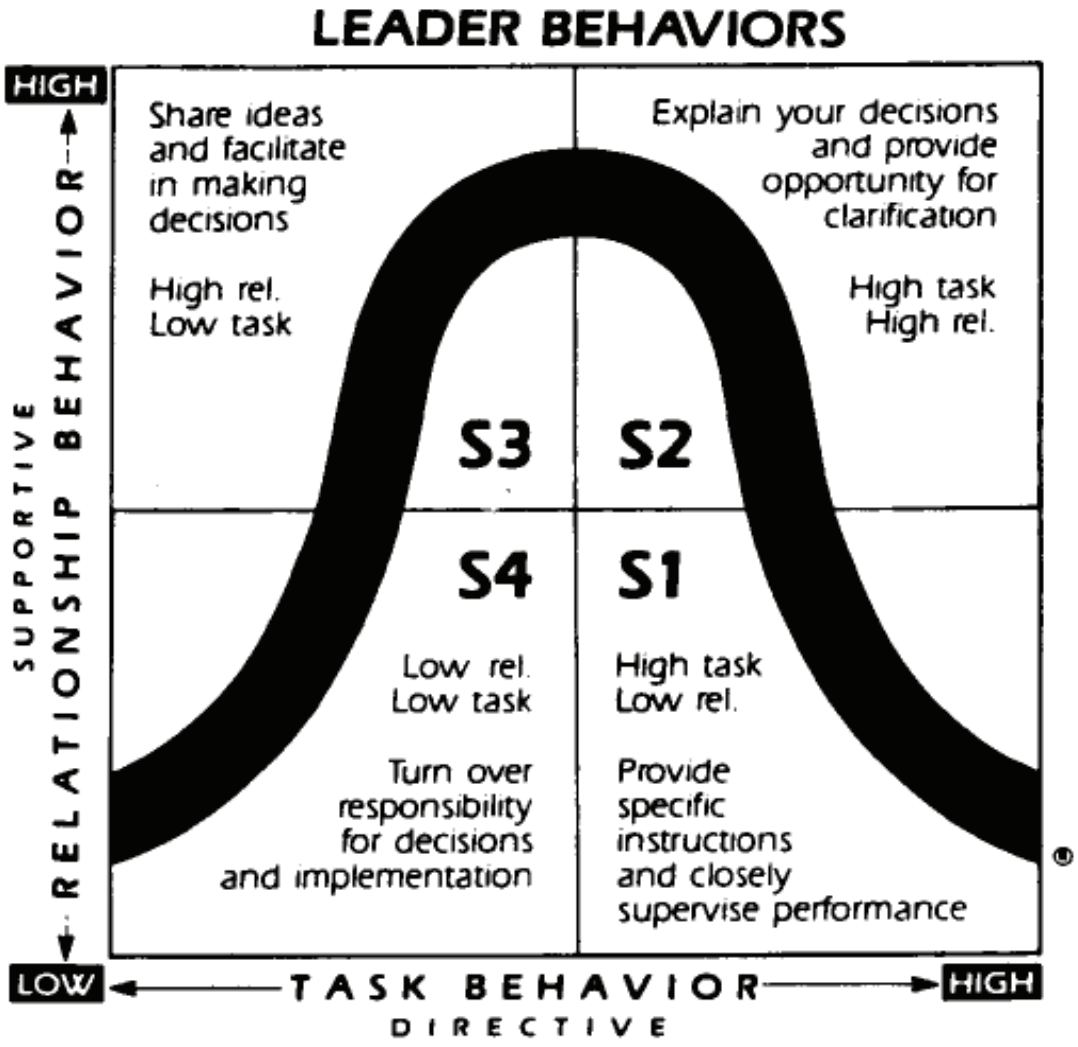


Figure 1. Situational leadership model[1,2)]

In referring to the leadership styles used in the model, the following shorthand description is used[2)]:

S1: High-task/low relationship behaviour is TELLING. M1

i) It is characterised by one-way communication
ii) The leader defines the roles of group members
iii) The leader tells them how, when and where to do various tasks
iv) As the members' experience and understanding of the tasks go up, so does their maturity

High-task/high relationship behaviour is SELLING M2

i) The leader gives clear directions as to role responsibilities
ii) Through two-way communication the leader gives socio-emotional support to get members to psychologically "buy into" decisions that have been made
iii) As the group's commitment to the task increases, so does their maturity

Low-task/high relationship behaviour is PARTICIPATING

i) The leader and the group share in decision-making M3
ii) Two-way communication is used
iii) The leader does considerable facilitating
iv) The members have the ability and knowledge to complete the task

Low-task/low relationship behaviour is DELEGATING M4

i) The group leader allows group members considerable autonomy in completing the task
ii) Members are both willing and able to take responsibility for directing their own task behaviour

In terms of follower readiness, it is not simply a question of being ready, but a question of degree. As can be seen in Figure 1, some benchmarks of readiness can be provided for determining appropriate leadership style by dividing the readiness continuum into four levels. Low levels of task relevant readiness are referred to as readiness level R1, low to moderate as readiness level R2, moderate to high as readiness level R3; and high levels of task-relevant readiness as level R4[2)].

To determine the appropriate leadership style to use in a given situation, one must first determine the readiness level of the follower in relation to a specific task that the leader is attempting to accomplish through the followers' efforts. Once the readiness level is identified, the appropriate leadership style can be determined by constructing a 90° angle from the point

on the continuum that identifies the readiness level of the follower to a point where it intersects on the curvilinear function in the leader behaviour portion of the model. The

quadrant in which that intersection takes place suggests the appropriate style to be used by the leader in that situation with a follower of that readiness level.

What we see with this model is that different individuals can provide occasional leadership, taking charge in areas where they have particular strengths. This approach will address the problem of a leader being isolated from his/her group. Leaders can increase subordinates readiness levels, encouraging them to become more self-motivated and responsible, through the behaviour-modification technique known as *positive reinforcement.* Positive reinforcement is based on the theory that timely rewarding of desired behaviour – or even an attempt at desired behaviour – is likely to encourage repetition of that behaviour. Behavioural change is not instantaneous, and leaders must increase their supportive relationship behaviour slowly to avoid appearing as *"pushovers"*[2)].

Activity 2

Small group activity

The performance of a group has been dropping during the last few months. Members have been unconcerned with meeting objectives. Redefining roles and responsibilities has helped in the past. They have continually needed reminding to have their tasks done on time. What would be your alternative actions that you would initiate as an extensionist?

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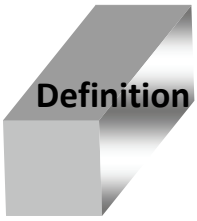
5. Facilitation for effective group functioning

We have seen in the Situational Leadership Model[1,2)] that it is often required from the extensionist or the group leader to play a facilitative role. Facilitation as a concept, activity and role is becoming more generally known and used in human resource practices. With the participatory approach of extension that is commonly advocated it became imperative that extensionists should understand facilitation and it is necessary that the facilitator became acquainted with the necessary skills[14,15)].

The word "facilitate" comes from the French word "facile", which means "easy". As a group facilitator, you help the group to discuss an issue, make a decision or solve a problem. It is required of you to keep the group moving, and always towards its goals. By listening,

observing and using of your intuition, you are always very aware of individual needs and desires. When the group understands the tasks and are busy working on that, you will focus on the process and the people involved in the process. With the proper facilitation skills and knowledge, an extensionist will be able to help the group to achieve its goals efficiently and enjoyably.



Facilitation refers to a process of learning and growth in a second person within a one-to-one relationship or in a group. More specifically, facilitating can be defined as the creation of a climate of providing opportunities for a second person to learn and how to learn about, and experience, him or her, with the goal of enhancing his or her quality of life as manifested in the psychological optimal functioning. This refers to the process whereby the individual grows further to become more fully functioning, characterised by the taking of responsibility for him/herself in the decision-making, the experiencing of emotions and feelings and in actions[7,15)].

This form of "help" could be used for better, meaning learning and growth in the persons being facilitated[14)]. In more popular extension terms, this means that instead of giving a person a fish to eat every day (as in the traditional way of training, instructing and teaching), the facilitator will teach him or her how to catch fish, so that he or she will be able to help themselves in future to problem solving and need satisfaction (empowerment).

5.1 Personal skills and qualities of a group facilitator

- Listens and observes
- Uses visual aids effectively
- Record ideas legibly
- Asks probing questions
- Thinks quickly
- Acknowledges and responds to emotions
- Paraphrases and summarizes
- Resolves conflict
- Uses humour and energises a group
- Knows a variety of group techniques, including problem-solving and decision making

- Designs or chooses group discussion techniques
- Understands people and groups
- Communicator: ability to put over points and use all techniques available both verbal and non-verbal, receptive listening as also important.
- Flexibility: the ability to fulfil different group roles; leader, supporter, inquisitor in order to keep the group process fluid and maximise potential
- Confidence: to instil confidence in the group by appearing purposeful and in control.
- Patience/perseverance to appreciate difficulties of group working and have the determination to seek a task finished.
- Leadership: have the respect of the group to become the surrogate leader if and when required.
- Integrity: be an example for the group of how to conduct oneself at the group.
- Respectable: have the admiration of the group as being a person whom they can trust the judgement of.
- Perceptive: have the capability to recognise undertones in the group – using the positive ones to the groups' advantage and countering the negative ones to diminish them.

5.2 Facilitation strategies that assist groups to function effectively[10,11)]

Facilitation is not a soft option. The facilitator needs sometimes to exercise a high degree of control in order to give everyone a voice, keep discussion on track and explore issues thoroughly.

Facilitation strategies that assist groups

- Organised skill; ensuring the group has a common vision and all correct equipment to carry out the set tasks
- Group roles: assisting group members to designate roles for specific activities such as task and maintenance roles
- Ensuring equal participation within the group
- Using early diagnosis of problems, and intervention to prevent or deal with conflict within the group
- Allowing members to pursue inappropriate avenues to a limited extent. Making mistake and realising these errors often reinforces appropriate approaches
- Encouraging group members to reflect upon their activities so that they have a better understanding of the process they are engaged in
- Encourage different group members to share their learning experiences with each other
- Emphasizing the process of group learning rather than the outcomes of the group

6. Conflict management[10,11,12,13)]

The word conflict refers to any situation where two or more people have different needs, goals, desires, interest or values which are, or seem to be, incompatible. *"Competition"* usually brings out the best in people, as they strive to be top in their field, whether in sport, community affairs, politics or work. In fact, fair and friendly competition often leads to new sporting achievements, scientific inventions or outstanding effort in solving a community problem. When competition becomes unfriendly or bitter, though, conflict can begin - and this can bring out the worst in people.

Conflict in itself is not a bad thing, but actually has many positive consequences that benefit individuals and groups. Dealing with *internal conflict* is necessary for individuals to develop and learn, and *external conflict* can enable individuals and groups to build better relationships (both within the group during conflict, and hopefully with those they were in conflict with after the conflict has been resolved).

Conflict is often necessary to create an awareness of alternatives or options and to achieve changes that will improve people's lives and futures.

6.1 Common causes of conflict

Causes or sources of organisational conflict can be many and varied. The most common causes are[10,11,12]:

1. Poor communications
   a. Group members experience continuing surprises; they aren't informed of decisions, programs, etc by group leaders.
   b. Members don't understand reasons for decisions, and they aren't involved in decision-making.
   c. As a result, members trust the "rumour mill" more than the leadership**.**

2. The alignment or the amount of resources is insufficient. There is:
   a. Disagreement about "who does what".
   b. Stress from dealing with inadequate resources.

3. "Personal chemistry", including conflicting values or actions among group leaders and members, for example:
   a. Strong personal natures don't match.
   b. We often don't like in others what we don't like in ourselves.

4. Leadership problems, including inconsistent, missing, too-strong or uninformed leadership (at any level in the organization), evidenced by:
   a. Avoiding conflict, "passing the buck" with little follow-through on decisions.
   b. Members see the same continued issues in the group.
   c. Group leaders don't understand the tasks of their subordinates.

6.2 Categories of conflict

There are at least **FOUR** major categories of conflict found in a farmer group[11,12,13]:

Conflict between individuals **(Intra personal conflict)**	People have differing styles of communication, ambitions, political or religious views and different cultural backgrounds. In our diverse society, the possibility of these differences leading to conflict between individuals is always there, and we must be alert to prevent and resolve situations where conflict arises.
Conflict between groups of people **(Interpersonal conflict)**	Whenever people form groups, they tend to emphasise the things that make their group "better than" or "different from" other groups. This happens in the fields of sport, culture, religion and the workplace and can sometimes change from healthy competition to destructive conflict.
Conflict within a group of people **(Intragroup conflict)**	Even within one organisation or team, conflict can arise from the individual differences or ambitions mentioned earlier; or from rivalry between sub-groups or factions. All leaders and members of the organisation need to be alert to group dynamics that can spill over into conflict.
Intergroup conflict	Conflict between one or more groups

Activity 3

Small group activity

1. Give an example of conflict caused by each of the root causes discussed.

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2. Other root causes of conflict often include;
   - Different goals and objectives for the group
   - Different needs
   - Cultural differences

In your own words give a short description of how you think each of these could lead to conflict between individuals of a group.

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6.3 Stages of conflict

Handling of conflict requires awareness of its various developmental stages.

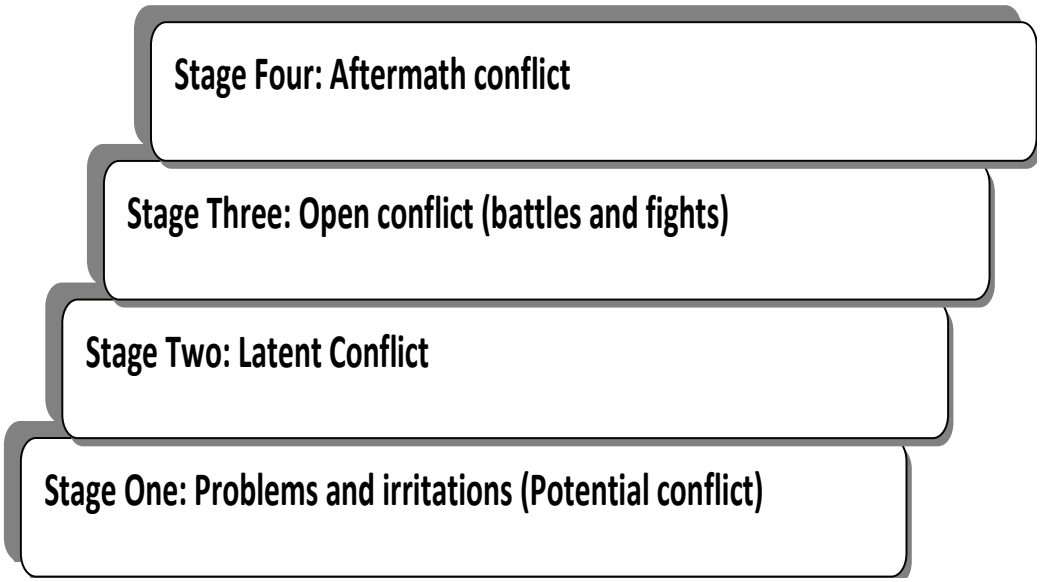

Figure 2. Different stages of conflict [11,12)]

Typical stages include:

- *Potential for conflict exists:* - in other words where people recognise that lack of resources, diversity of language or culture may possible result in conflict if people are not sensitive to the diversity.
- *Latent conflict:* where a competitive situation could easily spill over into conflict - e.g. at a political rally or in the workplace where there are obvious differences between groups of people.
- *Open conflict:* - which can be triggered by an incident and suddenly become real conflict.
- *Aftermath conflict:* - the situation where a particular problem may have been resolved but the potential for conflict still exists. In fact the potential may be even greater than before, if one person or group perceives itself as being involved in a win-lose situation.

6.4 Styles of Conflict Management[11,12)]

Conflict management is the process of planning to avoid conflict where possible and organising to resolve conflict where it does happen, as rapidly and smoothly as possible. Different styles of conflict management could be followed (Table 1)

Style	Characteristics	Task-Social Dimension
Collaborating (problem solving)	Win-win. Cooperative approach to conflict. Attempts to satisfy all parties **Three components:** ● **Confrontation:** Bring the conflict out into the open ● **Integration:** -looking at many options until both parties are satisfied. ● **Smoothing-**smooth out ruffled feathers.	High task, high social
Accommodating (yielding)	This style may camouflage deep division among group members in order to maintain the appearance of harmony.	Low task, high social
Compromising	● Lower our expectations and goals. We give up in order getting something. ● Lose-lose style because neither party is ever fully satisfied.	Moderate task, moderate social
Avoiding (withdrawing)	● Flights from fights. ● By avoiding they hope the conflict will disappear. ● May, in some cases be good in abuse situations	Low task, low social
Competing (Power/ Forcing)	Forcing your will on others is a win-lose style Groups tend to ascribe blame when groups don't function properly.	High task, low social

6.5 Role of extensionist in conflict management

The following conflict handling strategies can be followed depending on the specific situation:

- *Conflict prevention:* to prevent the outbreak of conflict, especially violent conflict
- *Conflict settlement*: to end conflict, by reaching of a peace agreement
- *Conflict management*: to avoid and limit future violence by encouraging the parties involved to change any negative conduct into a positive behaviour
- *Conflict resolution*: to look at causes of conflict and to build new and lasting relationships between hostile groups
- *Conflict transformation*: to consider wider social and political reasons for conflict and to transform the negative emotions associated with conflict into positive changes.

Conflicts and disputes do not resolve themselves, but often get worse as time goes by. Therefore the extensionist needs first to observe the sign of conflict and in groups where the relationships between members are important and should last long after the conflict situation has been dealt with, a **win-win solution** is always preferred. Conflict resolution is therefore the strategy to handle conflicts in a group, and this term both refers to the process of resolution as well as the results of that process.

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My notes.....

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Developer: Dr Joe Stevens **Authenticator:** Dr SE Terblanche

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Extension Learner Guide

Agricultural Extension

Level 5

Module 8

Situation analysis

Study objective

After completion of this module, the learner should be able to have a basic understanding of:

- What is an extension programme?
- Stages in the planning of an extension programme
- Process of analyzing a situation
- What information to collect?
- Choosing of an appropriate method for data collection
- Difference between open ended and close ended questions
- Key informants
- Group interviews
- How to conduct interviews?
- How a workshop can be used to collect information
- Use of formal and informal surveys to collect data and information
- Brainstorming
- Problem tree analysis
- Analysing of facts and data
- Use of ranking and scoring to explore perceptions
- How to select an appropriate method and technique for situation analysis

Table of contents

Agricultural development needs to be undertaken from three main perspectives namely:

- The *ecological* perspective: focusing on how natural resources – soil and water are used and managed for sustainable agricultural production.
- The *economic* perspective: focussing on the marketing of the agricultural products through competitive value chains which link farmers to customers.
- The *social* perspective: focussing on how stakeholders interact, who controls change in agricultural practices, and how to ensure that the benefits of innovation are enjoyed by all sectors of the society.

Therefore the analysis of the situation before an *extension programme* can be draw up should also incorporate and analyse these three perspectives of the existing situation.

1. What is an extension program?

An extension programme is a written statement which contains the following four elements[16)]:

- **Objectives:** which the extensionists expect to achieve in the area within a specific period of time. This will often be a one year period, to enable the extensionist to review the program at the start of each farming year.
- **Means:** of achieving the objectives
- **Resources:** that are needed to fulfil the program
- **Work plan:** indicating the schedule of extension activities that will lead to the fulfilment of the program objectives

The extension program with clearly defined objectives is help full to the local farmers, the extensionist and his managers. For farmers it shows both what they can expect from the extensionist and will help to evaluate how effective the extensionist is in achieving these objectives. For the extensionist, the program provides a firm basis for the planning of extension activities on a weekly and monthly basis, and anticipates what resources will be required to attain this. Managers of extensionist can use these programs to evaluate extensionist' performance, and to offer support where required.

The planning of extension programs usually follows one of the following routes:

- *Planning from the bottom:* farmers, with their extensionist make plans for the developing of local agriculture on the basis of specific needs and the local potential.
- *Top down planning:* the extensionist is simply expected to implement plans made at national or provincial level. He may for instance be given a target to support farmers with the implementation of a specific policy like for instance providing financial support to new small scale farmers.

1.1 Stages in the planning of an extension program[10,11,15)]

Whatever specific procedures are laid down for the planning of extension programmes, the following five distinct stages can be identified[16)]:

Stage 1: Analyse the present situation

Stage 2: Set objectives for the extension program

Stage 3: Develop the program by identifying the needs to be addressed to achieve the specific objectives, and then use this for the preparation of a work plan

Stage 4: Implement the program by putting the work plan or action plan into effect

Stage 5: Evaluate the program and its achievements as a basis for the planning of future programs

These different stages are interrelated and the planning does not always proceed neatly from one stage to another. Provisional objectives may be set during the situation analysis stage, but then may be altered as new facts and information are collected and a better understanding of the situation prevails. Objectives may be altered even further as unexpected difficulties arise while the program is being implemented. However, the first stage in the planning of an extension program always starts with a thorough analysis of the present situation.

2. Situation analysis

Before the planning of an extension plan and programme can be drafted, it is important to understand the specific farming problems and their causes, and the natural (ecological), economic and social (human) resources and needs of the specific area. The following activities are involved with the situation analysis:

2.1 Collecting of facts or data

It is important for the extensionist to collect the following information[14,15)]:

- about the people and their specific needs in the area
- their farming systems
- the natural resources and the facilities available for the local development
- social structure and local culture
- education and literacy levels
- size of the farms
- local channels of communication
- local credit systems
- marketing
- transport and other infrastructure available

These facts can be collected by using the available information (secondary data) from a variety of sources: reports on soil classification and land use surveys, farm management studies, social surveys and previous extension programs can provide a lot of useful information. A good knowledge of the existing secondary information is important to the extensionists to increase his background knowledge in order to interpret the additional (primary) information gained with fieldwork. Information can also be collected by doing fieldwork and the using of formal (quantitative survey) methods or informal (semi structured and focused interviews with open ended questions) methods. The term quantitative or formal methods is restricted to survey methods based on some form of random sampling and standardised questionnaires “measuring” the same type of information for all units in the sample. This allows extrapolation of the results to the population from which the sample was drawn.

A lot of the information is available from the local farmers and farm leaders in the area. This information can be obtained in focus group discussions, contact with individual farmers and farmer groups, informal networking with local people and farmers. This will help the extensionist to build up a full understanding of the natural, social and economic potential of the area.

a. Choosing a method for data collection

Extensionists can either choose informal or formal methods of collecting data. Both types of data collection have their place, provided that they are critically used and applied with care. The choice of methods used by extensionists to collect data should be guided by the specific information needed to address the questions that the extensionist together with the stakeholders wants to address.

There are many methods to collect data and facts:

- Formal surveys
- Personal interviews(formal) or informal interviews (semi structured)
- Distributed questionnaires and checklists usually at a group meeting
- Group interviews
- Case studies where one or a few individuals or cases can be studied
- Systematic observation procedure applied during visits to farms. Observation of practices which have been recommended for the area are observed and recorded in a systematic manner.
- Workshops
- Secondary data analysis

Several tools are suggested for participatory research, including: secondary data reviews, workshops, and semi-structured interview techniques[14,15)]. When one is choosing to use participatory methods like semi-structured interviews with farmers and key stakeholders, or focus groups, or any of the PRA tools, it is important to ensure that the information and findings are trustworthy. Four criteria are important to ensure that findings can be trusted:[5)]

- How can we be confident about the "truth" of the findings (internal validity)?
- Can we apply these findings to other contexts or with other groups of people (external validity)?
- Would the findings be repeated if the inquiry were replicated with the same subjects in the similar context (reliability)?
- Can we be certain that the subjects and context of the inquiry determined the findings, rather the biases, motivations and perspectives of the investigators (objectivity)?

b. Couple of selected techniques to collect data from the informants

b.1 Informal interviews[2,,4,3)]

Informal interviews also refer to semi-structured interviews, with open ended questions.

Definition

Close ended questions[4]*:* the respondent is asked to select an answer from among a list provided by the researcher. It is aimed at receiving "specific information" and they are usually answered with a "yes" or a "no".

Open ended questions[4]*:* are probing questions, which can be used to help us to understand issues and concerns identify needs and explore problems. It cannot be answered with a straight "yes" or "no" and instead requires a lengthy response that is based on the respondents' own answer to the question.

Informality of interview[4]*:* refers to the open-endedness of the questions and not the amount of social protocol, seriousness or importance of the occasion.

Key informants[1]*:* people with a rich knowledge or subject matter under investigation or they "do not" present what is normal like for instance to learn from exceptional cases.

Informal interviews can be with individuals (key informants) or with groups (focus group or community group).The purpose of this method is not be statistically representative, but rather to exploit the present situation or find explanations. Therefore sampling of interviewees to participate is not based on random criteria, but rather on the needs of the investigation and the questions that the extensionist asks himself. It can be used to obtain as follows:

Key informants	Describe the problem situation Understand the perspectives of different actors Generate hypotheses
Group interviews	Gather information quickly and cost effective Promote discussion and obtaining the general opinion of a community about a specific proposal Explore a particular topic in more depth (e.g. with a focus group comprising several people of similar interest)
Community interviews	Normally convened by the authorities of that community (Traditional leaders, etc.) Can involve a large group of more than 15 people Where possible , efforts should be made to get a diverse group With a very large group it is advisable to split the group into smaller sub groups

In the conducting of interviews it is important to take the following guidelines into consideration:

- Define the **objectives**: it is important to define the objectives of the interview or group meeting.
- What particular information or perspective is this key informant or selected group likely to have?
- What stakeholders or interest group does he/she represent?
- Make a guide for the interview, a list of points or main questions to cover during the interview, so that these are not overlooked during the interview.
- *Keep the local custom:* sometimes it is requiring arranging the approval of a specific meeting through the local authorities. Avoiding this protocol van lead to major problems later.
- *Agree on the roles of the people present:* Agree on who will ask what questions, and who will take note if you make use of a team.
- *Decide on how and when to take notes:* information needs recording – or it will be forgotten. However, taking notes during an interview can create a "formal" atmosphere that could jeopardise the flow of information flow.
- *Establish confidence*: It is important to remember that people being interviewed are often more sensitive to the personality of the interviewer than to the questions themselves. The art of informal interview lies in the establishing of confidence through the establishing of a rapport with the person(s) being interviewed. The following points will help in the establishing of confidence:
- *Ask systematically* by following the attached guidelines:
    - Structure the interview so that the interviewee or group does not get confuse or lost
    - Avoid interrupting respondents when speaking or changing the subject abruptly.
    - Use simple language that the interviewee or group understands.
    - Do not intimidate the interviewee, or give the impression that he /she is being judged for the answers given, or that there is "right" or "wrong" answer.
    - Avoid questions that offend cultural sensitivities, or that create tension, or cause arguments between different participants
- *Keep to the time allotted*

Activity 1

Small group activity

1. Explain the difference between open ended and close ended" questions? Also indicate what are the advantages using these two approaches.

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2. Map the key informants in your farming community? Why are they important sources of information?

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3. Which biases should an extensionist be aware of in the selection of interviewees?

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b.2 Workshops

The workshop setting can either be used by the extensionists to promote training but also to collect information and data. This is an ideal opportunity for dialogue between the extensionists and the farmers. A workshop is a group (10-25 persons) or gathering sharing a common problem, and therefore can be important to identify problems (Box 1).

Box 1. Workshop as a participatory research tool for collecting of information[14,3,6,16)].

Definition:
A meeting where a series of set tasks are performed and an output produced. In PRA, workshops usually involve the PRA team, but also, if appropriate, local people, officials, technical specialists not taking part in the PRA full-time.

Key features:
- everyone involved needs to be encouraged to contribute
- someone needs to facilitate to keep the workshop moving and ensure that the tasks set are performed
- the output of the workshop needs to be recorded
- some form of visual presentation of ideas, findings and reports

Purpose:

1. *Preparatory workshop*
- assembling team, introductions, briefing
- training in PRRA techniques (if required)
- discussion and setting of PRA objectives
- discussion topics for investigation
- preparation of initial checklist of research topics
- review of appropriate tools / approaches
- planning of PRA

2. *Periodic recurring workshops*
- periodic review of findings of field work
- monitoring of progress of PRA
- checking of coverage
- review of techniques used / discussion of alternatives
- triangulation – (each topic of research investigated by different team members using different techniques and different sources)
- review of checklist of research topics
- report updating

3. *Final workshop*
- review of overall findings
- report preparation
- discussion of follow-up
- participation of key non-participants (local officials, community leaders)

The workshop is using raw material (experience and knowledge of the farmer and extensionist) through a process (action and interaction between the different parties) to develop an end product (solutions, formulated strategies, definitions). This however requires a careful hand of well experienced and trained facilitator.

b.3 Formal surveys[3,4)]

Formal surveys are methods based on:

- Some form of random sampling of units (e.g. farms)
- Standardised questionnaires "measuring" the same variable characteristic of all units in the sample

The combination of random sampling of units and standardise measurement of variable characteristics of these units allow statistical extrapolation of the results to the population from which the sample was drawn. Quantitative surveys usually collect data that either numerical (e.g. number of cattle) or information that can be translated into numbers (like gender of the household; male=1; female=2)

The major difference between the informal methods discussed above and the quantitative survey is the rigidity of the procedure. A quantitative survey needs to be carefully prepared, implemented and analysed. Only during the preparation phase is there room for iteration and adjustment of the content and procedure. Once implementation has begun, there is very little room for readjustment of the process. Any readjustment during the implementation phase will influence the standardise procedure of measurement on which the whole concept of a quantitative survey is based. **Therefore appropriate preparation is critical!**

Box 2: Guidelines with preparation and planning of survey

i. Define the objectives and the information you need: define the hypotheses (a proposition about a relationship between two or more variables) that will be tested

ii. Define the unit of analysis or the unit that will be sampled. This could be a specific geographical area, social community, a farm, a field, a crop, a herd,etc.

iii. Define the variables and indicators: these are the "characteristics" of the unit that can take on different "values" in which the extensionist is interested. In determining the farm typology, for example , these variables can be a combination of the following:

iv. Structural variables like farm size, capital, labour, irrigation, etc.

v. Functional variables like aspects of the operation on the farm, land use, off farm activities, etc.

vi. Variables regarding the farm environment like market access, settlement pattern, etc.

vii. Problems that characterise and distinguish these farm categories

viii. Aspect of the farm that influence the feasibility and profitability

ix. Define the sample procedure and sample size

x. Design the questionnaire

2.2 Identifying of problems and potential[7,8)]

It is important for the extensionists to help farmers and stakeholders to identify their main problems. The importance of problems, apart from their role in determining the extension program content or objective, also lies in the potential need incentive and consequently in the potential a focus for persuasion. This statement is base on the assumption that needs are the basic motive behind all behaviour or behaviour change and that problems can be regarded, as far as their function is concerned, as a specific form or variation of needs. Farmers may be able to identify the problems, but the extensionists should assist them in the conceptualisation of these problems and the prioritising of it.

The heart of the process involves mapping stakeholder perceptions of both *ideal* and *current* farming practices, and comparing similarities and differences.

Definition

A widely accepted definition of a problem is that it is the difference between "what is" (present situation) and "what can be" or "what should be" (desired or optimum situation. Perceiving a difference between the present and desired situation is equivalent to perceiving a problem or a need, namely the need to overcome the problem like for instance to improve my irrigation efficiency on the farm[7,8)].

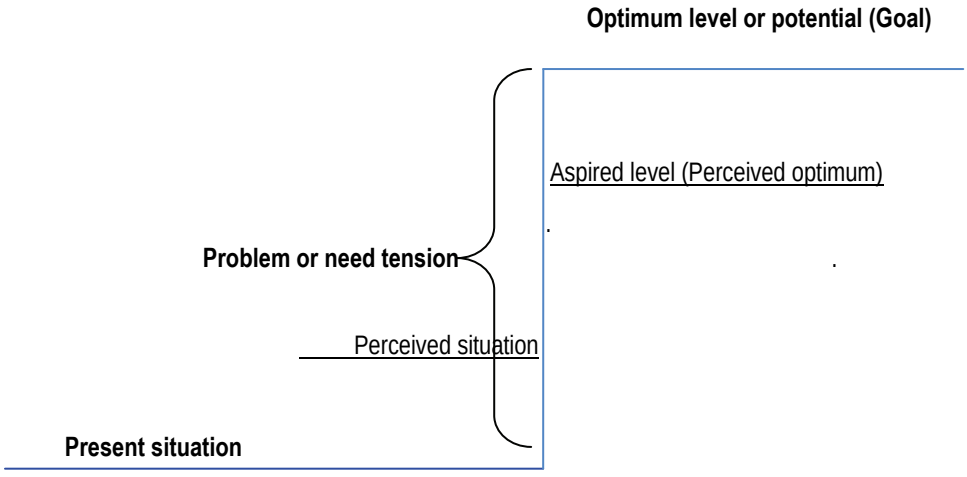

Figure 1. Diagrammatic illustration of a problem and the influence of perception on the magnitude of the problem[8)]

Figure 1 illustrates a problem as the "difference gap" between the present and desired situation. The bigger the difference the bigger the potential problem or need tension. The need tension or problem can be considerably reduced by an over-estimation of the present situation and also by under-estimating the possible or achievable[8)]. Divergence *within* and *between* stakeholder group perceptions of the ideal and current practice provide the fertile source of potential problem issues, action and learning[7,8)].

The general awareness and conviction that a "problem well put" is a problem halve solved: forms the basis for problem conceptualisation. The most accurate and complete definition or description of a problem is in terms of its causes. The initial step is to formulate the problem as concisely as possible, although in general or absolute terms e.g. low profit from whet production. Whenever there is no consensus concerning the problem, it should be established first, in order to achieve maximum commitment and effective communication. A possible technique to use to establish this is to make use of a brainstorming exercise.

a. Brainstorming[6,5)]

This is a group technique where creativeness takes precedence over the practical. The idea is to encourage the free introduction of ideas on an unrestricted basis and without any limitations as to feasibility. It places a high burden on the facilitator to manage the process, ensure peoples involvement and sensitivities, and then manage the follow up activities.

- List all ideas offered by participants
- All ideas are accepted without challenge, unless they conflict with ground rules previously laid down.
- It is relatively unrestricted, but it is possible to limit it to a single problem, or to solutions for a single problem.
- It is completely informal.
- It permits discussion of an idea only to clarify understanding
- Welcome "blue sky" ideas – it is easier to eliminate it later
- It gives people the opportunity to consider many alternatives, not just those which fall within their perceived range of abilities
- Encourage quantity. The more ideas you generate, the greater your chance of finding a useful one

Brainstorming is used to:

- Get as many ideas (new and novel) as possible before the group for evaluative discussion
- To encourage practical minded individuals to think beyond their day-to-day problems and to think quantitatively instead of qualitatively
- To move out on a problem when more conventional techniques have failed to come up with a solution.

- It should be structured and should follow certain rules for the process:
  - ✓ Define and agree on the objective
  - ✓ Brainstorm ideas and suggestions having agreed a time limit
  - ✓ Categorise/condense/combine /refine
  - ✓ Assess and analyse effects or results
  - ✓ Prioritise options and rank
  - ✓ Agree on action and time scale for it
  - ✓ Control and monitor

Advantage:

- People are thrilled at the freedom of expression inherent in brainstorming
- Solutions to previously insoluble problems can be discovered
- All members of the group can be encouraged to participate
- Because of the easy exchange of ideas and opinions inherent in the method it often has value in the building of group morale

Limitations:

- Brainstorming is useful to get out divergence of ideas and to bring creativity, but it slows down the process of narrowing the alternative choices
- It is effective when the group is relatively homogenous
- Can be used most effectively when both members and the group are relatively mature and have the ability to be creative
- Some members may be unable to “throw off” usual restriction (due to perhaps a lack of self-confidence) and therefore find it difficult to project themselves
- Some group members may use the opportunity in attempt to dominate the session and use it in an attempt to gain status

Activity 2

Small group activity

1. Identify and prioritise in your small group possible constraints that may influence optimum crop production in an area of your choice by using the “Brainstorming Technique”. Identify a facilitator from the group to manage the process.

2. After this exercise is finish- discuss the following:

a. Did the facilitator encourage participation of everyone?

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b. Were some individuals participating more than others? What are the reasons for that?

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2.3 Analysing of facts or data

Facts do not speak for themselves, and therefore it is necessary to ask why things happen in the way it does. For instance if a farmer report that the crop yields have declined in recent years, the extensionist must look into the information that would suggest an explanation. Is it because of ineffective irrigation, poor soil fertility, poor cultivation practices? He may obtain conflicting information from different sources, and must judge which is more reliable. The level of analysis depends on the objectives of the extensionist and the stakeholders.

With regard to the analysis of the information some factors are considered to be “variables” (factors that can be changed through the actions of partners and stakeholders) and others “parameters “(factors that stakeholders perceive to be outside their control like agricultural policy):

- Production technology is considered to be changeable, and therefore much effort is put aside by research and extension in this regard.
- Policies on the other hand is often seen as “fixed” –and need to be considered with regard to the impact on future development programs.

a. Problem tree analysis (problem conceptualisation)[3,15)]

The diagnosis of problems or needs as discussed in the “Brainstorming technique” can result in a long list of problems. To move from diagnosis to action, it is required to narrow the lists to contain a small number of priorities. Each group is asked to select four to five problems that they consider most pressing and that should be addressed immediately. The compilation of the list of group priorities becomes the list of farmer priority problems.

Once consensus has been reached, the conceptualisation or breakdown in terms of the causes and effects should be as systematic and specific as possible.

Priority problems are analyzed in mixed groups, using a method of problem and cause analysis called the *problem tree*. For each problem, the group analyses the underlying causes, and goes as far as possible in this analysis. The problem tree represents the causes of the problems ("the roots") and their consequences ("branches"). As farmers construct the problem tree, they see that large and difficult problems have many causes, some of which they themselves can change. The problem tree is thus a powerful tool to raise farmers' awareness of the power that they have to influence their environment. To create a problem tree, the extensionist asks the following questions:

- There is a problem because (causes/roots)
- This problem brings about (effects/branches)

The final product depends on the participant's abilities to analyze their situation, and on the expertise of the team (extensionist) in using a tool. Farmers that go through this exercise therefore take ownership of their circumstances from assessment phase and will thus take responsibility throughout the process.

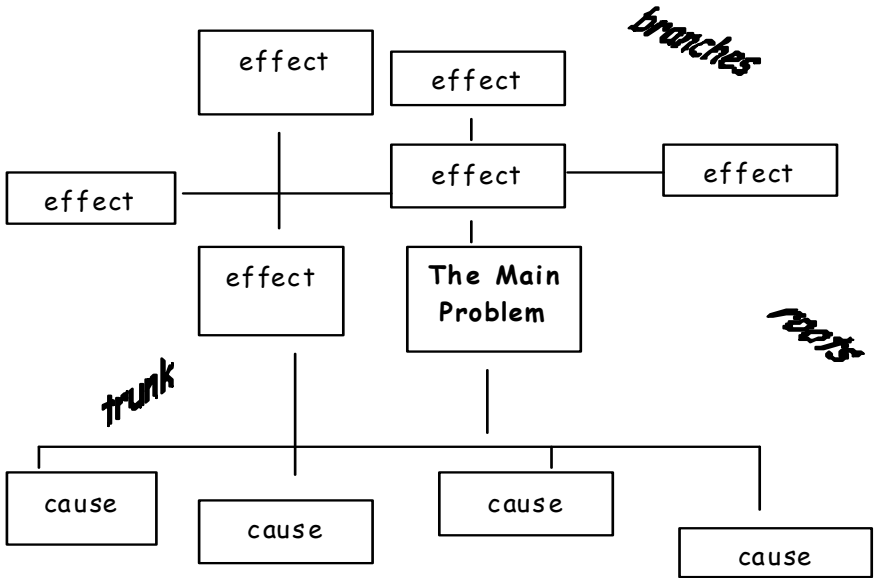

Figure 2. Problem tree analyses

This step wise conceptualisation of problems is invariably complex and involves many steps. The following should be kept in mind[7)]:

- There are different approaches and procedures of conceptualisation, but systematic, logical and sequential steps of reasoning are important.
- The completeness and detail of conceptualisation, which is essentially a hypothetical construct, depends on the available expertise, knowledge and insight concerning the subject matter.
- The suggested question namely “what the problem entails’ and “what the causes are” have the purpose of ensuring a complete breakdown of the problem into its most basic causes or components.
- A problem oriented rather than a solution oriented approach is followed, because the latter tends to lead to over-eagerness to arrive at a solution and consequently increase likelihood that critical aspects are overlooked.
- Although the technical conceptualisation eventually leads to the human causes and their conceptualisation, the specific interface is important and needs to be considered carefully.

Activity 3

Small group activity

1. Use the problem tree technique to conceptualise the priority constraint that was identified in Activity 2 which influence optimal crop production in the area selected. On completion, critically reflect on the learning about the area of application.

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2.4 Ranking and scoring

Preference ranking and scoring are tools that are used primarily to explore people’s perceptions, elicit criteria, and understand their choices and decision-making. These tools can be also used to obtain quantitative information about resource use or income which would otherwise have been collected using more conventional, data-intensive means, for example: data on labour use for different activities can be collected either by asking the farmer to record or recall the number of hours or days spent on each activity, or by asking him or her to allocate weights to each activity to reflect labour use.

Preference ranking and scoring have distinctive advantages over the more conventional data collection techniques when used in a participatory framework. Both these techniques are simple and highly visual for discussion and investigation of different alternatives. They are

therefore useful to facilitate discussion among stakeholders, or allow their participation in some decision about for example[9]:

- Problems /needs faced (which are more pressing)
- Technological options (new varieties, different ways of doing things)
- Priorities (for the extension programme or for agricultural development)

There are four basic types of ranking and scoring tools that could be considered:

- Preference ranking
- Pair wise ranking
- Matrix scoring and weighting
- Wealth ranking and well being analysis

Box 3. Ranking and classification technique as a participatory research tool[14]

Definition:

Tools for encouraging the people being interviewed to divide sets of items or activities into categories and rank them according to different criteria.

Key features:

- can be used as formal exercise or as aid to interviewing
- provides focus for discussion
- can be carried out with individuals or with groups
- provides a clear, graphic form of presentation of local people's ideas
- adaptable to local circumstances and can use materials readily understood and manipulated by local people

Main types used:

- *Matrix ranking*: Using local classifications, the features or characteristics of groups of items or resources can be ranked according to different criteria such as reliability, seasonal stability, price, income generated, preferences.
- *Pair-wise ranking*: A more detailed ranking can be obtained using pair-wise ranking which compares pairs of items in a group until all are placed in an order of priority according to certain criteria. The advantage in conducting pair wise ranking compared with complete preference ranking is that people are forced to make very careful decisions between the items. In preference ranking the danger is that participants may become overwhelmed with the number of items and will not make carefully considered choice.
- *Indicative or preference ranking*: A notional ranking can be used in many circumstances to provide indications of relative size or importance of particular features, numbers of people involved in activities. Local materials such as stones or beans can be used to quickly indicate proportions or numbers in a more concrete fashion.

2.4.1 Ranking

Ranking is usually a visualised exercise, either with individuals or with groups of respondents. Ranking with groups generally allows quicker progress and promotes discussion. The use of objects like leaves, fruits, grain, coins, etc. to represent the option to be ranked or criteria used to rank, generally facilitates the visualisation of the exercise. The basic steps in ranking involve the following[9)]:

- Determine the option or criteria. This is usually base on the list of options or problems identified by the group through a brainstorming or CATWOE exercise. Generally speaking the list should not be too extensive.
- Determine the relative ranks. Start by asking the respondents:
    - Which is the best? (most important or most useful, etc.)
    - The “next best”/
    - The “worst”?
    - “Next worst”?
- Ask “Why”: “What is good about it?”. These criteria can be used in the matrix as well.
- Include views of the stakeholders. Depending on the objectives of the exercise, the response of different groups or different types of stakeholders can be compared.

Example of ranking production problems

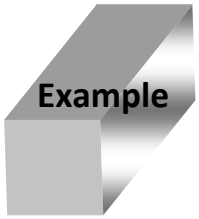
Production constraint	Ranking by extensionists	Ranking by farmers
Lack of water for irrigation	6	1
Water stress in crops	2	2
Crop diseases	7	6
Low soil fertility	5	5
Poor cultural practices	3	3
Weeds	4	7
Lack of knowledge	1	4

The extensionists identified and ranked the following criteria as constraints for optimal irrigated crop production. Farmers were asked to rank the same criteria, and argue that water was the most crucial constraint, because they could do something about the lack of knowledge, but nothing about the lack of irrigation water.

2.4.2 Scoring

Scoring is also a visualised exercise similar to ranking, and the following steps can guide the process[9]:

- Determine the options and criteria: use symbols or items to denote the options and criteria where possible, to facilitate visualisation.
- Determine the scores: decide on the range of the scores to be used (e.g. 1-10 scale). Ask respondents or group to pace objects (stones, beans,etc) in each cell of the table according to their perception of the value of the option or problem according to the criteria.
- I f weighting is to be applied to the criteria afterwards (e.g. by ranking or scoring the criteria themselves), a fixed number of stones/beans (e.g. 10) should be distributed cross each row. Alternatively, a fixed number of stones/beans (e.g. 50) can be distributed throughout the whole table. This automatically gives a weighting for each criteria.



Farmers were asked to compare two varieties in the Zanyokwe irrigation scheme by dividing the ten bean seeds between the two varieties within a matrix drawn on a piece of paper. This exercise helps scientists to gain useful information about the varietal performance and perceptions of farmers of the varieties.

	Local	New variety
Leaf	4	6
Flower	3	7
Pod	6	4
Pod filling	6	4
Seed yield	6	4
Taste	6	3
Market	7	3
Storability	5	5

3. How to select an appropriate methods and techniques for the analysis of a situation?

The selection of particular method or techniques to be used for situation analysis should be determined by:

- *The character of the subject*
  - Is direct information needed?
  - Are there different points of view to be presented?
  - Is this a controversial subject that will stimulate discussion?
- *Available leadership*
  - Who can be called upon as speakers, facilitators, discussion leaders?
  - How can membership be involved?
- *Available facilities*
  - Does the room lend itself to formal or informal use?
  - How can the setting be adapted to facilitate discussion?
  - Is equipment available- visual aids, computer connections, chalkboard,etc?
- *Character of audience*
  - How many are expected to attend?
  - What is the level of education, age distribution, occupational background, and general interest of the group?

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My notes.....

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Authenticator:

- Dr Fanie Terblanche

Extension Learner Guide

Agricultural Extension

Level 5

Module 9

Project development and management for extensionists

Study objective

After completion of this module, the learner should be able to have a basic understanding of:

- What is a project?
- Characteristics of a project
- Types of projects
- Critical factors that determine the success of a project
- Difference between a project and a program
- Which factors constrain the achievement of a project objective
- What is project management?
- Dimensions of project management (technical and socio-cultural)
- Phases of project management
- Project parameters
- Project scope and objectives
- Work break down structure
- Network diagram and the basic rules that apply
- Planning of the time dimension of each activity (Gannt charts)
- Planning of cost dimension for each activity
- Implementation of the base plan
- Characteristics or core traits of the successful project manager
- Monitoring and evaluation of progress and impact
- Feedback by the project manager
- Negotiation for supplies and materials
- Completing of a project

Table of contents

Every person manages projects from time to time. An extensionist is in contact with individual farmers and farmers who farms on agricultural projects. These projects are the end results of a series of processes that the project went through, before the final stages of the project.

Many agricultural projects have failed in the past, mainly because of the in-proper planning and management of the process. If not properly planned and managed, one sits with a disillusioned community at the end of the day. The following module provides an overview of the critical aspects and elements to take into consideration with the planning and execution of an agricultural project.

1. What is a project?

Definition

A project is "an endeavour to[2)]:

i) accomplish a specific objective through

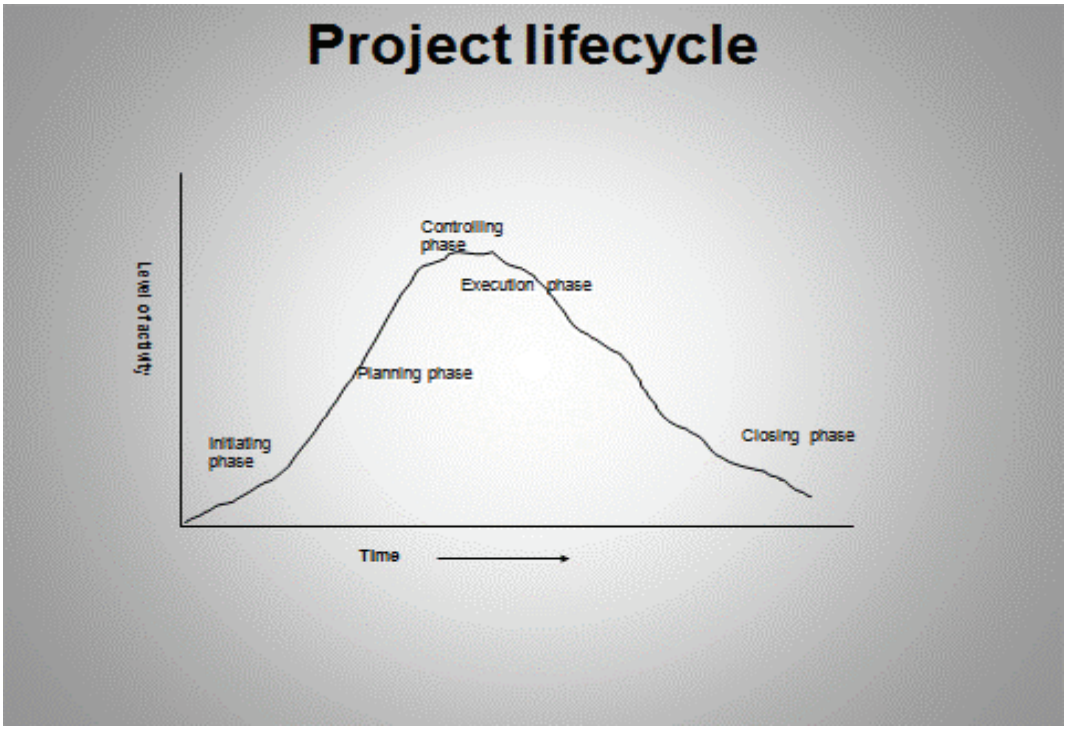
ii) a unique set of interrelated tasks and

iii) the effective utilization of resources"

1.1 Characteristics of a project

- It has an established objective
- It has a start and finish date – a defined life-cycle

a. Life cycle of a project



1. Controlling phase: ensuring Initiating process: recognising that a project or phase should begin

2. Planning: phase: devising and maintaining a workable scheme to accomplish business need that the project was undertaken to address

3. Executing phase: coordinating people and other resources to carry out the plan

4. that the project objectives are met by monitoring and measuring progress and taking corrective action where required

5. Closing process: formalising acceptance of the project phase and bringing an orderly end to the project

6. It consists of well-defined small tasks (Work Breakdown Structure- WBS) and a sequence of executing the tasks – a schedule.

7. Projects create something new – an end product (deliverables)

8. Projects can be small or large

9. It carries uncertainty and risks

10. It leads to change

11. It utilizes various resources (people; organizations; equipment; materials and facilities)

12. Projects have a customer: the customer is the entity providing the funding necessary to accomplish the project objectives.

b. Special features of a project

Start and finish	A project has a clear start and finish
Lifecycle	A projet has a beginning and an end, with a number distinct phases in between
Schedule and timeline	Projects are often time limited – this means they must finish by a certain date
Budget	Projects have a clear budget, often broken down into a budget per work package
Non repetitive	Activities are essentially, unique and non repetitive
Resources	Resources may be sourced from different functional departments and need to be coordinated
Teams	Project teams are formed to complete the project

2. Types of projects

Projects can be categorised in different ways:

1. Degrees of openess: projects can be open, closed or semi-open.

    - *Closed* refers to a project where manager and clients knows exactly what to do (change based on previous experience).

    - In a *semi-open project* both manager and client (stakeholders) are sure of what has to be done, but do not know how the project should be conducted.

    - *Open project* is where nobody knows what to be done and how it should be done.

2. Function or discipline: disciplines could include agricultural production, marketing, human resources, technology development, operations or prduction, etc. Irrespective of the primary focus, the project may cut accross several functions, refered to as the systematic nature of the projects.

3. Nature of deliverable; two main types of deleiverables under this category are products and services. Between these extremes are numerous variations. E.g. a service can be in terms of a product or in terms of a behavioural or cognitive issue. Even in agricultural innovation, there is both hard and soft forms.

Box 1:Critical success factors to project success[1)]

A study was conducted to test the importance of certain factors that were believed to be critical to project success. The results showed that the following are the top ten major factors :

1. Clearly defined goals and project mission
2. Top management support
3. Competent project manager
4. Competent project team
5. Sufficient resources
6. Client/customer involvement and consultaion
7. Good communication
8. Responsiveness to cleints
9. Proper monitoring and feedback
10. Appropriate technology

3. Difference between project and a program

There is no clear defined differences between an extension project and extension programme, and this is largely a question of semantic or of degree. The following are the differences between a project, business and a programme.

Table 1. Differences between a project, business and a program

Project	Business	Program
Temporary	Ongoing	Ongoing
Has a beginning and an end	The same process is repeated	The situation determines the necessity for change
Produces a unique deliverable (product)	Produces the same output each time	The deleiverables is usually a service (it can consist of a number of projects)

4. Factors that constrain the achievement of project objective

The succesful accomplishing of an agricultural project is usually constrained by four factors namely[2)]:

- *Project scope:* all the work that must be done in order to satisfy the customer that the deliverables meet the requirements or acceptance criteria agreed upon at the onset of the project.

- *Schedule for a project* or the timetable that specifies when each activity should start and end: project objectives usually state the time by which the project scope must be completed in terms of a specific date agreed upon by the client and the individual performing the work. It is imporant that a plan should be prepared before the start of the project, which include all the work tasks, associated costs and estimates of the time to complete the activities.

- *Cost of a project* : the amount the customer agreed upon to pay for acceptable project deliverables. Project cost is based is based on a budget that estimate costs involved with the various activities and resources that willed to accomplish the project.

- *Customer satisfaction:* ultimately the project manager is to make sure the customer is satisfied. This goes beyond just completing the project scope within the budget and on schedule, but it requires ongoing communication with the customer to keep the customer informed and to determine wheteher expectations have changed.

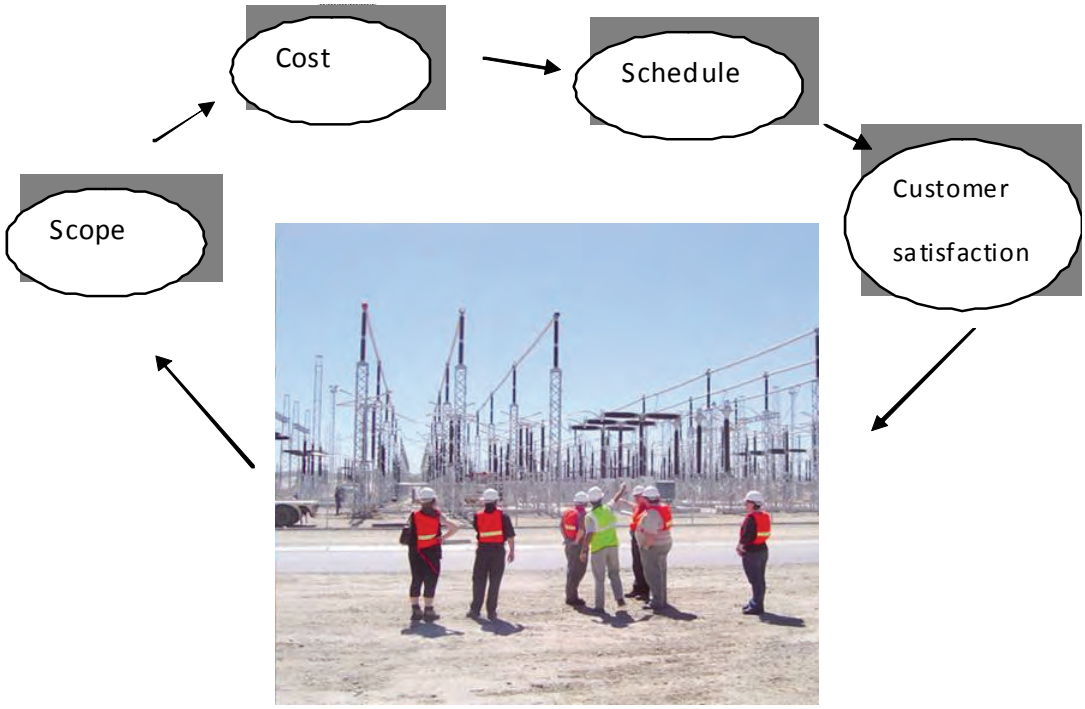


Figure 1. Factors constraining project success

5. What is project management?

Project management brings together and optimises the resources necessary to succesfully complete a project. These resources include skills, talents, and cooperative effort of a team of people, facilities, tools, and equipment, information, money, systems and techniques.

The project managment process means planning the work and then working the plan.

So what we see from the definition above is that project management involves a process of first establishing a plan and then implementing that plan to accomplish the project objectives.

5.1 Dimensions in project management[2)]

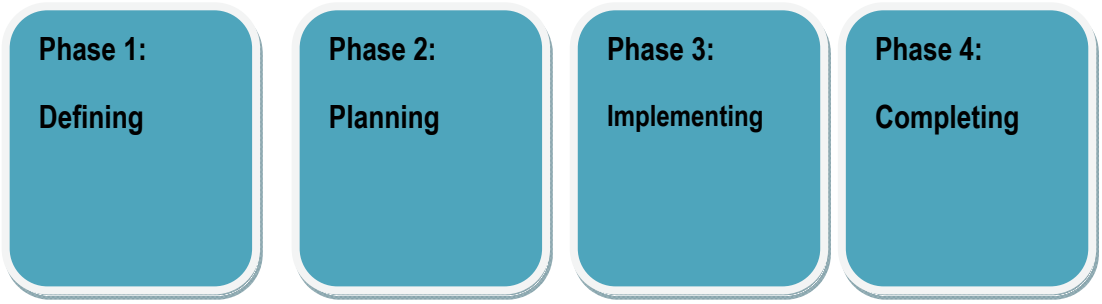
a. *Technical dimension (task)*
This dimension consists of formal, disciplined, pure logic parts of the process. This dimension includes planning, scheduling and controlling of the project. The creation of deliverables and work break down structures facilitate planning and monitoring the progress of the project. Work break down structures serves as a database that links all levels in the organisation – major deliverables and all the other work.

b. *Socio-cultural dimension (relationships)*
The second dimension is socio-cultural side of the project management process. It centres on creating a temporary social system within a larger organisational environment that combines the talents of a divergent set of professionals working to complete the project. The challenge is to shape a project culture that stimulates teamwork and high levels of personal motivation as well as a capacity to quickly identify and resolve problems that threaten team work. The socio-cultural dimension of project management also involves the interface between the project and external environment managed. It is expected of the project manager to shape expectations of customers, and to build a cooperative social network among a divergent set of allies with different standards, commitments and perspectives.

Effective project managers balance their attention to both the technical and socio-cultural dimensions of project management. Success demands both training on technical and socio-cultural sides **of project management.**

Figure 2. Skills required for successful project management

5.2 Four phases of project management



Elements important during the four phases of a project:

- *Planning horizon:* estimates of current events can be very accurate, but are reduced for more distant events.
- *Project duration:* long duration projects increase the uncertainty in estimates
- *People:* Important issues here are skills, whether previously worked together, staffs turn over.
- *Project structure and organisations*
- *Organisation culture:* Organisations vary in importance they attach to estimates.
- *Time division:* A critical factor is the time available or budgeted for the project.

6. Project parameters

During a project's lifespan, managment focuses on three basic parameters:

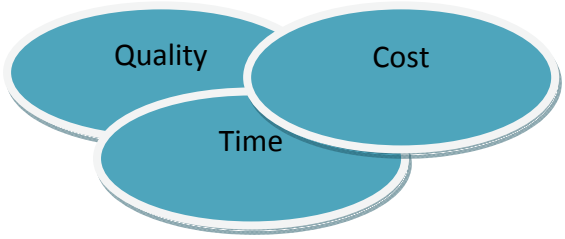


Figure 3. Parameters for successful project management

A successfully managed project is one that is completed at the specific level of quality, on or before the deadline, and within budget. Each of these parameters is specified in detail during

the planning phase of the project. These specifications form the basis for control during the implementation phase (Figure 4).

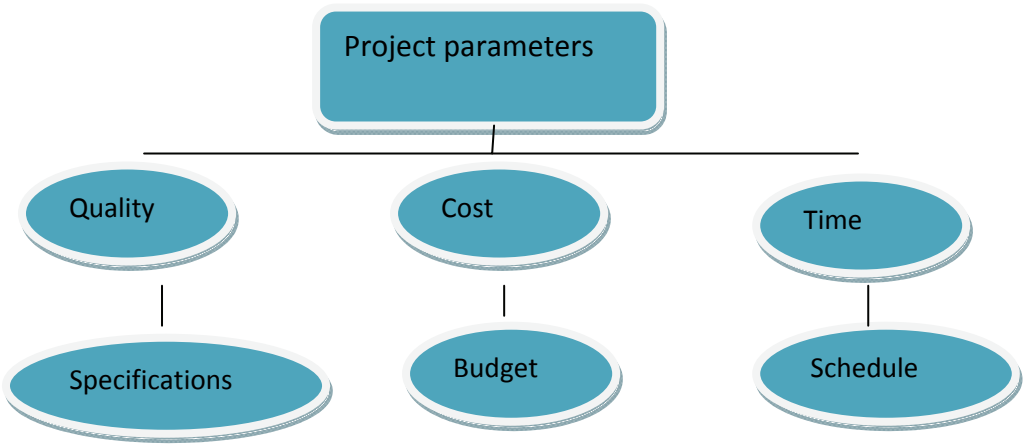


Figure 4. Project parameters

A typical statement in the field of project management is the desire to have a 90% probability of meeting time and cost estimates. Past experiences are also a good point for developing time and cost estimates.

Activity 1

Individual activity: My project management skills

Rate yourself as a project manager by completing the following skills checklist.

	Organising a project from beginning to end
	Structuring a plan that will stand up under pressure
	Getting people to accept my plans and support them
	Setting measurable project objectives
	Motivating team members
	Helping team members solve problems
	Utilising available resources optimally
	Eliminating waste of time and money
	Measuring project performance
	Using information systems that respond to project needs

7. Getting under way

When the nucleus of the project team is assembled, its first order of business is to clarify the projects scope, as well as the basic strategy for carrying it out. There is an orderly process that can guide you through this process:

a. Study, discuss and analyse

b. Write the project scope

c. Set a project objective and results

d. Divide the project scope into major pieces or work packages

e. Define the specific activities

f. Generate alternative strategies

g. Evaluate alternatives

h. Choose a course of action

a. Study, discuss and analyse

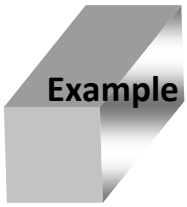
It is critical to spend adequate time at the beginning to study , discuss and analyse the project. This establishes a clear understanding of what you are dealing with. It may be necessary to research how similar projects structured their approach , or what other patterns of past experience can contribute to project planning.

b. Project scope or definition

When you are confident that you have a firm grasp of the situation, define a preliminary project scope. This preliminary definition of the project will be subject to revision as additional information and experience are acquired.

Scope statement: a narrative description of the work required to fulfil the objectives of the project.

According to research, apoorly defined scope or mission is the most frequent barrier to project success, 50-60% of project failures relate to this.



Project scope in Zanyokwe irrigation scheme:

'to sustainably manage the irrigation schemes with the objective of conserving the natural resources and contributing to the economic, social and spiritual upliftment of the rural community in Keiskammahoek.."

Box 2:Important elements of a project[1)]

- Project justification
- Summary of the product and boundaries
- Project deliverables
- Quantifiable goals and major sucesses

c. Project objectives

When the overall project scope or goal is defined, the specific purpose of the project should be decided and formulated with the immediate objectives. The immediate objectives should state clearly what the project intends to achieve as a contribution towards meeting the overall objective. These objectives should be agreed upon by the client and the organisation or individual who will perform the project.

An immediate objective is……..

- Says what the changed way of doing things is
- Is likely to occur as a result of the use of goods and or services provided by the project
- Is as s pecific as possible by refreeing to the quantity, quality, time and location
- Can be shown to have been achieved

The outputs derived from the scope and objectives of the project shoud be clearly specified:

The outputs should be:

- Realistic
- Specific
- Achievable

Outputs that meet these criteria will enable the project manager to asses how succesful he/she has been in achieving those outputs. These criteria also makes it easier to monitor and to evaluate the project through indicators.

d. Devide the project scope into major pieces or work packages[2)]

Once objectives of the project is defined, one way to conquer the big challenge is to break it down into activities. Activities are described as actions that will be undertaken, rather than as states that will be achieved. They should be directly be related to the outputs, and as they are often sequential in nature, they are numbered and listed according to the order in which they are undertaken.

A *work break down structure (WBS)* is a hierachcal tree of work elements or items accomplished or produced by the project team during the project.This helps to divide the project in manegeable work packages or items to ensure that all work elements needed to accomplish the project scope are identified.

The criteria for deciding how much detail or how many levels to put in the WBS are:

- The level at which a single individual or organisation can be assigned responsibility and accountability for acomplishing the work package.

- The level at which the project manager wants to control the budget and monitor and collect data during the project. *So important there is not a single correct WBS for any project!*

e. Generate alternative strategies

The next step is to generate alternative strategies that might lead you to the objectives set for the project. To generate these alternatives, brainstorming may be implemented with the project team.

f. Evaluate alternative strategies

After the generation of alternative stratgies it is important to evaluate the alternative strategies you have generated. Be sure that the criteria used for evaluation are realistic and reflect the end-result objectives.

g. Choose a course of action

- *Graphically portray activties in a network diagram*

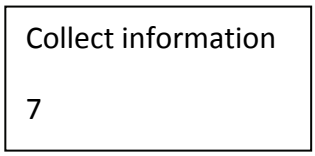
Define the specific activities that needs to be performed for each work package in order to accomplish the objectives of the project.

Graphically portray the activities in the form of a *network diagram.* This diagram needs to show the necessary sequence and interdependence of activities to achieve the project objectives. This project network is the tool used for planning, scheduling and monitoring of project progress.

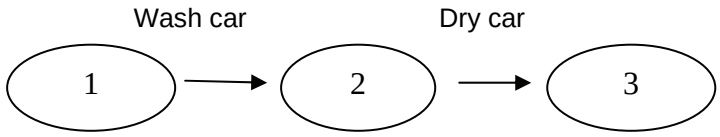
Approaches:

There are two different formats that can be used in drawing the diagram. One format is activity in the box (AIB) and another format is activity on the arrow (AOA).

Activity in the box (AIB); description of activity and duration written in the block.



Activity on the arrow (AOA): the activity is represented by an arrow in the network diagram, and the activity description is written above the arrow as ashown below.



- *Make a time estimation of how long it will take to complete each activity.* It is also necessary to determine the types of resources and how many of each resource are needed for each activity to be completed within the estimated duration.

  The objective with the planning of the time dimension is to determine the shortest time necessary to complete the project. Begin with the workbreak down structure and determine the time required to complete each subunit.next determine in what sequential order the subunits must be completed, and which ones may be under way at the same time.

From this analysis you will have to determine the three most significant time elements:

- Duration of each step
- Earliest time at which a step may be started
- Latest time at which a step may be started

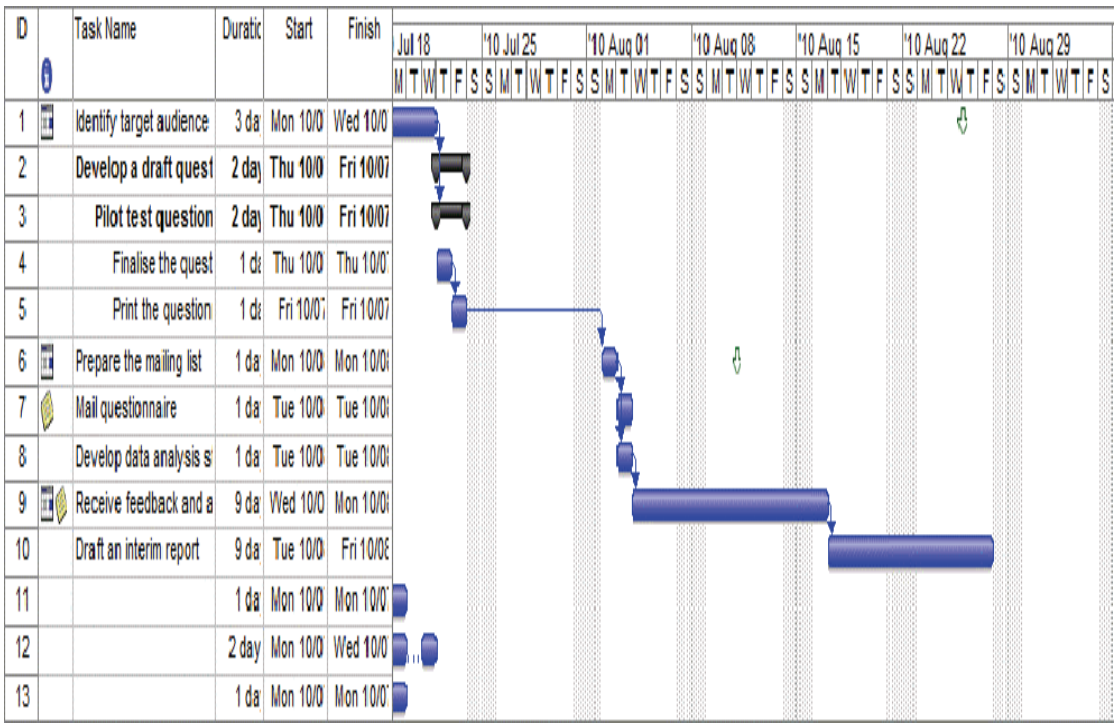
Basic rules in networking…….

- Networks flow typically from left to right
- An activity cannot begin until all preceding connected activities have been completed
- Arrows on networks indicate precedence and flow. Arrows cannot cross over each other.
- Each activity should have a unique identification number
- Looping (recycling through a set of activities) is not allowed
- Conditional statements are not allowed

- *Gannt charts*

A Gantt chart is a horisontal bar chart that graphically displays the time relationship of steps in a project. To create a Gannt chart, list the steps required to complete the project and estimate the time required for each step. The use of computer programs like Microsoft Project Management make the creation of a Gannt chart easy[2)].

Example of a Gannt chart



ID	Task Name	Duratic	Start	Finish
1	Identify target audience	3 da	Mon 10/0	Wed 10/0
2	Develop a draft quest	2 day	Thu 10/0	Fri 10/07
3	Pilot test question	2 day	Thu 10/0	Fri 10/07
4	Finalise the quest	1 da	Thu 10/0	Thu 10/0
5	Print the question	1 da	Fri 10/07	Fri 10/07
6	Prepare the mailing list	1 da	Mon 10/0	Mon 10/0
7	Mail questionnaire	1 da	Tue 10/0	Tue 10/0
8	Develop data analysis s	1 da	Tue 10/0	Tue 10/0
9	Receive feedback and a	9 da	Wed 10/0	Mon 10/0
10	Draft an interim report	9 da	Tue 10/0	Fri 10/0
11		1 da	Mon 10/0	Mon 10/0
12		2 day	Mon 10/0	Wed 10/0
13		1 da	Mon 10/0	Mon 10/0

- *Planning the cost dimension for each activity.*

  The cost is based on the types and quantities of resources required for each activity. It is important to do careful planning for project costs. To begin with, if you overestimate costs you may lose the job before you have started since you are not competitive. A good plan includes the identification of sources of supplies and materials, and this careful research assure that the costs are realistic.

  Typical cost components

  - Human Resources
    - Labour: wages paid to all staff working on the project for the time spent on it.
  - Running costs (Operational)
    - General and administrative
    - Equipment rental: cost of renting equipment and support services such as purchasing,

accounting,secretarial,etc.for time dedicated to the project

- Overhead costs: usually calculated as as a percentage of direct labour cost.

- Capital costs
  - Materials and equipment: cost items purchased for use in the project
  - Supplies : cost of tools, equipment, office supplies, etc. needed for the project

- Profit (if applicable): in a project where profit is applicable, the reward to the firm for the succesful completing of the project. Usually calculated as a percentage of the project cost.

Box 3: Guidelines for estimating time, costs and resources

It is recognised that time, cost and resource estimates must be accurate of the project planning, scheduling and controling are to be effective:

- At the activity or work package level, estimates should be made by the person (s) most familiar with the task
- Estimates should be based on normal conditions, efficient methods and normal level of resources
- Use consistent time units
- Estimates should not include allowances for contingencies. Thes should be budgeted for seperately.

- *Assigning of responsibility*

  Determine who is responsible for completing each subunit or step of a project should be done as early as possible, so that they can participate in the planning of both schedules and budgets. The participants leads to a greater commitment to achieve the project within the time and cost limitations.

- *Calculate the project schedule and budget to determine whether the project can be completed within the required time, with the alotted funds and with the avialble resources.*

  It is important to determine with the help of the project schedule and budget whether adjustments are required to the project scope, activity time estimates or resource assignments. This is a **baseplan or roadmap** for the accomplishing of the project scope on time and within the budget.

Activity 2

Small group activity: Work break down structure

1. Select a project of your choice and break it down into subunits or activities. Show by the drawing of a diagram the relationship and sequential flow among the subunits.

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8. Implementation of the project plan (baseplan) – role of project manager

During the implementation phase, the project manager coordinates all elements of a project . This involves a number of responsibilities controlling work in progress to see that it is carried out according to the plan, providing feedback to those working on the project , negotiating for materials, supplies and services, and resolving differences amongst those involved in the project. These responsibilities require a variety of skills.

Box 4: Characteristics or core traits of the 21st century project manager

- Excellent communicator
- Creates a motivational environment
- Good integrator
- Facilitating interpersonal relations
- Able to manage conflict and stress
- Rewards and recognizes people
- Able to manage change
- Quality oriented
- A team player
- Leadership capabilities

Key duties during implementation of the project plan:

- Controlling of work progress
- Providing feedback
- Negotiating for material, supplies and services
- Resolving diffrences

Make sure you have a monitoring and evaluation plan in place and keep to the milestones

8.1 Monitoring of progress and performance[3,4)]

The heart of the control process is the monitoring of the progress of the project. It is your way of knowing what is going on- how actual compares with the plan. With effective monitoring, you will know if and when corrective action is required. Common ways to keep abreast of project progress are:

- Inspection
- Interim progress reports
- Testing
- Auditing

Interim progress reviews typically occur on a fixed schedule, such as daily or whenever suitable. It may occur when some problem in performance is observed or at the completion of a significant step towards the completion of the project.

The following three topics are usually on the agenda:

- Review of the progress against the project plan
- Review of problems encountered and how they were handled
- Review of anticipated problems with proposed plans for handling them

The role of the project manager during an interim progress review is to achive his/her objectives of knowing the status of operations and influence the course of future events as necessary. Apart from the many roles that a project manager plays in a project (Figure 5), the following roles are important to play during the progress review discussion:

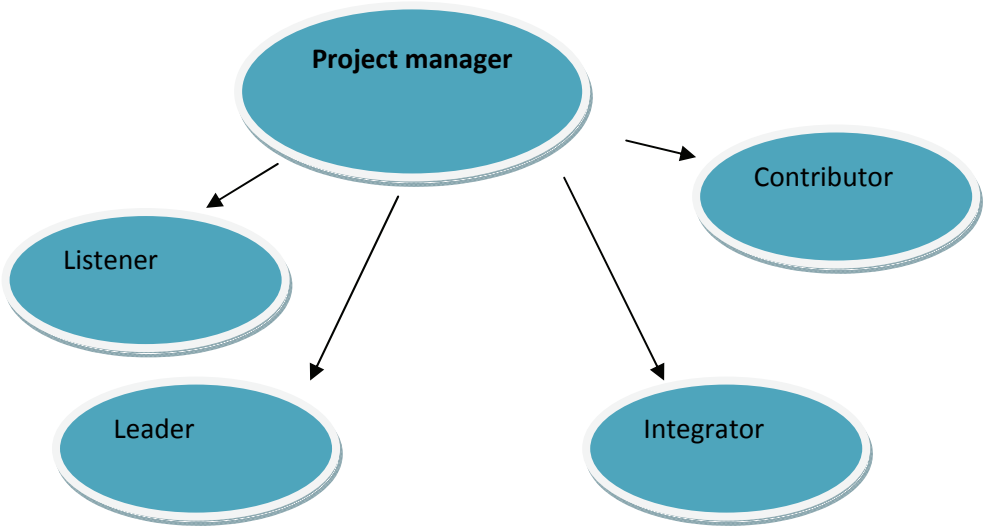

Figure 5. Project manager's role during interim progress reviews

Listener: Listen as the individual updates you on the progress, deviation form the plan, problems encountered and solutions proposed.Listen not only to what is said but how it is said. Is the person excited, frustrated or discouraged?

*Contributor:*In many interim reviews, progress is in line with the project plan. However, you will occasionally have problems to deal with. When this occurs, you can

contribute to their solution by directing the other person towards possible courses of action. Use your knowledge and experience as necessary to move the project forward.

Integrator: An important role of the project manager is to integrate the individual parts of the project into a compatible whole. Is something being neglected? Is there duplication of effort? How can the people available be best employed?

Leader: Perhaps the most important role for the project manager is that of a leader. Through a variety of techniques, you must keep the teams;effort directed towards the common goal of completing the project according to specification, on time, and within the budget. You must confirm and recognise good performance, correct poor performance and keep interest and enthusiasm.

8.2 Providing feedback[4)]

Project managers find opportunities to provide feedback to those who have a hand in completing the project[4)].Through feedback, individuals learn about the effect their behaviour has on others and on the project's success. The most important guideline when providing feedback is to dela only with what you can observe. This limits your discussion to actions and results, because you cannot observe someone's intentions.

Activity 3

Individual activity – checking your feedback style (√)

	Describe rather than evaluate: By describing observed actions and results, the individual is free to use or not use the information. By avoiding evaluation, you reduce the likelihood of a defensive reaction.
	Be specific rather than general: Avoid using 'always" and "never". rather, discuss specific times and events. Avoid generalised conclusions such as; "you are too dominating". Rather be specific by saying:"When you do not listen to others, you may miss a valuable idea".

	Deal with behaviour that can be changed: Frustration is increased when you remind someone of a shortcoming over which he or she has no control.
	Be timely: Generallly feedback is most useful at the earliest opportunity after behaviour.
	Communicate clearly: This is particularly important when handling negative feedback. One way to ensure clear communication is to have the receiver rephrase the feedback to see if it corresponds to what you have in mind.

8.3 Negotiation for supplies and materials

Negotiation is an important process that takes up as much as 20% of a managers' time. Negotiating is one way to resolve differences, and it can contribute significantly to the success of a project.

Guidelines for negotiation[4)]

Prepare: do your homework- know what outcome you want and why. Find out what outcome the other party wants. Avoid negotiating when you are not prepared – ask for time you need.

Minimize perceptual differences: the way you see something can be quite different from how the other part sees it. Do not assume you know the other persons' view – ask questions to gain understanding, and to restate your understanding so that it can be confirmed.

*Listen:*active, attentive listening is a mandatory to effective negotiation. Let the other side have an equal share of the air time.

*Take notes:*you need to know where you are – what has been agreed upon, what remains to be sresolved. Do not rely on memory only!

Be creative: early closure and criticism stifle creative thinking. Be willing to set some time aside to explore different and unsuual ways to solve the problem. Durng this time, do not permit criticism of ideas offered.

*Make trade-offs:*avoid giving something for nothing. At least get some goodwill or an obligation for future payback. The basic principle to follow is to trade what is cheap to you but valuable to the other party for what is valuable to you but cheap for other party (win-win).

Be quick to apologise: an apology is the quickest, surest way to de-escalate negative feelings. It need not to be a personal apology.

Avoid ultimatums: an ultimatum requires the other party to either surrender or fight it out. Neither outcome will contribute to future cooperation.

Set realistic deadlines: many negotiations continue too long because no deadline exists. A deadline requires both sides to be economical in their use of time.

9. Completing the project

The goal of project managment is to obtain acceptance of the project results. This means that the client agrees that the quality of the project parameters have been met. In order for this to happen, it is important that the client and te project manager must haev a well documented criteria of performance in place.

Objective, mesurable criteria are always best, while subjective criteria are risky and subject to ineterpretaion. Thered should be no room for doubt or ambiguity, although this is often difficult to achieve.

The final step of any project should be an evaluation review. This is to look back over the project to see what was learned that will contribute to the succes of future projects.This review is best done by the core project team and typically involves a group discussion.

Activity 4

Group activity: Communication in a project

1. Discuss why effective communication is important to project success. Also discuss ways of enhancing such comunication

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My notes.....

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Extension Learner Guide

Agricultural Extension

Level 5

Module 10

How to prepare a holistic farm plan for irrigation

Study objective

After completion of this module, the learner should be able to have a basic understanding of:

- What is a farm and to assist in the understanding of the physical and social boundaries of a farm
- Farm enterprise and the various types of farm enterprises
- Holistic farm management and holistic goals
- Whole farm planning (WFP)
- Process of whole farm planning

Sustainable agriculture practices include economic viability, environmental stewardship and social responsibility. Farmer decisions concerning sustainable agriculture should therefore

enhance the environment, the farmers' economic situation and benefit the society as a whole. Holistic farm planning of an irrigation farm define the way to move forward on these three tenets. What is this "whole" that should be managed? Is this "whole" that you need to plan starting and ending at the farm gate? What about the relationship with the broader community beyond the farm gate? So often the "whole" includes much broader than the immediate area of farming. Important is to identify who are the key-decision makers involved on the farm – only the farmer or are their partners, family members. Do they have veto power over decisions?

In preparing of a holistic irrigation farm plan the following should be addressed:

- Evaluation of natural and other resources that are available
- Evaluate the whole irrigation enterprise (land, soil, water, climate, crops, irrigation and drainage)
- The sustainable use of these resources
- Identify management practices for best irrigation and drainage
- Possible options are identified and analysed for new technologies to improve water use efficiency (WUE) and crop production

Once a detailed understanding of what resources are required is attained, the resources must be available in appropriate quantities and of the right quality to ensure optimum efficient farming.

Activity 1

Small group activity

1. Define in your own words a typical farm and elaborate on possible different enterprises.

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2. Define what you understand underneath "farm boundaries" for decision making.

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1. What is a farm?

The concept of a farm is of central importance in farm planning and management. An essential feature is its resource base, which provides the inputs necessary to produce outputs or products. The resouces define the *physical boundaries* of the farm. Farm resources have two characteristics;

i) they are scarce
ii) they have alternative uses.

The quality and quantity of the resouce, the techniques employed and the skills used in the obtaining of the best possible combination all help to determine the quality and quantity of the final product. The following resources are commonlly found on the farm, also known as production factors[3)]:

1. Natural resources: include water, land, soil and rainfall.

2. Labour resources: this is a human effort and is needed on all farms. Farmers may have three different types of labour:

   a) the farm family (family labour)

   b) hired labour

   c) labour provided through cooperation between memebers of a community where farmers lives

3. Capital resources: these are resources that are produced as a result of 'human effort', land and labour can often be made more productive if the land is improved. Improvements of the land and the skills and knowledge obtained by the people are a form of capital. Capital resources are usually divided into two types: durable and stock. Durable capital is made up of items that last for a long time, such as buildings, machinery and equipment. Stocks are inputs and materials, such as seed, fertilisers, annul feed for livestock that are usually used within a season.

The farmer and his family also has a *social boundary* where decisions are taken, and therefore the real boundaries of a farm consist of *physical and social boundaries*. Together it forms the farm household system that includes the decision-making unit (farmer and farm family), the resource base and the various enterprises.

Usually a farm is made up of several enterprises, and each of these enterprises has its own inputs and outputs. Inputs are the scarce resources used in the production process, while outputs are the livestock and crop products, the specific farm produces.

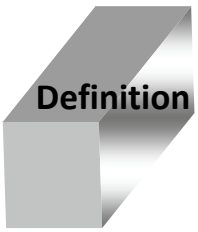
The output of one farm enterprise can also be the input of another farm enterprise. The following types of enterprise are commonly found on a farm[3)]:

- **Competive enterprises:** enterprises compete when they use the same scarce resources. For example the use of the same labour force for different crops at the same time, the one crop can be increased only if the other is reduced.

- **Supplementary enterprises:** where one enterprise supplement another when they use resources that might otherwise not be used. For example, where labour is used for the harvesting of a winter crop but also for a second crop that is grown during the summer growing season. Labour is a resource that is left not unused, and the two crops do not compete for the labour because they require the resource at different times of the year. In this case the two enterprises are supplemenaty.

- **Complemenetary enterprises:** enterprises are complemenetary if they interact in a supportive way to one another. For example, a farmer may keep poultry or livestock that produces manure. The manure can be applied as a fertiliser to crop enterprises. This relationship between livestock and crops shows that these two farm enterprises are complemenetary.

2. What is holistic farm management?[1)]



Central to whole farm planning is the use of holistic farm management[1)]. Holistic farm management is a simple decision making framework that can be learned like any other skill. The importance of holistic farm management is the creating of a holistic farm goal, which is used to measure the success as the farmer and farm workers work to balance the need to improve their overall quality of life and the quality of surrounding land and environment.

The name *"holistic"* implies resources are managed in *whole units* rather than as parts in isolation from their surroundings. To have a clear description of *what is being managed*; people begin by defining their *whole*. This definition involves a listing of: 1) all decision-makers involved in the management, ii) the natural resources available, and iii) the capital (funds) available. Setting up and running a farm business successfully entails that the manager or management team need to be able to manage:

1) nature and the natural resource potential of the farm,
2) the finances of the business,
3) marketing,
4) employees and other stakeholders involved in the business, and risk.

In order to manage a farm holistically the manager requires insights in understanding the ecosystem, understanding the effects of the same management when practised in different environments, capacity to make good decisions within the complexity of the farm business and ecological/farming environments.

2.1 Farm planning

All farmers plan all the time

Some farmers use formal written plans for decision making, and others do not. The factors that are taken into consideration are the following:

- Production plan
- Financial
- Marketing plan
- Land use plan
- Conservation and biological plan

Decisions and planning should always move the farmer towards his/her holistic goal.

2.2 What is a holistic goal?[1)]

The holistic goal is the heart of holistic farm management. For any given “whole’ the decision makers, the resources and the capital available provide a personal direction and can pull a group of people together through shared values and desired lifestyle. This goal gives us a way to evaluate our decisions and actions to ensure that we are using time, money and resources optimally to move us towards what we value most – for both the short and long term.

It is different what we conventionally perceive as a goal- namely that it is a comprehensive statement that addresses three components namely:

- The desired quality of life, based on the owners goal and what is valued deeply
- Addresses the ways to actually produce that quality of life and
- Thirdly what will sustain it far into the future

Box 1: Checklist of a holistic irrigation farm plan:

1. Farmer or owner holistic (value based) goals – begin with end in mind
2. Property information and owner details
3. Infrastructure, topography and natural features
4. Evaluation of land suitability
5. Planning of irrigated cropping enterprises
6. Evaluation of irrigation system
7. Irrigation drainage and recycling systems
8. Action plan

Each of these sections mentioned above will be included in the farm planning, and from section 3 to section 8, information is mapped against a base map such as an aerial photograph or scaled survey map (using a GPS). How you present the information, as a map or a plan or an overlay is your choice.

Some farmers may prefer an aerial photograph mounted on a board, with transparent overlays on which annual planning is done. Other prefers to have all the plans included in a main report.

Activity

Activity 2

Individual activity: Holistic goal

You are a small scale irrigation farmer in South Africa involved in the growing of various crops. Use your best judgement to create a *holistic goal* that will take the following into consideration:

- Decision makers like those who have veto power over your farming operation (such as a parent, partner, family members – even though they are not involved in the day-to-day decision making, they must be included.

- The holistic goal should be stated in the positive! Strive to state 100% what you want and 0% what you do not want! Avoid to referring to problems in the stating of the holistic goal.

- Remember the holistic goal should have three interrelated components namely:
    - Quality of life statement
    - Forms of production (what you need to produce to create the quality or desired lifestyle envisaged)
    - Future resource base (what the future must look like to sustain the desired quality of life)

This exercise is an iterative exercise – you will do some writing, thinking and some talking – and then most probably change the initial goal again.

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3.Whole farm planning (WFP) guidelines and steps

An intelligent plan is the first step to success. The man who plans knows where he is going, knows what progress he is making and has a pretty good idea when he will arrive. Planning is the open road to your destination. If you don't know where you are going, how can you expect to get there?

3.1 What is a Whole Farm Plan (WFP)

Whole Farm Plans describe the characteristics and capacity of a farm, and identify resources and opportunities to be an economically successful farm with diverse agricultural, ecological, and social activities[2)]. It is a living, working document that lays a foundation for decision-making. A Whole Farm Plan brings together important information about all the elements of a farm that need to be managed for success. It includes an inventory and assessment of land related resources, legal information, and farm activities. This information forms the basis for creating a vision and goals for the farm. The farm's vision and goals provide a supportive framework for developing other farm planning documents and agreements (such as land-use and tenure agreements, and business and succession plans)[2)].

A Whole Farm Plan is a farm's key reference document. You can go to it for information about communication, agreements, and your land-base, and to review your farm vision. With good information about your farm and its resources, you can make sound decisions. The

investment of time and effort to discuss, define, and record common values and goals helps to learn how to work together as you support the farm and manage its assets and activities.

Whole farm planning is a process of planning, property design and management based on natural resources, owner value based goals and economic factors.

Box 2: A farm plan should include the following core components

- Whole farm plan process
- Client or owners' focus and goals : how it link to regional priorities and responsibilities
- Risk management: on and off site impacts relating to property and business
- Land capability and soil
- Water
- Biodiversity
- Bio security: on and off site impacts and their appropriate management

3.2 Advantages of a Whole Farm Plan (WFP) [2]:

- provides a basis for future land management decisions
- supports farmers to use environmentally sustainable farming practices and principles
- informs farm agreements (land-use, tenure) and plans (business, succession)
- brings environmental and social values into land management decisions
- deeper understanding of and commitment to your farm's purpose
- improved relationships with partners
- optimal farm efficiency and profitability
- better preparation for expansion, retirement, and change
- records of long-term, sustainable stewardship of the farm as measurable actions.

Activity 3

Individual activity: Understanding of the WFP

1. Define Whole Farm Planning (WFP)

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2. Name the components of WFP and explain why each of these components is important.

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3. What are the advantages of WFP?

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3.3 WFP planning procedure

The following planning procedure is recommended for the whole farm planning of an irrigation farm (Figure1).

Step 1: Identify farmer's goals

Outcome: Statement of the owner's goals for farming and specifically for irrigation on the farming enterprise

Because agriculture becomes more market driven and commercial in nature, a farmer must improve his management skills in order to be more effective in buying and selling and to adapt effectively to the changes in his environment. Good farm management skills will help the farmer to achieve his objectives. A farmer's objectives can be identified through face to face interviews or informal discussions. Outline the following:

1. Identify short term, medium and long term goals for irrigation on the farming enterprise
2. Identify preferred faming style opted by the farmer
3. Identify the farmer's personal preferences
4. Identify how irrigation farming helps to achieve the owner's goals
5. How the irrigation or envisaged irrigation will impact on society and the community as a whole

A farmer's objectives can include any of the following:

- Maximising profits
- Increase production
- Increase sales
- Minimising costs
- Avoiding too much debt
- To achieve a satisfactory living standard and ensure that he can care for his family
- To reduce the risks involved with farming
- Ensuring that his farm survives in the long term
- Creating wealth over time

Step 2: Gather relevant information of the farm

Outcomes:

- *Map showing the location of the farm*
- *Overall farm plan: a map showing the entire farm (even if only a part of the farm is irrigated). You may use a topographic or FIS map with farm boundaries.*
- *A base map at a scale suitable for farm planning to show the details of the cropping areas and irrigation systems in detail.*

The following information should be collected:

1. Ownership details
2. Detail of property (ies) (ha) and general location within the district
3. Mapping of natural resources (topography, landscape, soil, water, climate, veld)
4. Area potential
5. Infrastructure assessment (house, sheds, dams, stock handling facilities, roads, conservation works, etc)
6. Implements and machinery (tractors, implements, irrigation equipment)
7. Labour availability (human resources)
8. Farming enterprises in the area
9. Irrigation history: outline of the development of irrigation on the property and list water license details
10. List problem areas for instance water logging, bush encroachment, etc
11. Management structure and capability
12. Financial assessment

Step 3: Study of infrastructure, topography, and natural features and evaluate present land use

Outcomes:

- *An analysis of current farm infrastructure, topography and natural features that influence development and specifically irrigation. This should be indicated on the plan or map you use for the exercise.*
- *Analysis of the soil, water and climate to determine the areas suitability for irrigation*
- *Current and proposed cropping enterprises*
- *Description of current irrigation systems and irrigation management*

The following information should be collected:

1. Infrastructure: houses, sheds, dams, boreholes, access roads, fencing, etc. What is available and the quality of it? Note where current physical infrastructure affects current irrigation or proposed irrigation developments.
2. Topography: describe the landscape and note how any topographical features such as slope, gullies and ridges or flood ways affect irrigation development.
3. Natural features and areas that will affect irrigation and productivity. This may include areas of native vegetation, water courses, natural springs and wetlands. Note any environmentally sensitive areas (erosion, food zone and sensitive habitats).
4. Identify problem areas such as salt affected areas, water logging, erosion, or flooding. *(More detail discussion of land suitability evaluation will follow in Module 11).*
5. Identify current and potential cropping enterprises
    a. Rotations of crops
    b. Crop areas
    c. Current crop performance (yields and quality)
    d. Soil suitability for current and proposed crops
    e. Water budgets
6. Evaluation of current irrigation system and its performance:
    a. Pressure irrigation system include evaluations of:
        i. Pumps
        ii. Blocks (valves)-for each block note the number of emitters/outlets and operating pressure
        iii. Provide emitter details (jet sizes), rated discharge, and operating pressure
        iv. Determine operating pressure or discharge ranges, mean application rates and application uniformity
        v. Filter effectiveness, flow rates and water quality
    b. Surface irrigation includes the following evaluations:
        i. Fields: determine infiltration depth, extent of water logging, irrigation duration for each field, volume of water applied, bay size, area and length of short furrow, etc.
        ii. Channels; describe condition of channels and command over fields
7. Evaluation of the current drainage and drainage management system
    a. Current drainage and recycling system
    b. Adequacy of the drainage and recycling system performance and management practice

Step 4: Resource planning

Outcomes:

- *Planning of the improvement or development of the system and management*

Correct planning of natural resources forms the foundation for success.

1. The information collected is mapped against a base map (aerial photo, scaled survey plan).
2. The detail of planning depends on the situation (agricultural potential, owners goals, owners preferences and capital (human and economical) requirements
    a. Natural resources: soils, land capability and landforms, climate, water
    b. Livestock (small or large livestock, poultry): stocking system, fodder flow, pastures and carrying capacity
    c. Crop types, cropping system and rotation (grain, industrial, horticulture)
    d. Forestry
    e. Ideal combination of livestock and crop planning which forms the farming system
    f. Management operation requirements

Step 5: Action plan

Outcomes; Analysis of steps 1-4, and implementation plan for the recommendations for the improvement of the farming system and management

1. Summarise the limitations and opportunities that have been identified and how it affects crop production and the efficient use of irrigation water on the farm
2. Provide details of how the changes to management that is proposed will be implemented
3. Detail enterprise and sub enterprise budgets
4. Decide on time frame for the implementation of the planning
    - This will influence the planning of financing the capital requirements, capacity (human and management) requirements for the implementation of the production plan
    - This will steer the planning of a management information system
5. Monitoring of action plan: monitoring is done by using a checklist.

Example

Example of irrigation development action plan matrix developed together with the farmer

A: Priority	***B: What development change required?***	***C:Benefits: Water use Efficiency (WUE) estimated***	***D:Timing***	***E:Cost***	***F:Other benefits***
Outline the proposals and list it in priority order	Both management and system changes are taken into consideration.	Assess proposals for its WUE benefits – how it will improve efficiency	Develop a timetable for their implementation	Assess proposals for the cost involved and how it will address the farmers goals	Compare costs and benefits, particularly the cost if not following the proposed plan

Step 9: Develop a management information system

Outcomes: A simple and easy to maintain record and information system for planning and decision making[4)]

1. Effective farm management is of cardinal importance for the sustainability of a farm. Like in any other business, it entails:
   - Taking of decisions
   - Execution or implementation of decisions
   - Responsibility for the decisions

2. However for the farmer to make the best decisions for the farming business requires:
   - Integrity and responsibility
   - Practical experience
   - Technical knowledge
   - Knowledge about business and marketing
   - Information system on the farming system (record keeping)
   - Management of the information system

3. The most important criteria for an effective management information system for farming are that it must be:

- Simple and easy to use
- It must be used on a regular basis by the farmer
- The farmer must have the necessary knowledge to use the information effectively in decision making

Business more than any other occupation is continual dealing with the future – Henry Luce

Activity 4

Small group activity: Implementation of the WFP procedure

You visit an irrigation farmer in the Marblehall district and were asked to help with the planning of the irrigation farm. How will you assist the farmer with the planning of the irrigation crops? Discuss in detail the framework of Whole Farm Planning that you will follow.

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My notes.....

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Extension Learner Guide

Agricultural Extension

Level 5

Module 11

Land suitability evaluation for irrigated agriculture

Study objective

After completion of this module, the learner should be able to have a basic understanding of:

- Basic principles of land suitability evaluation in irrigation development
- Preparatory investigation and data collection for evaluation of land suitability
- Collecting and analysing of climatic data for provisional identification of potential crops
- Determination of soil requirements and tolerances of potential crops
- How to conduct a detail soil survey
- Delineation of areas
- Evaluation of soil suitability for potential crops
- Evaluation of soil suitability for different irrigation systems
- Evaluation of suitability of irrigation water
- Conducting of Environmental Impact Assessment and drafting of preliminary mitigation plan
- On-site and off-site EIA

Table of contents

Appropriate and correct land suitability evaluation is a prerequisite for successful agriculture. It is even more important for irrigated agriculture than for other types of agriculture. Irrigated agriculture is the most intensive form of agriculture and requires high capital inputs and high production costs. It often involves long term perennial crops, such as fruit orchards or vineyards.

Land suitability evaluation rests on all the basic scientific background principles and facts discussed in sections dealing with climate, soils, crops, economics, etc.

1. Basic principles of land suitability evaluation in irrigation development

Land suitability evaluation for irrigated agriculture is much more complex and complicated than for other types of agriculture. ***In this module only a very superficial outline of the most important aspects of land suitability evaluation for irrigated agriculture can be given***.

Land suitability evaluation rests on all the basic scientific background principles and facts discussed in sections dealing with climate, soils, crops, economics, etc. Various different land capability/suitability evaluation systems are used in different countries. The ***American eight-class land capability*** evaluation system, and various variations of it, is widely used. However, this system is far too rigid and static to be useful for land evaluation for irrigated agriculture. The ***FAO's dynamic and flexible land suitability*** evaluation system is much more useful for land suitability evaluation in general, and especially for land suitability evaluation for irrigated agriculture.

In South Africa there has also been a big swing from rigid irrigability classification of soils to more dynamic and flexible approaches. Because the latter do not work according to fixed "recipes", they require inputs from people with more knowledge and insight.

• Principles of land suitability evaluation

The FAO's *Framework for Land Evaluation* identifies six principles for land suitability evaluation. These are, with additional comments pertaining specifically to irrigated agriculture:

i) Land suitability is assessed and classified in relation to specific land utilization types (LUTs)

A LUT is a very specifically defined entity, including specification of:

- Each specific crop considered (e.g. maize or apples) and not just groups of crops (e.g. grain crops or deciduous fruit crops). In many cases evaluation needs to be done for specific cultivars, clones or rootstocks.
- The production techniques envisaged, especially which type of irrigation system.

This principle requires that evaluations (interpretations) must be very specific, since soil or land has different qualities (advantages and/or limitations) for different LUTs according to the requirements and tolerances of the different LUTs.

ii) Evaluation requires comparison of the projected cost of inputs required with economic outputs obtained on each type of land

Commercial irrigated agriculture must be economically viable to be sustainable. The emphasis is on ***each type of land***. This evaluation is broad and sometimes qualitative rather than quantitative. It is ***not*** a farm management plan, which involves year-to-year decisions regarding things such as which and how much fertiliser to apply, pest management, etc.

Sometimes irrigated agriculture is established with socio-economic rather than purely economic objectives. In such cases different evaluation criteria must be used.

iii) A multi-disciplinary approach is required

Involvement and contributions from specialists such as agro-climatologists, soil scientists, crop ecologists, agronomists and/or horticulturalists (depending on envisaged crops), irrigation engineers, agricultural economists, land use planning specialists and extension specialists (and in some cases even rural sociologists or anthropologists) are vital to make sound assessments of land suitability. The specialists need to work together as a team and interact effectively throughout the evaluation process.

iv) Evaluation requires careful attention to the physical-biological, socio-economic and social context of the area under consideration

Evaluation must be done relevant to:

a. The properties, characteristics and qualities of the physical-biological resources (climate, soil, water, etc.) of the area.
b. Socio-economic conditions, such as physical infrastructure (transport, telephones, etc.); capabilities, skills and interests of the farmer(s); availability, skills and cost of labour; availability of support services (extension/advisory services; technicians, mechanics); access to inputs; markets; land tenure arrangements; etc.
c. Social aspects, such as culture, religion, etc.

v) Suitability refers to land use on a sustainable and environmentally responsible manner

Since irrigated agriculture involves large capital inputs, ensuring long term sustainability is critical. Both on-site and of-site environmental impacts must be evaluated and attention given to mitigation plans.

vi) Evaluation should involve comparison of alternatives

The comparison can be between different land uses, e.g. between irrigated agriculture and rainfed cropping. Due to especially high input costs irrigated agriculture is sometimes less profitable than rainfed cropping – i.e. the so-called *"Nett Incremental Irrigation Benefit"* (NIIB) becomes negative. In South Africa an increasing number of irrigation farmers with water licences do not use their allocated water and rather do rainfed farming, mainly due to high electricity costs (for pumping water) and/or high labour costs.

Comparison can also be between different LUTs within irrigated agriculture, e.g.:

- Between different crops, or even different cultivars, clones or rootstocks of the same crop.
- Between different irrigation systems.

Failure to consider alternatives may have the result that the best or most profitable land use or LUT is not selected for a specific piece of land. The land may be found suitable for a specific envisaged land use or LUT, but a better or more profitable land use or LUT may be overlooked. In the worst case scenario it may be found that the land is not suitable for the specific envisaged irrigated LUT (crop and/or irrigation system) and a decision is taken not to recommend irrigation farming, while there may be another irrigated LUT for which it may be highly suitable.

2. Preparatory investigations and data collection for evaluation of land suitability

The detailed surveys required obtaining the information and data needed for land suitability evaluation in land use planning is expensive and time-consuming. Therefore, less detailed investigations, studies and surveys should first be done to obtain a general overview of possibilities to implement an envisaged LUT before deciding that there is enough potential to warrant detailed investigations, studies and surveys and where to do required detailed surveys. To expend the minimum amount of time and money and achieve the highest efficiency during the preparatory investigation and data collection phase, a certain sequence of steps should be followed. If the findings of any step should show that the envisaged irrigation development or change to existing irrigation is unlikely to be successful, then the process should be terminated at that point and no time and funding wasted on further investigations and evaluations. In some cases, especially when doing a land suitability evaluation for a single commercial farmer, some of the steps can be skipped. The steps, in order of sequence, are:

Step 1: Establish whether the Department of Water and Environmental Affairs will/can make water available for the envisaged irrigation development or change to existing irrigation and how much.

Irrigation is impossible without water, so it is logical to ascertain this first. Normally this is probably cleared out before any land suitability evaluation or land use planning is done. It is; however, better to make sure that it has been sorted out.

Step 2: Determine the attitude towards and aptitude for irrigated agriculture of the farmer(s) or envisaged farmers

The attitude of a farmer or farmers towards irrigated agriculture and/or his/her/their aptitude for irrigated agriculture is extremely important in determining the success or failure of introducing irrigated agriculture. They are equally important when significant changes to new LUTs are considered where irrigation farming is already being practised.

Surveys to determine this are especially important where new small-scale irrigation development is considered in an area which has no history of irrigation farming. In a case in KwaZulu-Natal in the 1980s such pre-survey found that the intended beneficiaries of a proposed irrigation scheme were not interested in such irrigation development and consequently the proposal was shelved, rather than to spend a lot of money on a scheme that was doomed to failure. In a more recent case in Mpumalanga a group of small-scale farmers decided that they would do better by selling the water allocated to them to other users (industries; commercial farmers) rather than to use it themselves for irrigation. So, after several years the irrigation development envisaged (by outsiders) has not yet happened.

Also in the case of individual commercial farmers it is sometimes important to first determine the objectives and interests of the farmer beforehand. In the south-eastern Free State a farmer told consultants whom he contracted to draft a land use plan for his farm that he knew that they would tell him that he had water and good irrigable land and could make a lot of money by growing vegetables for the Bloemfontein market. But, he told them that they could forget about it, he was not interested. He was a stock farmer and the only irrigation that he would consider would be to produce green fodder in winter for his sheep.

Unfortunately this very important type of study, which is easy, fast and cheap to conduct, is often not done at all or done very superficially. Moreover, it is usually done towards the end of the land suitability and land use planning exercise, when almost all the expensive surveys and evaluations have been done. It may then be found that those were all unnecessary, or that mainly irrelevant and inappropriate information and data had been gathered.

Step 3: Study all social, cultural and political factors that may impact on the envisaged irrigation development or changes to existing irrigation

Social, cultural and political (local/provincial/national) factors often impact strongly on the success or failure of new irrigation development or changes to existing irrigation. Provincial governments sometimes have strong views and guidelines on types of irrigation systems that they are willing to support.

Step 4: Conduct a general study on infrastructure

By nature irrigated agriculture has a high demand for an effective infrastructure, both physical infrastructure (dams, weirs, canals, roads, railroads, transport services, telephone services, processing plants, markets, etc.) and support services (advisory services, technicians, mechanics, etc.).

A survey of the general infrastructure early on is essential:

- What is available and the quality thereof.
- What is not available? Can it be made available/constructed? What will be the approximate cost?, e.g. bringing a new power line over a long distance or building a new major bridge can be very expensive. The cost may even be prohibitive.

This is a quick and inexpensive exercise. Thus, it is inadvisable to leave it towards the end of the land suitability evaluation process, after a lot of time-consuming and expensive surveys and studies have been done – just to find at that point that the infrastructure is inadequate and/or too expensive to provide or maintain.

Sometimes a more detailed follow-up study of specific infrastructure that may be required for a specific LUT that is recommended is required at a much later stage.

Step 5: Collect and study all existing relevant maps, reports and other information on the area

The objectives of this step are:

- To ensure that lots of time and money are not wasted to do time-consuming and expensive surveys for collecting data and information that are already available at an appropriate scale.
- To use relevant data and information that is available only at a too small scale or is too general for actual land suitability evaluation, in order to identify promising areas for the eventual irrigation development. Time and money can then be spent on detailed surveys on these promising areas only and part of it not wasted on areas that are obviously not suitable.

Step 6: Conduct a quick drive-through reconnaissance of the area/farm

It is important to early on get a real life "feeling" for the area or farm under consideration. It sometimes looks quite different on the ground in the field than one's impressions gained from just looking at existing maps or reports. It is even more important where existing maps or reports are not available.

It is very important that all members of a multi-disciplinary team must accompany such drive-through reconnaissance in order to improve communication between them during the rest of the land suitability evaluation process. This was usually not done in the past, with only the soil surveyors doing field reconnaissance studies. In practice it has been found that it is highly beneficial, and in the end more efficient, if representatives from all disciplines involved join the drive-through reconnaissance study.

Step 7: Estimate anticipated costs of land clearing and land levelling

In areas considered for new irrigation development high cost land clearing may be required. This may include:

- Clearing of dense bush or forest vegetation.
- Clearing of boulders and/or rocks.

In some cases major land levelling operations may be required. During the drive-through reconnaissance the need for any of these should be noted. Estimates of anticipated costs should be made based on these observations. If the estimated costs seem to be prohibitive then the process can be aborted at this point and no time and money wasted on further investigations. If no high cost land clearing or levelling is required, then the evaluation process continues normally. If there is doubt whether the costs of land clearing or levelling will be acceptable or prohibitive, the process continues, but this aspect must receive attention again at a later stage.

Step 8: Broad scale soil survey

Where planning has to be done for a new medium to large irrigation scheme a broad scale soil survey needs to be done to identify and demarcate promising areas for development – if such survey(s) has not been done for the area before.

Where water is to be delivered from a dam, the areas included in this survey are those which can possibly be served with water from previously identified potential dam sites. Reasonable assumptions in regard to pumping costs, canal lengths, etc. must be used. Expected command levels for canals from the identified potential dam sites form the baselines from which to work. Civil engineers, irrigation engineers and economists play key roles in decisions regarding demarcation of the areas to be included in the soil surveys.

Activity 1

Small group activity

1. Discuss the principles that apply in land suitability evaluation.

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2. A thorough discussion of the procedure and steps recommended for the undertaking of a preparatory investigation should be conducted. Emphasis should be made to evaluate how these steps could be applied in your work place and whether there are any shortcomings. Participants should have adequate time for this exercise- and after the exercise there should be an opportunity for feedback to the rest of the group on the discussion.

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3. Collecting and compilation of climate data and provisional identification of potential crops[1)]

Five steps are discussed in the approximation identification of potential irrigation crops that could be grown on the farm.

Step 1: First approximation identification of potential crops

This step involves preliminary identification of all crops that could potentially be produced on the scheme or farm in terms of:

- The capabilities, interests and preferences of the farmer(s) or envisaged farmer(s).
- The influence of social, cultural and political factors.
- The availability of required infrastructure.
- General knowledge regarding the climatic suitability of the area for certain types of crops.

Step 2: Collect and collate data and information on the climatic requirements and tolerances of each of the crops identified (described in Step 1)

- This step is critically important, because without it no sound land suitability evaluation or recommendations and decisions can be made. The most important climatic parameters for which data and information regarding the requirements and tolerances of crops are needed have been discussed in the learning material on climate (Part 3: Agro climatology).

- According to FAO guidelines the ideal is to make use of local data and information, including both published research findings and information obtained from researchers, extension officers, other advisors and leading farmers[1)]. This could be supplemented with appropriate relevant data and information from other areas in the country. If the obtained data and information are inadequate for any specific crop, then it can as a last (but less useful) resort being supplemented by data and information from elsewhere in the world. Sometimes there are differences between the data and information obtained from different publications and/or persons and "informed judgements" must then be made.

- The crops thus identified as potential crops on the basis of preparatory studies are coded as *PC-p crops.*

- A table or tables are then constructed, indicating the required (ideal) and tolerance levels for each crop considered for each relevant climatic parameter.

- Crops scientists (agronomists and horticulturists) are the key people to take responsibility for this step. It is a desk-top study, supplemented with field interviews if and as required.

Step 3: Collect and collate data and information on the climate of the area/farm

- Data and information must be collected and collated for all climatic parameters which would affect the suitability of the area/farm for each of the crops identified under Step 1 and for which requirements and tolerance levels have been determined in Step 2.

- There are often no weather stations in an area. Climatic parameters must then be interpolated from data from weather stations in surrounding areas. This must be done very carefully, taking into consideration factors such as topography, meso-climate effects, etc. Sometimes there may be a limited number of weather stations in an area. Data from these must also be used carefully, taking into account that there may be significant climatic differences between different parts of the area/farm. Most weather stations record data for only a limited number of climatic parameters. Some parameters can be derived from these. Others have to be obtained from general small-scale maps and/or through field interviews with knowledgeable persons in the area.

- An area (even a large) farm often has distinctly different climates that are important in regard to suitability for different crops. These must be demarcated and analysed separately regarding climatic parameters.

- A table or tables are then constructed, giving the values for different climatic parameters.

- Ideally this step should be the responsibility of agro-climatologists, especially in view of the fact the many values have to be derived by means of interpolation or interpretation. Unfortunately agro-climatologists are virtually non-existent in South Africa. Thus, this step is usually done by crop scientists and extensionists.

Step 4: Second approximation identification of potential crops

- This step consists of comparison of the requirements and tolerances of each climatic parameter for each crop, as identified in Step 2, with the actual values for that parameter for the area (or different climatic zones of the area), as identified in Step 3. In this way it is determined how well the area is suited to the requirements and tolerances of each crop in regard to each parameter. This process is called **"matching"**.

- For each parameter the area is for each crop rated as "Good" (G), i.e. suitable, "Sub-optimal" (S), "Marginal" (M) or "Not suitable" (N). Tables are constructed giving the ratings **of each parameter for each crop.**

- Those crops for which the area is found to be climatically unsuitable are now removed from the list of potential crops.

- The crops identified as potential crops on the basis of preparatory studies and climatic suitability is coded as PC-pc crops.

- This step is the responsibility of crop scientists.

Step 5: Third approximation identification of potential crops

- In this step agricultural economists look at the projected economic feasibility of each of the potential crops identified in Step 4. Those crops that are rated as non-feasible are removed from the list of potential crops. Sometimes the agricultural economists suggest that certain crops that are not on the list may be economically feasible options if the area is climatically suitable to them. These are then referred to the crop scientists, who do Steps 2 and 4 on them. Those (if any) the area is found to be climatically suitable to are then added to the list of potential crops.
- The crops identified as potential crops on the basis of preparatory studies, climatic suitability and economic feasibility are coded as PC-pcf crops.

4. Determination of soil requirements and tolerances of potential crops

In this section the approach to the identifying of soil requirements and tolerances of potential crops and parameters used for the design of soil survey and map legends are discussed. The following steps are followed:

Step 1: Determination of the soil requirements and tolerances of potential crops

- This step is critically important, because without it:
    - an appropriate soil survey legend, determining which soil parameters and class limits are used, cannot be designed for the detailed soil survey.
    - no sound land suitability evaluation or recommendations and decisions can be made.
- The most important soil parameters for which data and information regarding the requirements and tolerances of crops are needed have been discussed in the study material on soil (Part 2). According to FAO guidelines[1)] the ideal is to make use of local data and information, including both published research findings and information obtained from researchers, extension officers, other advisors and leading farmers. This could be supplemented with appropriate relevant data and information from other areas in the country. If the obtained data and information are inadequate for any specific crop, then it can as a last (but less useful) resort be supplemented by data and information from elsewhere in the world. Sometimes there are differences between the data and information obtained from different publications and/or persons and “informed judgements” must then be made.

- A table or tables are then constructed, indicating the required (ideal) and tolerance levels for each crop considered for each relevant soil parameter.

- Crops scientists (agronomists and horticulturists) are the key people to take responsibility for this step, but in close consultation with soil scientists. It is a desk-top study, supplemented with field interviews if and as required.

Step 2: Draft a list of soil properties/parameters that are relevant to irrigability evaluation and class limits for these

- This step is critically important, because without it no sound land suitability evaluation or recommendations and decisions can be made. Relevant soil properties/parameters include:

Several related to soil-water relations, e.g. infiltration capacity, hydraulic conductivity, internal drainage, profile available water capacity
Workability and susceptibility to crusting (surface sealing) and/or subsurface compaction
Salinity, sodicity and toxic ions
Soil fertility and pH
Susceptibility to erosion (water and wind)

- This step is the responsibility of soil scientists, in close consultation with crop scientists and irrigation engineers.

Step 3: Draft a list of non-soil elements of land that are usually included as phases in soil survey and soil map legends and class limits for these

- These are essential for compiling useful soil survey legends and soil map legends and efficient land suitability evaluation. Relevant land elements include:
  - Slope gradient.
  - External (surface) drainage.
  - Flood hazard.
  - Mechanical limitations, e.g. stoniness.
  - Present erosion (type and degree).
  - Present land use.

5. Conducting of a detailed soil survey

Irrigated agriculture demands that detailed soil surveys should be included in the evaluation of land for irrigation purposes. The following steps are recommended:

Step 1: Development of an appropriate soil survey legend

- Development of an appropriate soil survey legend before the field survey is started is essential. It is to ensure that all soil parameters that will be needed later during land suitability evaluation will be recorded during the field survey, i.e. it guides the soil survey. It must also be ensured that appropriate class limits are distinguished. The parameters and class limits identified in Section 4(Step 2) are used in the development of the soil survey legend. It is very important to take the requirements and tolerances of each of the *PC-pcf crops* into account. The soil survey legend is developed by soil scientists, but in close interaction with crop scientists and extensionists.

- Soil data obtained from previous soil surveys in the area (Steps 5 and 8, Section 2) during the preliminary broad-scale survey are used during the compilation of the soil survey legend, because they give some indication of what soils could be expected during the detailed field survey.

- To achieve highest efficiency during the later land suitability evaluation, the soil survey legend can be adjusted somewhat during the field survey – in order to accommodate new information on the soils that is found during the survey. It is best to have regular interaction between the soil surveyors and crop scientists (and others, like irrigation engineers) during the course of the field survey in regard to adaptations to the soil survey legend.

- The soil properties which must be determined, are grouped into three categories:

  a. Properties used for taxonomic classification at soil form level (according to the South African soil classification system).
  b. Properties that is important for determining the suitability of soils for the different *PC-pcf crops*.
  c. Other soil properties that are generally considered to be important for the determination of the irrigability of soils, as determined in Section 4.

- Taxonomic classification is for three reasons important, viz.

  a. It assists in making more reliable and efficient land suitability evaluations and technology transfer, making use of results obtained on comparable soils elsewhere.
  b. It assists in recognition of similarities of the nature of soils within the survey area.
  c. Recognition of similar soil areas will be important when re-interpretation (new land suitability evaluations) may be required at a later stage – sometimes at a much later stage.

  Without taxonomic classification one can never be certain whether you are dealing with a similar soil or a different one. General descriptions and classification are not adequate for this.

- In the development of a soil survey legend soil mapping units are defined. A soil mapping unit represents a type of soil that in addition has certain properties and characteristics falling within certain class limits, used during the development of the soil survey legend. The objective with well-defined soil mapping units are:
    a. To ensure that soils which have the same land suitabilities for the same reasons are grouped together on the soil map.
    b. To ensure that soils that (i) have different land suitabilities or (ii) have the same land suitabilities, but for different reasons, are separated on the soil map.

Step 2: Conducting of the field work in a detailed soil survey

- A detailed soil survey requires actual detailed field work. It cannot be based on interpretations of remote sensing images, like satellite images or aerial photographs. No shortcuts may be taken. Errors lead to very expensive, disastrous consequences.

- Before starting the survey the following must be selected:
    a. An appropriate mapping scale and map scale. It is usually 1:5 000. Unlike for rainfed cropping a smaller scale (say 1:10 000) is not suitable for irrigated agriculture.
    b. An appropriate observation density. According to the FAO guidelines this should be two observations (auger holes or profile pits) per hectare.
    c. The best available base map on which to do the mapping. The ideal is a recent orthophoto map, or otherwise an enlarged aerial photograph. GPS can be used to indicate the positions of observations. In practice it has been found that the positioning of observation sites and delineation boundaries can be done more accurately by making use of features on the orthophoto map or aerial photograph for orientation.
- According to the FAO guidelines[1,2)] the survey speed at a scale of 1:5 000 and 2 observations per hectare is about 500 ha per 20-day man-month. *Any tender claiming that a detailed soil survey for irrigated agriculture can be done significantly faster must be viewed with suspicion.*

- Because irrigated agriculture is so intensive and management units (e.g. individual orchards) are small, it is essential that a very high level of ground truth must be achieved during the detailed soil survey. A high level of ground truth requires that:
    a. The content of each delineation, i.e. the soil classified as being in that delineation, must be correct. It means that on the final soil map the correct soil mapping unit symbol must be assigned to each delineation.
    b. The boundaries of all delineations must be indicated correctly.

Definition

Delineation is an area indicated on a map with a boundary (line) around it. A soil map usually contains more than one (sometimes several) delineations representing any specific soil map unit.

It is very important to map out present land use features that will be important to take into account when land use and/or irrigation lay-out plans are later drafted. It is especially important to delineate:

i) Features like homesteads, villages, dams, roads, etc. This may sound so logical that it does not even have to be stressed, but in reality there has been cases in South Africa where centre pivot irrigation lay-outs have been planned such that they would run right over a farm's homestead or through a rural village. Such features are clearly seen on orthophoto maps and enlarged aerial photographs used as base maps and can be delineated on the base maps before starting the field survey.

ii) Areas of historical, cultural or religious significance on which irrigation development may not be permitted. These should also be identified and delineated on the base maps before starting with the field survey.

- Ground truth errors on a final soil map can occur due to one or both of the following:
  a. Errors made during the field work.
  b. Errors made during the transfer of data from field mapping sheets to the final map.

Step 3: Compilation of a soil map and report

- After completion of the field soil survey a high quality soil map and accompanying report is compiled. The emphasis is on the compilation of a basic **soil** map. One should **not** go directly to the compilation of land (or soil) suitability or soil potential maps. The latter are of relatively restricted use and limited useful lifespan. In contrast a good basic soil map has almost unlimited useful lifespan and can later be used for various new interpretations and land suitability evaluations, including revisions of existing evaluations required by new technology developments.

- A number of factors determine whether a soil map is both good and useful or not. An inherently good map which is difficult to use is seldom used to its full potential. These factors cannot be discussed in detail in this learning material. Only a few will be mentioned briefly:

  a. The inherent quality of a soil map is determined mainly by:

- Its level of ground truth.
- Whether the required types of soil information were gathered during the field survey.
- Whether it is presented at an appropriate scale.
- The legibility of the map. This requires that the map must not have a too fine “texture”, i.e. too many small delineations.

b. The usefulness of a soil map is determined mainly by the factors listed under (a) above and:
   - The quality and usefulness of the map legend.
   - The quality and usefulness of the accompanying report.

- Studies have shown that a poorly constructed soil map legend often leads to a soil map not being used to its full potential. This is usually because the map legend makes it difficult to use the map. The map legend is the two-way link between the soil map and its accompanying report:

  a. One may be interested in some area on the map and want to find out what soil(s) occur in that area. It must then be easy to go from the map to the legend, and if necessary from there to the report, to identify the soil(s).
  b. One may be interested to know where on the map a certain type of soil, identified in the legend or in the report, is found.

- A good and useful soil map legend requires two main characteristics::
  a. The legend must not just contain high-level pedological jargon. It must be in a language that the users of the map can understand.
  b. It must have symbols, i.e. letters and/or numbers (figures), e.g. A1, A2, A3, B1, B2, etc. Colours or hatchings alone are not acceptable. Colour printing is seldom true over whole map sheets and especially between different map sheets, often giving confusing colour variations. Hatchings tend to dazzle eyes and cause confusion and uncertainty. A combination of colour and symbols is a good option.
  c. The legend must be logical. This means that
     i. Where possible similar map units must be grouped together in logical groupings.
     ii. Most importantly, map units **must** be arranged in alphabetical and numerical order in the legend.

- Since a map legend usually is printed on a map sheet together with the map, it cannot take up too much space. This means that it must be concise and can often not give all information required for land suitability evaluation. This limitation is overcome by including an **expanded legend** (in the form of a big table) in the accompanying soil survey report. This can be supplemented by other tables in the report, summarizing specific properties or qualities of different map units.

- A soil map, even a good one, without a good accompanying report is of very limited value and usefulness. There various guidelines for how a good soil survey should be constructed and what information it should contain. A whole list of the types of information required will not be given here. Some of the key ones include:
  - The field survey techniques used, including mapping scale, observation density, base maps used, etc.
  - Analytical techniques used.
  - How the soil survey legend was developed. What taxonomic soil classification system was used?
  - Comprehensive discussion of the map units, or groups of map units, found.

Note: It must be ensured that features like homesteads, villages, etc. and areas of historical, cultural or religious importance are clearly delineated on the final soil map.

6. Conducting of soil suitability evaluation and compilation of soil suitability tables and maps

This section deals with evaluation of the suitability of each soil map unit in regard to

a. The soil requirements and tolerances of each *PC-pcf crop*.
b. The soil requirements and tolerances of different irrigation systems.
c. General soil requirements for irrigability.

Included under “soil requirements and tolerances” here are also the non-soil land features mapped during the detailed soil survey, such as slope gradient, mechanical limitations (e.g. stoniness), etc.

6.1 Soil suitability evaluation for potential crops

This step deals with the evaluation of each soil map unit for each of the *PC-pcf crops*. It consists of matching of the soil requirements and tolerances of each crop, as identified in Section 4, Step1, with the soil properties and qualities of each soil map unit, as indicated in the final soil map legend and explained in the soil survey report (Section 5, Step 4). This should not be done as a general matching, but for each soil property/parameter.

1. For **each parameter** each soil map unit is for each crop rated as “Good” (G), i.e. suitable, “Sub-optimal” (S), “Marginal” (M) or “Not suitable” (N). Comprehensive tables are constructed giving the ratings **of each soil map unit for each parameter for each crop.** Compilation of such comprehensive tables used to be extremely tedious. Consequently the trend was to do the ratings for each parameter for each crop to identify limitations, but not compile tables. With modern computer technology there is no longer any excuse not to compile these tables. These tables are very

important, because the individual parameter ratings provide the information required to:

a. Identify the soil factor(s) causing any specific soil map unit to be given a specific rating in the later integrated soil suitability ratings.
b. Identify the soil factor(s) causing certain soil map units to be given different ratings from certain others in the later integrated soil suitability ratings.
c. Facilitate identification of suitability units which can be managed similarly.
d. Enable later suitability revaluations.

2. From the individual parameter ratings integrated soil suitability evaluations are made for each soil map unit for each crop, assigning a certain suitability rating to each soil map unit for each crop. Two tables are compiled from these, viz.:
   a. A table depicting the integrated suitability of each soil map unit for each crop. The total area (ha) of each map unit, comprising the areas of all delineations representing that map unit added together, is also given in the table. Normally the following four suitability classes are distinguished, with symbols in brackets:
      - Suitable, i.e. good, having no significant limitations (G)
      - Sub-optimal, having moderate limitations (S)
      - Marginal, having serious limitations (M)
      - Not suitable, having very serious limitations (N)
   b. A table depicting for each crop the total areas of land classified as suitable (good), sub-optimal or marginal respectively.

3. Objectivity is essential during these evaluations. Decisions must as far as possible be based on facts and not on subjective personal ideas. All relevant research results and practical experience for comparable conditions must be taken into account. Lack of adequate relevant available data may for some cases enforce “scientific guessing”. **One must guard against grossly over-optimistic ratings, a mistake that has been made quite often in South Africa in the past – usually with disastrous consequences.**

4. By using the basic soil map together with the table depicting the integrated suitability of each soil map unit for each crop, several soil suitability maps can be compiled for different crops as and when required. These are then subsequently used in drafting land use planning maps, field lay-outs, etc.

5. The tables must be incorporated in a comprehensive report, describing in detail the limitations (kind and degree) of each soil map unit for each crop.

6. These evaluations are the joint responsibilities of crop scientists and soil scientists co-operating very closely. Evaluations made by either of these two groups of scientists alone are not only less efficient, but has in recorded instances in South Africa in the past led to mistakes with disastrous consequences.

Notes: More sophisticated suitability ratings can be used than just G, S, M and N. The FAO system is an example. It works according to the following hierarchy (with symbols:

- Suitability order: Land is assessed as "suitable" (S) or "not suitable" (N).
- Suitability Class: Divisions of suitability orders to indicate the degree of suitability, i.e. highly suitable (S1), moderately suitable (S2), marginally suitable (S3), presently unsuitable for economic reasons, but otherwise marginal (N1), permanently unsuitable due to physical reasons, e.g. very shallow soil on solid rock (N2).
- Suitability subclasses: Divisions of suitability classes indicating not only the degree of suitability, but also the nature of the limitation(s) that make the land less than highly suitable. The subclass code consists of the suitability class code, followed by a symbol(s) indicating the nature of the limitation(s). A list of symbols is given to use for different limitations, e.g. "S3w" indicates marginally suitable (S3) due to a hazard of excessive wetness ("w").
- Suitability units: Divisions of suitability subclasses designated by numbers within subclasses to indicate units which may be managed similarly, e.g. "S3w-3".

Example

The hierarchical nature of the FAO suitability classification is illustrated by the following example[1,2]:

S3w-2

Where

S = Order "Suitable

3 = Class "Marginal

w = Subclass "Wetness hazard"

2 = "Management unit 2"

6.2 Soil suitability rating for different irrigation systems

As explained in Part 2, a number of soil factors/parameters affect the suitability of a soil for different irrigation systems. In this step the requirements and tolerances of different irrigation systems in regard to different soil parameters need to be defined clearly. As indicated in the study material on soils, good South African research data and information from field studies and observations are available in this regard and **must** be used. For **each parameter** each

soil map unit is for each irrigation system rated as “Good” (G), i.e. suitable, “Sub-optimal” (S), “Marginal” (M) or “Not suitable” (N) by the process of matching.

1. Comprehensive tables are constructed giving the ratings **of each soil map unit for each parameter for each irrigation system.** These tables are very important, because the individual parameter ratings provide the information required to:
   - Identify the soil factor(s) causing any specific soil map unit to be given a specific rating in the later integrated soil suitability ratings.
   - Identify the soil factor(s) causing certain soil map units to be given different ratings from certain others in the later integrated soil suitability ratings.
   - Facilitate identification of suitability units which can be managed similarly.
   - Enable later suitability revaluations.

2. From the individual parameter ratings integrated soil suitability evaluations are made for each soil map unit for each irrigation system, assigning a certain suitability rating to each soil map unit for each irrigation system. Two tables are compiled from these:
   - A table depicting the integrated suitability of each soil map unit for each irrigation system. The total area (ha) of each map unit, comprising the areas of all delineations representing that map unit added together, is also given in the table. Normally the following four suitability classes are distinguished, with symbols in brackets:

Suitable e.g. good, having no significant limitations (G)	Sub-optimal , having moderate limitations (S)	Marginal, having serious limitations (M)	Not suitable , having very serious limitations (N)

   - A table depicting for each irrigation system the total areas of land classified as suitable (good), sub-optimal or marginal respectively.

3. Objectivity is essential during these evaluations. Decisions must as far as possible be based on facts and not on subjective personal ideas. All relevant research results and practical experience for comparable conditions must be taken into account. Lack of adequate relevant available data may for some cases enforce “scientific guessing”. **One must guard against grossly over-optimistic ratings, a mistake that has been made quite often in South Africa in the past – usually with disastrous consequences.**

4. By using the basic soil map together with the table depicting the integrated suitability of each soil map unit for each irrigation system, several soil suitability maps can be compiled for different irrigation systems as and when required. These are then subsequently used in drafting land use planning maps, field lay-outs, etc.

5. The tables must be incorporated in a comprehensive report, describing in detail the limitations (kind and degree) of each soil map unit for each crop.

6. These evaluations are the joint responsibilities of irrigation engineers and soil scientists co-operating very closely. Evaluations made by either of these two groups of scientists alone are not only less efficient, but has in recorded instances in South Africa in the past led to mistakes with disastrous consequences

6.3 General soil suitability evaluations

Apart from the soil suitability evaluations for potential crops and irrigation systems, there are a number of other very important soil suitability evaluations that need to be done. Only the following four most important are briefly treated here:

a. *Waterlogging (and usually resultant salinization) hazard:* Evaluation of the nature and severity of the hazard is required to eventually determine whether it will be practically and economically feasible to install required drainage systems. An important factor is the depth to the layer limiting drainage and causing waterlogging. The closer it is to the soil surface, the more difficult and especially more expensive the required drainage systems become.

b. *Flood hazard:* Much irrigated land (and land considered for irrigation) is situated close to rivers and at low elevations above the normal river flow. This is because soils in those landscape positions are normally deep alluvial soils and because of their proximity to the river and their low elevation it is easy to command water for irrigation onto them. Flooding after heavy rains in the catchment of the river may cause major crop losses on soils in these positions. The frequency and severity of flooding must, therefore be determined.

c. *Erosion hazard*: Erosion hazard seems to be usually seen as mainly a factor in rainfed cropping and extensive grazing. It is, however, presently an important factor in irrigated agriculture, due to:

    - The introduction of aggressive overhead sprinkler irrigation systems, especially floppy systems (large drops falling from great heights) and centre pivot systems (high spontaneous application rates in the outer parts of the circle, giving high energy fluxes).
    - Irrigation being applied on sloping areas without making series of level terraces for flood irrigation or applying furrow irrigation along contours.

It was recently found that a 70 ha area intended for small-scale irrigation development in Limpopo was rated unsuitable due to a high erosion hazard caused by a combination of (i) susceptibility of the soil to erosion and (ii) the aggressive irrigation system demanded by the client (floppy).

d. *Mechanical limitations*: An example is for instance stoniness.

For **each parameter** each soil map unit is rated as "Good" (G), i.e. suitable, "Sub-optimal" (S), "Marginal" (M) or "Not suitable" (N) by the process of matching. In the case of erosion hazard it must be done separately for each irrigation system that is considered. A table depicting the suitability of each soil map unit according to each parameter is compiled. In the case of erosion hazard the table must show the ratings for each irrigation system considered.

7. Suitability evaluations of irrigation water

Irrigation water quality is an important factor to evaluate. Groundwater used for irrigation often has quality limitations. Where irrigation is done by pumping from a river or stream large seasonal variations in water quality is often found. During periods of low flow, and especially during droughts, serious deterioration in water quality often occurs.

Three types of suitability evaluations need to be done for irrigation water, *viz.*

a. Suitability of the water for irrigating different crops.
b. Suitability of the water for irrigating different soils.
c. Suitability of the water for use with different irrigation systems.

South Africa has a set of published standards for the suitability of water for irrigation.

7.1 Evaluation of the suitability of the irrigation water for potential crops

This evaluation is done for all crops which have passed all the previous evaluations, i.e. the *PC-pcfs crops*. Different crops have vastly different sensitivities or tolerances to different water quality parameters. Information on these is available in several publications. There fortunately only a small number of water quality parameters that need to be considered when evaluating irrigation water suitability for crops:

a. *Salinity* (high dissolved salt content): This is by far the most common irrigation water quality problem. Crops differ from extremely sensitive to salinity in irrigation water, being negatively affected by even relatively low salt contents in the water, to extremely tolerant to salinity, not even affected by very high salt levels in the water. When using overhead sprinkler irrigation on some vegetable and fruit crops leaf scorching by salts can be a problem.

b. *Boron toxicity*: This is usually mentioned in publications on irrigation water quality. Different crops differ widely in their sensitivity to boron toxicity. Boron toxicity is very seldom a problem in irrigation water in South Africa. Boron levels toxic to sensitive plants have been found in a few cases in water from deep boreholes and it is safer to test borehole water for it before the water is used to irrigate sensitive crops.

c. *High chloride effects*: High chloride levels in irrigation water are seldom toxic to plants, but they have serious negative effects on the quality of some crops in which high quality is paramount, e.g. tobacco. The tobacco industry in the Katriver valley in the Eastern Cape was, for example destroyed by high chloride levels. So, if any crop(s) of which the quality may be negatively affected by high chloride levels in the irrigation water is/are amongst the PC-pcfs crops, then the chloride level of the irrigation water must be determined and evaluated against the tolerance of the crop(s).

d. *Toxic heavy metals and/or faecal substances*: These are new factors for which irrigation water suitability must be evaluated when vegetable crops and especially export fruit crops are grown under irrigation in South Africa. They are due to serious water pollution problems in many areas. They do not affect yields or intrinsic quality, but they make crops unacceptable for the export market and unsuitable for human consumption. Water must now be analysed for these before being used for irrigating such crops.

Evaluation of the salinity level of the irrigation water against the salinity tolerance of each crop is done. A table giving the suitability of the irrigation water in terms of **salinity** for each crop must be compiled. The table is incorporated in an explanatory report covering all three water suitability evaluations, i.e. for crops, soils and irrigation systems.

7.2 Evaluation of the suitability of the irrigation water for irrigating different soils

Two irrigation water quality parameters, viz. (i) salinity and (ii) sodicity, determine the suitability of water for irrigation of different soils. Information providing the class limits for classification of water in different classes are available in literature.

a. ***Salinity***: Salinity, i.e. the amount of dissolved salts in the water, is determined by measuring the electrical conductivity of the water. The symbol “C” (for conductivity) is used for salinity. The suitabilities of water with different salinity classes for irrigation on different soils are as follows:

- Low-salinity water (C1): Can be used for irrigating most crops on most soils with little possibility that soil salinity will develop.
- Medium-salinity water (C2): Can be used for irrigating most crops on most soils, provided that adequate (moderate amount) leaching is maintained.

- Crops with moderate salt tolerance can be grown without special practices for salinity control.
- High-salinity water (C3): Cannot be used on soils with restricted drainage. Even with adequate drainage special management for salinity control is required and crops with good salt tolerance should be selected.
- Very high salinity water (C4): Is not suitable for irrigation under normal circumstances. Can be used on soils with high permeability and very good drainage, provided considerable leaching is ensured and only very salt-tolerant crops are grown.

b. ***Sodium hazard***: Sodium hazard is not expressed as the amount of sodium in the water, but as a ratio between sodium and (calcium + magnesium). This ratio is termed the "sodium adsorption ratio" (SAR). Classification of irrigation water in respect to SAR is based on the negative effect of exchangeable sodium on the physical condition of soils. As discussed in the study material on soils, sodium has a strong dispersing effect on soils. This causes soil structure deterioration, leading to soil crusting and dense subsurface soil layers. The suitabilities of water with different sodicity classes for irrigation on different soils are as follows:
    - Low-sodium water (S1): Can be used for irrigation on almost all soils, with little danger of development of harmful sodium levels in the soil. Sodium-sensitive crops, such as stone fruits and avocados, may accumulate injurious sodium concentrations if leaching is inadequate.
    - Medium-sodium water (S2): Will present an appreciable sodium hazard in any highly dispersible soil, especially fine-textured soils with high cation exchange capacities. Poor drainage and low leaching conditions are aggravating. It can be used on highly permeable coarse-textured soils.
    - High-sodium water (S3): May produce harmful levels of exchangeable sodium in most soils. Not suitable for irrigating dispersible soils. On other soils special management is required, such as good drainage and high leaching – and often use of suitable chemical amendments to replace exchangeable sodium.
    - Very high sodium water (S4): Generally not suitable for irrigation purposes on any soil.

(More detailed information in Part 4: Irrigation Management, Module 3)

Analytical data for the irrigation water are used to classify the water into salinity and a sodicity class. A table depicting the suitability of the water for each soil map unit according to salinity and sodicity respectively is compiled. The table is incorporated into the explanatory report mentioned in Section 7.1.

7.3 Evaluation of the suitability of the irrigation water for use with different irrigation systems

Several water quality factors affect the suitability of irrigation water for use with different irrigation systems. This evaluation is not directly part of land suitability evaluation. It may, however, limit the selection of possible irrigation systems and thus impact on the final land suitability evaluation in economic terms.

1. ***Salinity*** is the most important general factor to evaluate. Aspects to consider, include:

    - Irrigation water with moderate to high (or very high) salinity requires that substantial leaching must be achieved. This demands occasional very heavy irrigations. Flood bed irrigation is the only system that can achieve this effectively. Systems like micro sprinklers and drip can apply only light irrigations at a time. This leads to salt build-up in the wetted zone. In the case of drip irrigation there is additional build-up of salts on the outside of the sphere that is wetted around each dripper. Thus systems like micro sprinklers or drip should be rated as “Not Suitable” for water with moderate, high or very high salinity.
    - In the case of furrow irrigation water moves up into the ridges between furrows. It evaporates from the top parts of the ridge, leaving salts behind there. The salt build-up in the top parts of the ridges is bigger the higher the salinity of the irrigation water is. This poses a limitation to crops grown on the top of ridges. On the other hand, substantial leaching of salts to deeper soil layers occurs from the bottoms of furrows and lower sides of ridges. This is beneficial to crops planted in the furrows or on the lower sides of the ridges.
    - Water with high to very high salinity can cause corrosion of metal components of pumps, pipes of overhead irrigation systems, etc.(Figure 1). This has an economic impact due to increased maintenance costs, crop yield and/or quality reductions due to water stress caused by time-outs of irrigation systems as a result of more frequent equipment breakdown, etc.

2. Other corrosive agents in the water will cause similar problems to those discussed under the last bullet above. High iron contents in irrigation water lead to deposits of insoluble iron oxides in pipes, causing clogging up of the pipes and reduced pressure and flow rates.

Figure 1. Effect of corrosion on irrigation system

3. Irrigation water may contain materials that can clog up the small openings of micro sprinklers or drippers.
   (More detail in Part 4, Module 3)

Activity 2

Small group activity: Evaluation of land capability

This activity involves an excursion onto an irrigation farm where, in small groups, you will evaluate the soil and climate for the provisional identification of crop enterprises. Whilst doing so you will also assess the quality of the irrigation water and determine the suitability for potential crops.

The facilitator will provide the following to you:

- A map of the area to be surveyed.
- Appropriate climate information.
- Test results of the irrigation water
- Soil map.

In your group, walk around the farm and record what you observe and assess the suitability of the farm for irrigation purposes.

8. Conducting an overall integrated land suitability evaluation

An overall integrated land suitability evaluation is done, using the data and ratings identified during all the different evaluations done according to Sections 3-7.

8.1 Integrated crop suitability evaluation and identification of possible cropping patterns

- A crop that received a suitable (G) rating in the climate evaluation may end up having a final rating of sub-optimal (S), marginal (M) or even Not Suitable (N) for some, or even all, soil map units on the basis of the soil suitability evaluation. A soil map unit having a soil suitability rating of suitable (G) for a specific crop may end up having a final rating of sub-optimal (S) or marginal (M) for that crop due to some climatic limitation identified during the climate suitability evaluation. (A crop rated as "Not Suitable" during the climate suitability evaluation does not go through the soil suitability evaluation.) Various other combinations are possible.
- Suitabilities of some crops and/or some soil map units may be rated further downwards due to water quality limitations. In some cases this down-rating may be quite big.
- A table is constructed depicting the integrated crop suitability rating of **each** soil map unit for **each** crop. Suitability classes are indicated as G, Ss, Ms, Ns, Sc, Mc, Nc, Sw, Mw or Nw. Ss, Ms and Ns indicate that some soil factor (or combination of factors) is more limiting than any climate factor and causes the soil map unit to fall into S, M or N. Sc, Mc and Nc indicate that some climate factor (or combination of factors) is more limiting than any soil factor and causes the soil map unit to fall into S, M or N. Sw, Mw and Nw indicate that some water quality factor is more limiting than any soil or climate factor and causes the soil map unit to fall into S, M or N. G has no climatic or soil limitations.
- For annual crops a number of possible cropping patterns (crop combinations and/or rotations) are determined, using the data from these evaluations. For perennial crops a number of possible crop combinations are determined. These are the responsibility of crop scientists.
- For **each** of the envisaged possible cropping patterns/crop combinations a suitable crop water requirement model, such as SAPWAT3, is used to determine the total annual water requirement for that cropping pattern/crop combination in mm and in $m^3.ha^{-1}$. For **each** cropping pattern/crop combination a first approximation estimate is now made of the total area of land that can be put under irrigation with the available water.
- A comprehensive report is compiled, outlining the methodologies followed, discussing the information conveyed by the table and explaining conclusions drawn.

8.2 Integrated irrigation system suitability evaluation and identification of probably suitable irrigation systems

In this step the findings of the soil suitability rating for different irrigation systems (Step 3, Section 6) and the evaluation of the suitability of the irrigation water for use with different irrigation systems (Section 7, Step 4) are integrated. It may be found that an irrigation system that was found to be the most suitable for use on a certain soil map unit (or units) may be downgraded severely because of its poor suitability for the irrigation water.

It may be necessary to compile a new table depicting the integrated rating of each soil map unit for each irrigation system considered. The rating symbols G, Ss, Ms, Ns, Sw, Mw and Nw are used. Meanings of the symbols are as discussed under Section 8.1.

A report is compiled, outlining the procedures followed in this step, discussing the findings and explaining the conclusions. The table (if compiled) and report is integrated with the report as mentioned in Section 8.1.

9. Conducting of an environmental impact assessment and human impact assessment and drafting of a preliminary mitigation plan

One of the six principles of land suitability evaluation is that “suitability refers to land use on a sustainable and environmentally responsible manner” (Section 1). Irrigated agriculture potentially can have serious environmental impacts, especially off-site. Development of medium to large areas irrigation areas especially can have major impacts. Most impacts are usually negative, but some can be positive.

What are environmental impacts?

Environmental impacts originate from irrigation and irrigated areas themselves. They differ in type and degree between different irrigated areas, due to different crops grown, different farming systems and differences in irrigation water quality. Thus, every case requires a unique environmental impact assessment. Where a major dam has to be constructed to provide water for irrigation it usually has major environmental impacts, the types and degrees of which must be assessed.

Negative impacts that are identified must be mitigated by implementing suitable actions. This requires the compilation of a mitigation plan. Implementation of a mitigation plan has economic implications. Different land use options have different environmental and/or human impacts with different mitigation requirements, which have different costs. Thus, some ball park indications of these costs are required before doing the final land suitability evaluation which revolves around economic analyses.

9.1 Environmental impact assessment (EIA)

Irrigated agriculture has a wide range of potential negative environmental impacts, both on-site and off-site. During the irrigation development phase these may be mainly on-site and involves potential impacts like destroying the only site of a rare plant species or the habitat of a rare animal, bird, reptile, butterfly, etc. species. It may mean that an area with high potential for irrigation development from a soil and climate point may have to be excluded from irrigation development.

9.1.1 Assessment of potential environmental impacts of irrigated agriculture

i) On-site environmental impacts

After the implementation of irrigation there should theoretically be no negative on-site environmental impacts. It should be avoided by means of good land suitability evaluation and good farm and irrigation management. Unfortunately this often not the case and **very serious** negative impacts occur. These are usually due to

a. Poor or incorrect land suitability evaluation and land use planning and/or
b. Rejection by a farmer or government agency of negative results found during land suitability evaluation because the findings and recommendations of the land suitability evaluation do not fit in with their vision.
c. Poor farm and irrigation management.

Rejection of farmers or government of the negative results founds during land suitability evaluation (Point b) has led to major disasters in South Africa, especially on small-farmer irrigation schemes. ***In terms of environmental impact assessment land use planners should warn against the serious impacts that could be caused if their findings are not accepted and their recommendations are not followed. This should be an important statement in the land suitability evaluation report.***

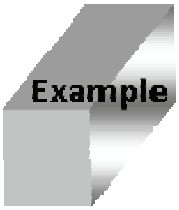

Table 1. Most important on-site environmental impacts

a. Salinization of irrigated soils	This is by far the most widespread negative on-site environmental impact of irrigated agriculture. In the most serious cases it leads to the total degradation of a whole irrigation scheme to the point that it collapses and is closed down. The best-known South African example of an irrigation scheme that has suffered this fate is the Golden Valley scheme near Cookhouse in the Eastern Cape. Serious salinization (accumulation of soluble salts) of irrigated soils is caused by poor (incorrect and/or inadequate) land suitability evaluation and/or unwillingness to accept and implement the findings of good land suitability evaluation and/or poor irrigation management. The most serious cases are due to the irrigation of soils that are not suitable for irrigation because of low permeability or inadequate drainage, or both, and/or use of irrigation water with high to very high salinity. Potential salinization of irrigated soils is usually not handled as an environmental impact assessment, but in the suitability evaluations of soils and irrigation water. It should, however, in addition also be included under the environmental impact assessment.
b. Sodification of irrigated soils	Sodification (accumulation of high sodium levels) irrigated soils is also a widespread and serious problem. It is a similar and related problem to that of salinization. Thus, all discussions on the latter under a are also valid for sodification.
c. Pollution of irrigated soils	Pollution of irrigated soils with toxic heavy metals is becoming an increasingly bigger problem in South Africa. In Section 7.2 it has been indicated that heavy metal levels in water must be included in evaluation of the suitability of water for irrigation. It must, however, also be included in on-site environmental impact assessments.

d. Accumulation of excessive levels of essential plant nutrients and/or pesticides in irrigated soils	Accumulation of excessive levels of ***essential plant nutrients*** in irrigated soils is a more widespread and more serious problem than usually realised. It is found where continuous injudicious heavy applications of fertilisers are made. Phosphorus (P) is the most prominent plant nutrient in this regard. Except in light gray sandy soils, P does not move in the soil and accumulates in the plough layer. It is thus also not leached from the soil. In the 1970s plant-available P levels so high that it reduced wheat yields by up to 50% were found in some irrigated fields at Vaalharts. Other even worse examples were found elsewhere. The potential for this to happen, differs widely between different soils and increases with increased intensity of the type of crop production. This must definitely be included in assessment of potential negative on-site environmental impacts. Assessment of potential negative on-site environmental impacts due to accumulation of excessive levels of various ***pesticides*** is essential. The potential for this to happen, also differs widely between different soils and increases with increased intensity of the type of crop production. ***This factor is not included under any other step in land suitability evaluation and must be handled under the environmental impact assessment.***

ii) Off-site environmental impacts

Irrigated agriculture in some cases has serious off-site environmental impacts, which may require relatively expensive mitigation actions to combat them. These impacts occur downstream from the irrigated area and involve ecological impacts and impacts on other water uses and water users.

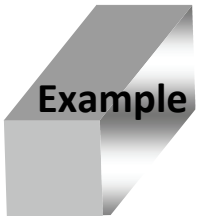

Table 2. Examples of off-site environmental impacts

a. Salinization (and/or sodification) of water	Salinization of downstream water is the most widespread and usually most serious environmental impact of irrigated agriculture. In order to avoid on-site salinization of irrigated land, irrigators must perforce ensure that salts brought in by irrigation water are leached out to such an extent that harmful levels of salinity are not accumulated in the irrigated land. The water which leaches from the land and ends up in streams or other water bodies perforce has much higher salinity than the original irrigation water. The higher the salinity of the irrigation water, the much higher is the salinity of the seepage water and the more negative is its impact. Where irrigation is done by pumping from a river (for example) each irrigator further downstream is irrigating with an increasingly more saline water than the ones upstream from him the further one moves downstream. The increased salinity in rivers caused by irrigation seepage rises much higher during periods of low flow. It can reach very high levels in pools formed when a river has started flowing. In assessing the environmental impact of increased downstream salinity of water due to irrigated agriculture, one must : i. Predict the levels of salinity expected, taking into consideration all the factors outlined above. ii. Determine the sensitivities and tolerances of downstream ecosystems and water users to different salinity levels in water. iii. Match i and ii.

b. Pollution of water with plant nutrient elements	Pollution of water with plant nutrient elements due to irrigated agriculture can in some cases be serious. It differs a lot according to soil properties, crops grown, farm and irrigation management, etc. Harmful pollution levels of plant nutrient elements due to irrigated agriculture are caused by application of excessive fertilizer levels. Pollution of water with plant nutrient elements due to irrigated agriculture also differs according to elements involved. Nitrate pollution is by far the most common and most serious pollutant amongst the plant nutrients applied. Nitrogen is the nutrient that is applied in by far the largest quantities. No matter in which form it is applied, most of it is converted to nitrate in the soil. Nitrate is not adsorbed or precipitated in the soil and is totally soluble. Thus it moves freely through the soil and becomes leached out into streams and other water bodies. In contrast, phosphorus does not move in soils (except bleached sandy soils) and does not leach from soils into streams or water bodies, except from bleached sandy soils. It can end up in streams and water bodies by means of soil erosion – which should not happen on well-planned and well-managed irrigated land. The main concern regarding water pollution by plant nutrient elements is that of eutrophication (development of high nutrient concentrations) of water bodies such as dams and canals and resultant effects like algal growth and secondary consequences from it. Water pollution hazards of plant nutrients originating from irrigated land should be estimated for at least the three major elements which are applied in large quantities, viz. N,P and K. In some cases it may be necessary to do it also for some selected micro-nutrient elements. In assessing the environmental impact of increased downstream pollution of water with plant nutrient elements due to irrigated agriculture, one must i. Predict the levels of pollution expected for each element assessed, taking into consideration all the factors outlined above. ii. Determine the sensitivities and tolerances of downstream ecosystems and water users to different pollution levels for each element assessed. iii. Match i and ii.

c. Pollution of water with pesticides	Pollution of water with pesticides due to irrigated agriculture can in some cases be serious. It differs a lot according to soil properties, crops grown, farm and irrigation management, etc. Harmful pollution levels of plant nutrient elements due to irrigated agriculture are caused by injudicious or excessive application of pesticides. In assessing the environmental impact of increased downstream pollution of water with pesticides due to irrigated agriculture, one must i. Predict the levels of pollution expected for each pesticide assessed, taking into consideration all the factors outlined above. ii. Determine the sensitivities and tolerances of downstream ecosystems and water users to different pollution levels for each pesticide assessed. Match i and ii.

9.2. Assessment of potential environmental impacts of a major dam

Where a major dam has to be constructed, a special comprehensive assessment much be made of the expected environmental impacts of the dam. A major dam usually has a large number of environmental impacts, some of which can be very serious. The types and severities of the impacts differ widely between different dams.

There are usually many on-site impacts, i.e. in the area that will be inundated by the dam.

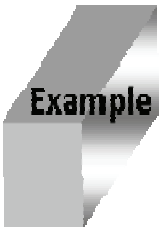

Table 3 is part of a bigger table listing the negative impacts expected in the inundation in the basin area of the Maguga dam in Swaziland.

Table 3. Some negative on-site environmental impacts expected from construction of the Maguga dam, as identified by means of an environmental impact assessment (EIA)

Negative Impacts Resulting from Reservoir Inundation

	Impact	Scale	Severity	Certainty	Direction	Significance	
						S/M Term	L Term
A. Biophysical							
A.1 Impact on Soils and Land Capability							
1	Increased erosion of soil in Perimeter Area	Sub-regional	High	Definite	Negative	Med/High	High
A.2 Impacts on Flora							
2	Loss of fragmented vegetation types	Sub-regional	High	Highly likely	Negative	Medium	High
3	Loss of extensive vegetation types	Sub-regional	Medium	Likely	Negative	Low	Medium
4	Loss of plant species	Sub-regional	High	Likely	Negative	Medium	High
5	Loss of timber resources	Sub-regional	Medium	Likely	Negative	Medium	High
6	Impoverished medicinal, food and household utility resources	Local	High	Highly likely	Negative	High	High
A.3 Impacts on Grazing							
7	Loss of grazing	Site	High	Definite	Negative	Medium	Medium
A.4 Impacts on Fauna							
	Mammals						
10	Loss of mammal diversity	Local	High	Definite	Negative	High	High
	Birds						
11	Loss of waterbird diversity	Local	High	Definite	Negative	High	High
12	Loss of dryland bird diversity	Local	High	Definite	Negative	High	High
13	Loss of downstream bird diversity	Sub-regional	Medium	Likely	Negative	Medium	Medium
	Reptiles and Amphibians						
14	Loss of habitat – Red Data reptiles	Regional	High	Definite	Negative	High	High
15	Loss of riparian habitat – amphibians	Site/local	Medium	Definite	Negative	Low	Low
16	Loss of general habitat – reptiles and amphibians	Site/local	Medium	Definite	Negative	Medium	Low
17	Localised loss of reptiles – inundation phase	Site	Low	Probable to likely	Negative	Low to Medium	Low
	Fish						
18	Obstruction to movement of eels	Local	High	Definite	Negative	High	High
19	Barriers to spawning and feeding of potadromous fish	Site	Low	Definite	Negative	Low	Low/Med
20	Loss of lotic fish species	Site	High	Definite	Negative	Low	Low
22	Increase in gas-bubble disease	Site	Medium	Definite	Negative	Low	Low
	Aquatic Invertebrates						
23	Changes to invertebrate community	Local	Medium	Definite	Negative	Low	Low

Maguga Development Network

A dam usually also has several off-site environmental impacts downstream. A major one is usually its impacts on the frequency and magnitude of floods. Where there is a lot of development downstream a reduction in the frequency and magnitude of floods can be positive, since it will curb flood damage. In many cases reductions in the frequency of flooding, and especially magnitude of occasional floods, can have serious negative impacts.

These can be on ecological systems and/or on the livelihoods and subsistence of floodplain communities that are dependent on floods. An example is the impact of the Jozini dam on the floodplains of the Pongola River below the dam.

9.3 Human impact assessment

Where major irrigation development is planned, it is absolutely essential to conduct a **comprehensive** human impact assessment **timeously**. The human impacts of both the irrigation development itself and of a major dam, if one is to be built, must be assessed. It is most important when people will have to be displaced to accommodate the irrigation development and/or the dam.

Human impact assessment is a complex procedure and cannot be discussed in detail.

9.4 Drafting of a preliminary mitigation plan

After conducting the environmental and human impact assessments a preliminary mitigation plan must be drafted in order to get an approximate indication of what the costs will be to overcome negative impacts for which the authorities will demand that they will have to be mitigated or otherwise the irrigation development will not be approved. These approximate costs will have to be included in the final land suitability evaluation (Section 10).

Together with the eventual irrigation scheme development (where applicable) and land use plan a comprehensive mitigation plan (CMP) must be drafted to outline detailed actions that have to be implemented to mitigate negative human and environmental impacts (including impacts on downstream water uses). A CMP is usually required before permission is granted for irrigation development.

Activity 3

Individual activity: Environmental Impact Assessment

1. What do you understand underneath the following concepts: “on-site” and “off-site “environmental impacts?

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2. Why do you think it is necessary to assess potential environmental impacts of irrigation agriculture practices?

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10. Final land suitability evaluation

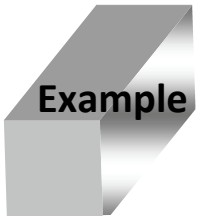
The final land suitability evaluation revolves around determination of the development and operational aspects for each land area. In individual land areas (e.g. soil map delineations) are implied here, not types of land areas (e.g. soil map units). Geographical factors, such as distance from a dam (or other water source), whether pumping is required (and to what height), whether it is part of a large irrigable block or only a small block far from other irrigable areas, etc. affect these evaluations.

During the process all parameters and aspects identified in Section 1-9 must be taken into consideration. In addition estimates of production costs (also including water costs and irrigation costs) and gross income must be included. For the latter yield estimates for each type of land have to be made. These must be based on experience in similar areas and must be realistic. Grossly over-optimistic yield estimates have caused major problems in especially small-scale irrigation development in South Africa in the past.

This step typically goes through a series of approximations before a final set of evaluations and recommendations can be drafted. Some of the land areas rated as having certain suitability in Section 8 may be re-valued or eliminated on economic grounds during this step.

Economic evaluations must be made for various alternatives. These evaluations should include comparison of the cropping and irrigation systems identified as possibilities in Section 8. Land areas which are still recommended for irrigation after this step are rated as land which is economically irrigable for specific cropping systems under specified production systems (including specific irrigation systems).

Taking into account the total quantity of water available and the seasonal crop water demands for the cropping systems found to be economically rated highest into account, it is now calculated how much land could be irrigated using each of these alternative cropping systems. Where water is a more limiting factor than the irrigable land available, it may be most beneficial to combine two or more of the cropping systems evaluated in the final recommendation.



An evaluation for an irrigation farm near Somerset East in the Fish river valley in the 1980s it was found that lucerne would give by far the highest gross margin per hectare. However, lucerne has a very high water requirement and it would not have been possible to put all the irrigable land under lucerne. In the end it was found that the highest whole farm gross margin would be achieved by growing lucerne on 67% of the irrigable land and long season maize on the remaining 33%.

Other types of irrigation alternatives that need to be evaluated and compared include: Marginal land near the dam (or other water source) versus high quality land far from the dam (requiring expensive water supply infrastructure), pumping near the dam versus expensive canals to blocks of land far from the dam (especially small blocks), etc., etc.

Furthermore, other less intensive types of agriculture or other types of land uses must be compared with irrigated agriculture as alternative types of land uses. In a study on the Malonga Flats in the former Venda it was, for example, concluded that it would be economically much better to develop two small areas with good irrigation potential, but being far from the main block of irrigable land and far from the potential dam site, for rainfed cropping than for irrigation. For some densely forested areas, requiring very clearing costs, it may be more viable alternatives than irrigation. Economic analyses of such alternatives are necessary before final recommendations can be made. The FAO [1,2]developed the concept of *"Nett incremental irrigation benefit*" (NIIB) to evaluate the results of economic evaluations comparing irrigation with the present land use or non-irrigated alternatives. If the NIIB has a positive value, then irrigation is better than non-irrigated alternatives. If the NIIB is negative, then the present land use or non-irrigated alternatives are better than irrigation.

A comprehensive report with tables must be compiled. Methodologies used, principles adopted and assumptions made must be clearly outlined. Results obtained must be given fully and conclusions drawn discussed. Conclusions drawn and recommendations made must be clearly motivated and justified. Summarising tables are very important.

References

1. FAO, 1976. A framework for land evaluation. FAO, Rome.
2. FAO, 1974. Approaches to land classification. FAO, Rome.

My notes.....

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