

Chapter 1: System Perspectives

1.1.The concept of system and System thinking

1.1.1. Concept of system: What is System?

System could be defined as an organized unitary whole composed of two or more inter-dependent and interacting parts, components or subsystems delineated by identifiable boundary or its environmental super system (Singh, 2001). A system consists of several components or subsystems which depend on each other. A system is defined as a unified whole or set of elements/components that are interrelated and interacting among themselves. A system processes input into outputs. Therefore, each system consists of boundaries, components, interactions between components, inputs and outputs.

System is an organized relationship among functioning units or components. We can define a System as a combination of resources or functional units *working together* to accomplish a given task. The term "*working together*" in system definition is very important as all the components are interrelated and interdependent and it cannot exist independently. As the definition says, these components interact with each other to accomplish a given task, which is actually the objective of the system.

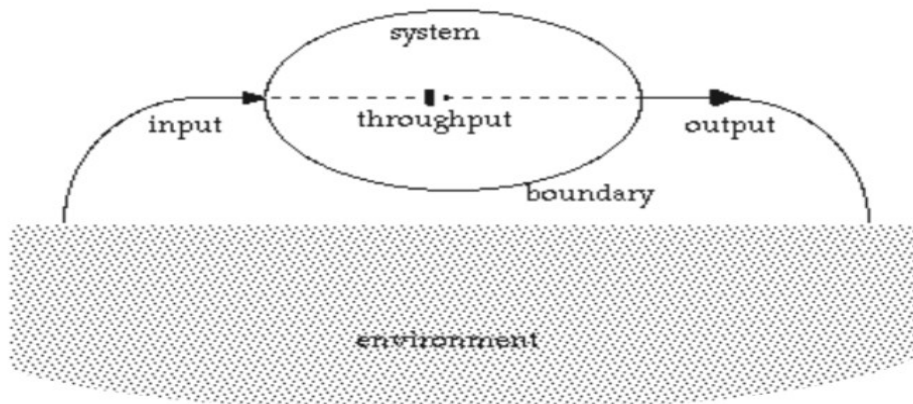
Ackoff (1974:13) defines a system as “a set of interrelated elements of any kind; for example, concepts (as in the number system), objects (as in a telephone system or human body), or people (as in a social system).” The system is not indivisible but must be seen as a whole that can be divided into parts. Ackoff (1974:13) states that the elements of the set and the set of elements have the following three properties:

1. The properties or behavior of each element of the set has an effect on the properties or behavior of the set taken as a whole. For example, every organ in an animal's body affects its overall performance.
2. The properties and behavior of each element and the way they affect the whole, depend on the properties and behavior of at least one other element in the set. Therefore, no part has an independent effect on the whole, and each is affected by at least one other part. For example, the behavior of the heart and the effect it has on the body depends on the lungs.
3. Every possible subgroup of elements in the set has the first two properties; each has a non-independent effect on the whole. Therefore, the whole cannot be decomposed into independent subsets. A system cannot be subdivided into independent subsystems. For example, all the

subsystems in an animal's body, such as the nervous, respiratory, digestive, and motor subsystems interact, and each affects the performance of the whole.”

The following figure gives us all the basic components of a system as it is understood in systems theory.

Figure 1: Basic Components of System in accordance with Systems Theory



Source: Developed based on Checkland (2000)

From the above figure (Fig. 1), we can see five terms such as input, output, throughput, boundary and environment. Our system, as living organisms for example, is needs inputs like oxygen, water, food etc from environment and provides outputs like carbon dioxide, urine, excrete wastes etc to survive. When we change inputs to outputs there is an intermediate process or physiological process which is called throughput. Our boundary is our skin that separates us from environment. This is where the concept of system was first emerged in biology. The concept of working together shows that our body is made up from different systems such as circulatory, expiratory, digestion etc systems. If one of our systems is affected, it will affect our overall performance that is interdependency. Therefore, the whole (e.g. our body) cannot be subdivided into independent subsystems.

Churchman (1968:11) declares that: “Systems are made up of sets of components that work together for the overall objective of the whole.” He discusses five characteristics of a system, namely the total system objectives, the system's environment, the resources of the system, the components of the system, and the management of the system.

1. **The total system objectives:** When studying a problem situation in terms of a system, one needs to state a total objective of the system. The systems analyst should identify the single goal of the system (the real goal) that will not be sacrificed in favor of any other goals.
2. **Environment of the system:** Churchman (1968:35) defines the environment of a system as that part that is outside the system. Ackoff (1971:662) defines the environment of a system as “a set of elements and their relevant properties, which elements are not part of the system but a change in any of which can produce a change in the state of the system. Thus a system’s environment consists of all variables that can affect its state. The environment determines in part how a system performs (Churchman, 1968:36). For instance the demand for an industrial firm’s product determines partly how the firm performs. Demand for the product is an example of the requirement schedule of the environment of a system.
3. **The resources of the system:** Resources are the means that the system uses to reach its objective. The system has control over the resources. Resources can be influenced to increase their advantage to the system. In the livelihood framework there are five different types of resources/assets.
4. **Components of the system:** Large systems need to be divided into components to aid the managing scientist in determining the performance of the total system. If the performance of components can be identified, it is possible to improve the performance of the whole system. The parts or components of the system are the different activities or jobs the system has to perform. These may also be called “missions”.
5. **The management of a system:** The management of a system has to deal with the generation of plans for the system. This includes the setting of the overall goals for the system, defining environment, the utilization of resources, and the division of the system into components (Churchman, 1968:44). These controls include checking the performance of the system against the set objectives, as well as adapting the system to changes in its environment (Churchman, 1968:45).

1.1.2. Systems’ common terms

- ♣ **Interdependence**-of objects and their attributes- independent elements can never constitute a system.
- ♣ **Holism**-emergent properties not possible to detect by subsystem analysis should be possible to define by a holistic approach or by study whole.

- ♣ **Goal seeking** - systemic interaction must result in some goal or final state
- ♣ **Inputs and Outputs**-in a closed system, inputs are determined once and constant; in an open system additional inputs are admitted from the environment
- ♣ **Transformation**-of inputs into outputs-this is the process by which the goals are obtained
- ♣ **Entropy** - the level of disorder or randomness present in any system
- ♣ **Regulation**-a method of feedback is necessary for the system to operate predictably
- ♣ **Hierarchy** - complex wholes (super systems) are made up of smaller subsystems
- ♣ **Differentiation**-specialized units perform specialized functions like our brain, CPU in computer, household in farming system
- ♣ **Equifinality**-alternative ways of attaining the same objectives (convergence) from different inputs, output is the same.
- ♣ **Multifinality**- attaining alternative objectives from the same inputs (divergence)

1.1.3. System's Classification

There is no universally accepted classification. For simplicity of understanding, system can be classified into three broad families; vis-à-vis natural, social, and artificial systems. Have a look at them.

1. **Natural systems**—are those systems that exist in nature. They consist of all the materials (both physical and biological) and interrelated processes occurring to these materials. They exist independent of humankind. Our role in relation to natural systems is to try to understand them and, make use of them. We also increasingly attempt to duplicate them, in part or whole; but at this point they become, by definition, man-made or artificial systems.
2. **Social systems** are more difficult to define. Essentially, they consist of the entities forming animate populations, the institutions or social mechanisms created by such entities, and the interrelationships among or between individuals, groups, and communities, expressed directly or through the medium of institutions. Social systems involve relationships between animate populations (individuals, groups, communities), not between things. The concern here is with human social systems as they relate to or impinge upon farming, and the term social system is used broadly to include institutions i.e. the rule of the game and relationships.

There is a certain degree of ambiguity in defining social systems. As an example, the law of property is in its essence a social system. It is viewed as consisting of concepts, principles and rules; it is a pure social system independent of natural systems. However, it also presupposes the

existence of property, including natural physical things such as land. But if there is no land or issue of land is changed, the law must be disappeared or changed in line with change in land issue. Here, social system is unclear because it is not observable like natural system. Therefore, social system is deliberate mental construct that people create through debate, negotiation and consensus to solve problems.

3. **Artificial systems** do not exist in nature. They are of human creation. Artificial systems include systems such as agricultural systems. They are constructed from either or both of two kinds of elements i.e. from natural and social systems. In this regard, dairy cooperative (cooperative is social and dairy is agriculture or natural) can be taken as the other example for artificial system.

1.1.4. Other classifications

Systems within the three broad divisions or their multitudinous subdivisions can be further classified according to system 'type'. Among these:

- ♣ **Static or dynamic;** depending on whether or not they change over time in response to internal or external influences. Here, dynamic systems or sensitive to changes in situations are compared to static systems.
- ♣ **Open or closed;** depending on whether or not they interact with their environment. In the real world every system is open, mathematicians, physicists, chemists etc. assume the system are closed but, they are open. E.g. when we mix chemicals we only assume some of them and write the formula for our understanding, but there are many reactions that we ignore due to fear of complexity or to make close system.
- ♣ **Abstract or concrete;** depending on whether or not they are conceptual or physical in nature. Abstract is invisible or conceptual i.e. social systems. Concrete systems are observable.

1.1.5. Systems thinking and the systems approach

System thinking is the study of objects as wholes and synthesizing all the relevant information regarding an object, in order to have a sense of it as a whole (Kay & Foster, 1999:165). An object (system) is seen as part of a larger system or whole but also made up of smaller systems. This leads to a hierarchy of systems.

The whole (sum of the parts) has emergent properties that cannot be found in any of the parts. The specific structures and processes that glue the whole together are responsible for these properties and need to be analyzed. These processes and structures are studied in terms of **inputs, outputs, transformations, and interconnections** between the components that make up the system.

According to Checkland (1981:5), a systems approach represents a broad view, taking all aspects into account and concentrating on interactions between different parts of the problem. System thinking provides a solution for multifaceted problems by crossing the traditional boundaries of different disciplines.

Four major concepts underlie the systems approach:

- **Specialization:** A system is divided into smaller components allowing more specialized concentration on each component.
- **Grouping:** To avoid generating greater complexity with increasing specialization, it becomes necessary to group related disciplines or sub-disciplines. In a system the elements or processes are grouped in order to reduce the complexity of the system for conceptual or applied purposes.
- **Coordination:** As the components and subcomponents of a system are grouped, it is necessary to coordinate the interactions among groups.
- **Emergent properties:** Dividing a system into subsystems (groups of component parts within the system), requires recognizing and understanding the "emergent properties" of a system; that is, recognizing why the system as a whole is greater than the sum of its parts.

The systems approach considers two basic components: *elements* and *processes*. ELEMENTS are measurable things that can be linked together. They are also called objects, events, patterns, or structures. PROCESSES change elements from one form to another. They may also be called activities, relations, or functions.

System thinking is proposed as a method to overcome the shortcomings of the traditional scientific approach. The systems approach considers the system as a whole, consisting of interdependent

elements (Kramer & De Smit, 1977:10). The specific arrangement of the parts of a system is significant. The environment and the interaction of the system with its environment cannot be ignored. Churchman (1968) developed a systems approach to address problem situations holistically.

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1.1.6. Evolution of system thinking (group assignment to be submitted at the end of the chapter)

Chapter 2: The concept of farming system

2.1 Basic Concepts of farming Systems

2.1.1 Definition and Philosophy of Farming systems

“Farming System is a complex inter-related matrix of soil, plants, animals, implements, power, labour, capital and other inputs controlled in parts by farming families and influenced to varying degrees by political, economic, institutional and social forces that operate at many levels ” (Mahapatra, 1992). The term "farming system" refers to a particular arrangement of farming enterprises that are managed in response to physical, biological and socio-economic environment and in accordance with farmer's goals, preferences and resources (Shaner et. al 1982). “The household, its resources and the resource flows and interactions at the individual farm levels are together referred to as a farm system” (FAO, 2001).

The farming systems can be described and understood as by its structure and functioning. The structure in its wider sense includes among others, the land use pattern, production relations, land tenures, size of holding and their distribution, irrigation, marketing including transport and storage, credit institutions and financial markets and research and education. Thus, the “farming system” is the result of a complex interaction among a number of interdependent components. To achieve it, the individual farmer allocates certain quantities and qualities of four factors of production: land, labour, capital and management, which has access the processes, like crop, livestock and off farm enterprises in a manner, which within the knowledge he possess will maximize the attainment of goal he is striving for.

The Farming System, as a concept, takes into account the components of soil, water, crops, livestock, labour, capital, energy and other resources with the farm family at the centre managing agricultural and related activities. The farm family functions within the limitations of its capability and resources, the socio - cultural setting, and the interaction of these components with the physical, biological and economic factors.

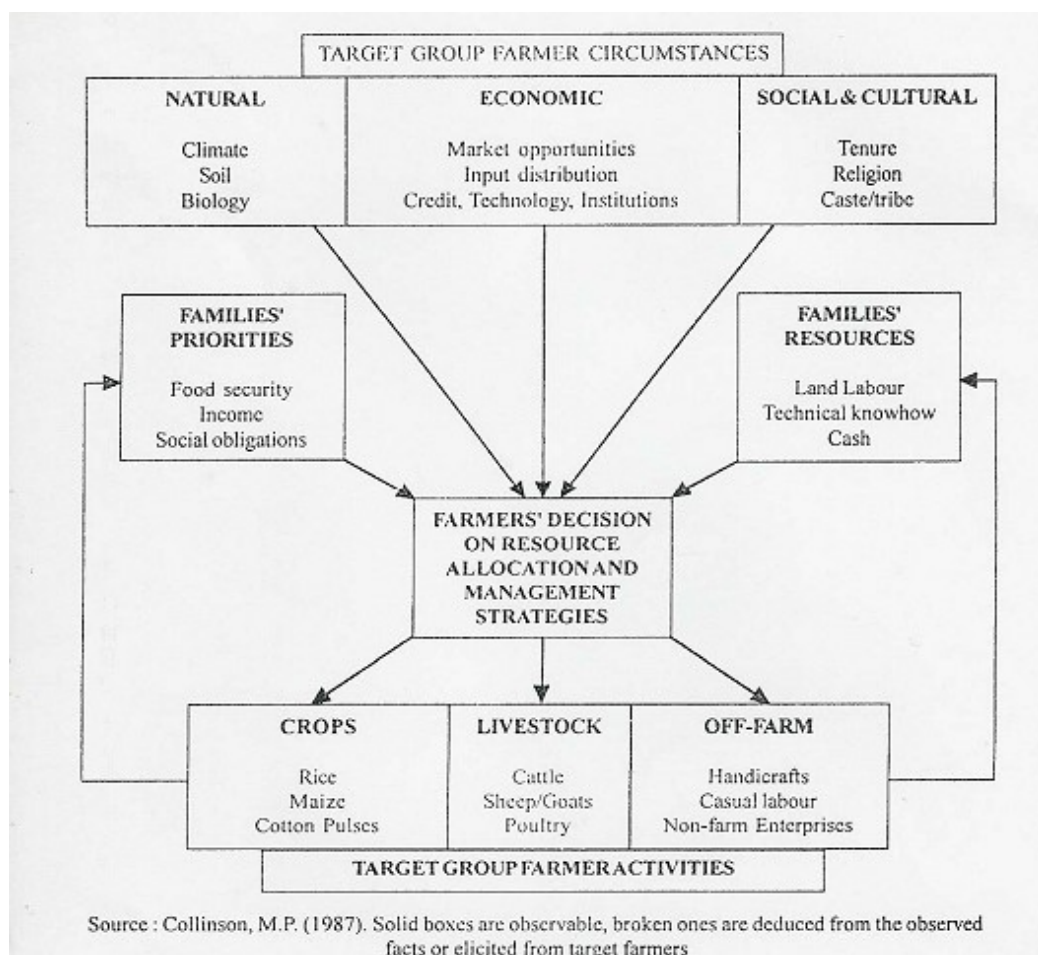
Farming system focuses on:

- The interdependencies between components under the control of household and,
- How these components interact with the physical, biological and socio-economic factors, which is not under the control of household.
- Farm household is the basic unit of farming system and interdependent farming enterprises carried out on the farm.

- Farmers are subjected to many socio-economic, bio-physical, institutional, administrative and technological constraints.
- The operator of the farming system is farmer or the farming family.

The primary inter-relationships at the farming system level are illustrated in Figure 1. This highly simplified model puts the farmer, the decision maker, at the center. Decisions are influenced by the priorities of the household, farmer's knowledge and experiences, and resource at his command. External factors - natural, economic and socio-cultural, also plays significant roles.

Fig.1: Farming System Model showing interrelationships at the farming system level

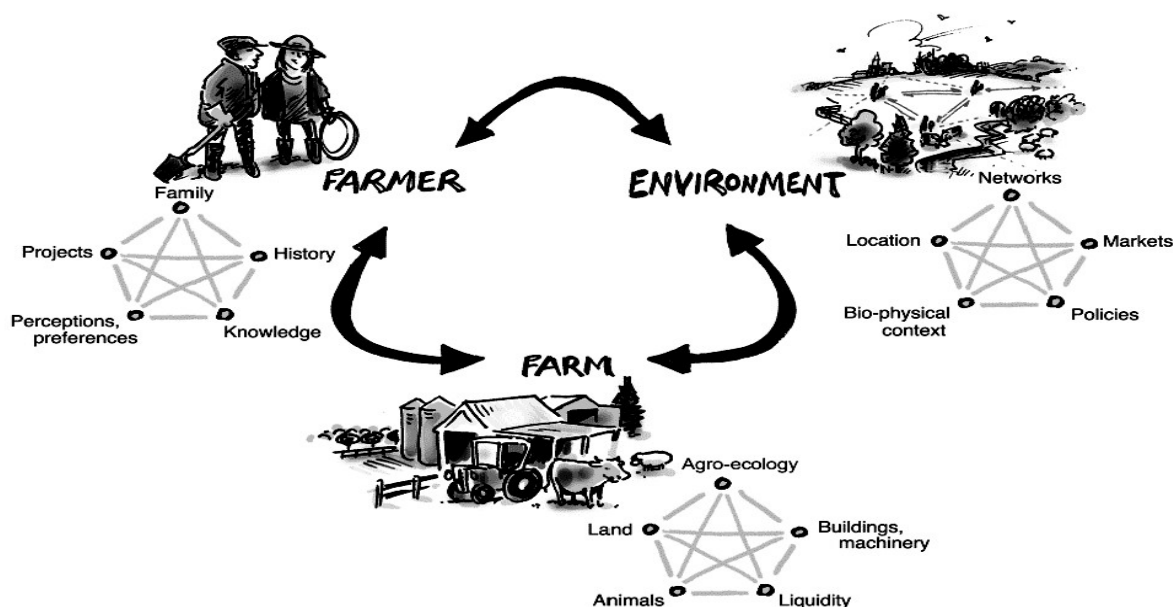


The concept of Farming Systems Perspective (FSP) implies seeing things from the farmers' viewpoint. Farmers' values, rationalities, customs, experiences, etc, therefore, are considered pivotal in the process of dealing with their circumstances. A professional from any research or development agency would be expected to empathize what a farmer could possibly know and feel about certain situations in his or her

environment. Here, it is generally noticeable that the severity and diversity of problems and opportunities understood by farmers are often different from those understood by outside parties.

FSP also urges that researchers and development practitioners use systems perspectives even when working on a single commodity and also uni-disciplinary problem. It means that inquiries should be sensitive to farming systems interactions, understand how farming systems operate, and use of this understanding in designing and evaluating new technologies that help to improve the benefit of even one product for the farmer. The concept has grown from farm boundaries to household systems and other environmental components. The following figure provides highlights of the major components and their interactions.

Figure 2: Farming Systems Components and their Interaction



Source: Adapted from Ika Darnhofer et al. (Undated)

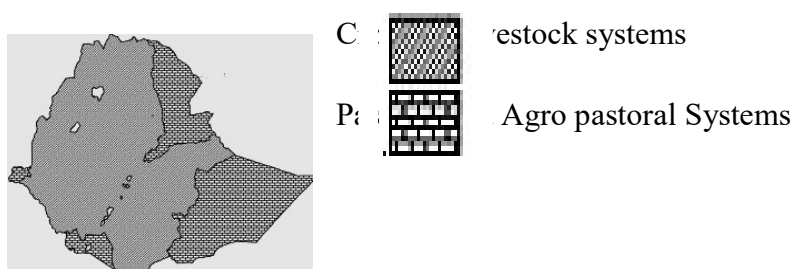
During making inquiries about a specific enterprise (e.g. dairy production) or problem (e.g. Natural resource depletion), for instance, we have to see at least the interaction of farmers', the farm, and their environments' with the enterprise or the problem. Scholars used to focus on single enterprise or commodity when they needed to increase its yield. Failure to reach a satisfactory and client directed successes, however, led to appearance of an important development where technical scientists were increasingly sensitized to the complexity and variability of farmers' production environment. They recognized that this environment consisted of both physical and socioeconomic components.

Accordingly, the farm began to be understood as one system. For example the livestock farming system approach proposed by animal scientists, considers the farmer, the herd and the resources as one socio-technical system. Economists, on the other hand, realized that farmers' behaviour could not be understood only through maximization of profit. For farmers and farm households, choices also take into account issues such as long-term preferences, security, lifestyle and quality of life.

Since small farmers are managing the farm household with multiple objectives and multiple enterprises, but with limited resources, the interaction between the various components is very critical in decision-making. Interactions may occur between the various components crop to crop, crop to livestock, farm household's on-farm to off-farm activities as they compete for the same resources. Interactions may also arise from farmers' objectives and his/her attitude towards risk. The interactions are important to identify the trade-offs and compromises in the system while identifying and prioritizing problems in order to understand the process of resource allocation.

Farming system can be viewed as a unique and reasonably stable arrangement of farming enterprises that the household manages according to well-defined practices in response to the physical, biological, and socioeconomic environments and in accordance with the household's goals, preferences, and resources. More commonality is found within the system than between systems. The farming system is part of larger systems; e.g., the local community, and can be divided into subsystems; e.g., cropping systems. The figure below shows the major farming systems in Ethiopia.

Figure 3: Major Farming Systems in Ethiopia



Source: Amare et al. (2005)

In addition to the above classification, by the way, one can also divide those stable arrangements of enterprises based on various criteria. Based on the inputs, for instance, farming systems can be intensive or extensive. Classification by outputs can also be made as subsistent and commercial farming systems.

2.1.2. Allied Terminologies

The following terms are very commonly used in texts written on Farming Systems and related issues. That is why you find them frequently in this module too.

Farming: Farming is an activity carried out by households on holdings that represent managerial units organized for the economic production of crops and livestock

Households: The household is a social organization in which members normally live, sleep in the same place, and share their meals. They may or may not be a joint family. A joint family 'is one consisting of two or more lineally related kinfolk, their spouses, and offspring.

Enterprises: Enterprises mean activities undertaken to produce an output that contributes to total production or income of the farm family. Enterprises, in this context, typically concern crops, livestock, processing or otherwise upgrading agricultural commodities produced on the farm, productive non-agricultural activities carried out on the farm such as handicrafts, and productive off-farm activities of the household members.

Participation: Participation is said to be one of the most used and most confused words in development agenda now a days. There are different types of participation, and can be classified according to the degree of initiative and involvement of beneficiaries. These include:

- *Passive participation* - where most decisions are made by outsiders; mostly one way communication between outsiders and local people;
- *Functional participation* - to get something useful accomplished;
- *Empowering participation* - to give a community a greater decision-making role;
- *Active participation* - where there is two way communication; people get an opportunity to interact with outsiders and;
- *Self mobilized* - indigenous process initiated and controlled by local communities.

Note: Development project always begins with *passive participation* where beneficiaries basically welcome the project proposals and support them, but are generally cautious in relation to project management.

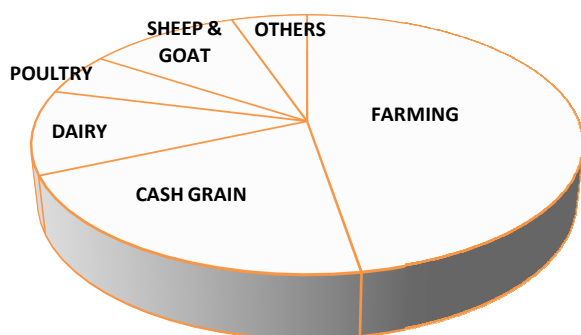
2.2. Types of Farming Systems

Farming systems can be classified based on such things as inputs and outputs. In this topic, we discover how farming systems can be classified based the composition of enterprises carried out on the farm, and interest of farmers', and technological inputs employed. Let's see these different types of farming systems.

2.2.1. Diversified Farming System

A farm on which no single product or source of income equals as much as 50% of the total receipt is called a diversified or general farm. On such a farm, the farmer depends on several sources of income.

Figure 4: Possible Sources of Income in Diversified Farming System



Source: Authors' own conceptualization (2013)

The advantages include;

- Better use of land, labour and capital: Better use of land through adoption of crop rotations, steady employment of farm and family labour and more profitable use of equipment are obtained in diversified farming;
- Business risk is reduced due to a crop failure or unfavourable market prices; and
- Regular and quicker returns are obtained from various enterprises throughout the year etc.

Some of the disadvantages are;

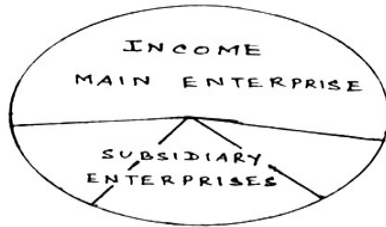
- Marketing is insufficient unless the producers arrange for the sale of their produce on co-operative basis;
- Because of various jobs in diversified farming a farmer can effectively supervise only limited number of workers;
- Better equipping of the farm is not possible because it is not economical to have expensive implements and machinery for each enterprise and;

- There are chances when some of the leaks in farm business may remain undetected due to diversity of operations etc.

2.2.2. Specialized Farming System

Under specialized farming, 50% or more income is derived from one single source. See the following figure.

Figure 5: Composition of Income Sources in Specialized Farming System



We may best consider specialization as the production of majorly one commodity for market, so that the farmer depends largely on a single source of income. This trend is evident when economic conditions are fairly uniform for a long period.

Source: Authors' own conceptualization (2013)

According to the definition, a farm on which 50% or more of the income are from sugarcane would be classified as sugarcane farming system, and the one yielding 50% or more of its income from vegetables would be called a vegetable farm. In Ethiopia, we may find evidences of such specializations.

The advantages of specialized farming system are:

- *Better use of land:* It is more profitable to grow a crop on a land best suited to it. For example, rice cultivation on a swampy land;
- *Better marketing:* Specialization allows better assembling, grading, processing, storing, transporting and financing of the produce;
- *Better management:* The fewer enterprise on a farm are liable to be less neglected and sources of wastage can easily be detected;
- *Less equipment and labour are needed:* A coffee farmer needs only special machinery and comparatively less labour for raising coffee than mixing many and;
- *Efficiency and skill is increased:* Specialization allows a man to be more efficient and expert at doing a few things etc.

The disadvantages are:

- There is a greater risk of failure of crop and market and may ruin farmers;
- Productive resources like land, labour and capital are not fully utilized;
- Fertility of soil cannot be maintained properly for lack of suitable rotation;

- By products of the farm cannot be fully utilized;
- Farm returns in cash are not generally received more than once a year and;
- General knowledge of farm enterprises becomes limited etc.

2.2.3. Mixed Farming System

Mixed farming is a combination of crop production with a sufficient amount of livestock production. It refers to that type of diversified agriculture in which a farmer invariably devotes to livestock production as a complementary enterprise. To differentiate mixed farming from diversified farming, there should be a substantial size of herds being kept by the farmers contributing to income and consumption of the household.

The advantages of mixed farming system include;

- It helps in maintaining soil fertility;
- It tends to give balanced labour load throughout the year for the farmer and his family;
- It permits the proper use of farm by-products;
- It provides for greater chances of intensive cultivation and;
- It often gets higher returns on farm business etc.

2.2.4. Ranching Farming System

The word ranching does not come under the specification provided for the farm, i.e. it is not in the control of any owner nor is it enclosed by any boundary. Ranching means practice of grazing animals specially sheep and goat, and is always on public land. Sometimes, such land is utilized for raising dairy stock. It is then known as dairy ranch. Ranching is very common in Australia and Tibet. In Ethiopia, there are still pocket areas where ranching is common (e.g. Somali region and most of the agro-pastoral areas). Ranching is gradually disappearing because of the increasing pressure on agricultural land.

2.2.5. Dry-land Farming System

Dry land farming generally refers to an area which receives less than 50 mm of annual rainfall. Areas where rainfall is up to 75 mm but is in coincidence with high temperature and greater wind velocity, resulting into a heavy loss of water may also be considered under this category. The major farm management problem in these tracts, where crops are entirely dependent upon rainfall, is the conservation of soil moisture. Farmers all over the world, where dry land farming is practiced help plants to save enough of water to mature the crop. By good tillage they increase the infiltration of such rain as received by the fields. They remove weeds to prevent the transpiration of moisture through their leaves.

2.2.6. Mechanized Farming System

The mechanical operation on a farm is called farm mechanization. It includes the use of manual implement, and modern machines used in various farm operations like tractor ploughing, tube-well irrigation, harvesting and threshing by combine harvesters and threshers, spraying by sprays and the like. In post-harvest operations, mechanization includes processing of products such as wheat milling, cold storage, oil expelling, cane crushing and so on. Dear learners; mechanized farming systems are common in, for instance, Arsi and Bale zones where large areas are cultivated by state and investors.

2.2.7. Marginal Farming System

The marginal farmer does not always consider economic criterion in evaluating crop performance, because his or her first concern is food for the farm family. As such, he or she has nothing to market except on occasions when things force them to get some cash. Marginal farming is characterized by the following factors:

- The farms or holding are tiny with greater pressure of population on the land;
- The resource structure is hopelessly poor with the result that the farmer cannot give a proper direction to the allocation and utilization of resources;
- The products are consumed directly by the household and not exchanged in market;
- There is a complementary relationship between enterprises as some of them will have to be raised for by-products for cattle maintenance without consideration for loss or profit and;
- Product price fluctuations have marginal effect on the production of crops, etc.

2.3. Components of Farming Systems

Components of farming systems are the enterprises that require due attention in the research & development processes, and they directly or indirectly influence household's management, preferences, and decision makings. The potential enterprises which are important in farming system in the way of making a significant impact of farm by generating adequate income and employment and providing livelihood security are as follows:

- **Crop Production:** Crop production is an important farming practice in countries like ours. Cropping systems based on climate, soil, size of plots, food habits, market incentives, technological and institutional inputs available, and water availability have to be evolved for realizing the potential production levels through efficient use of available socio-economic and physical resources.

- **Dairy Farming Systems:** Dairy farming is an important source of income to farmers. Besides, dairy farming is an important source of milk for home consumption, farmyard manure, and fuel products. The latter has attracted attention recently as biogas developments are underway.
- **Goat and Sheep Rearing Systems:** Sheep and goat rearing systems are very common in Ethiopia. Except in some cases, sheep is mostly reared in the highlands and mid altitudes, while goats are mostly seen in lowland areas of the country.
- **Poultry Production Systems:** Poultry is one of the fastest growing food industries in the world. Poultry meat accounts for about 27% of the total meat consumed worldwide and its consumption is growing at an average of 5% annually. Poultry industry in Ethiopia is relatively a new agricultural industry. Till very recently, it was considered a back yard profession in Ethiopia. Now, there are farms and farmers who generate income dominantly from poultry production.
- **Apiculture:** Apiculture is the science and culture of honeybees and their management. Apiculture, in Ethiopia, is mostly a subsidiary occupation and it is an additional source of income for farm families.
- **Agro-forestry Farming Systems:** Is a collective name for land use systems and technologies, in which woody perennials (trees, shrubs, palms, bamboos etc) are deliberately combined on the same land-management unit as agricultural crops and animals. Agro-forestry is important for meeting fodder, fuel wood and small timber of farmers, conserving soil and water, maintenance of soil fertility, controlling salinity and water logging, positive environment impact and alternate land use for marginal and degraded lands. Selection of proper land use systems conserve biophysical resources of non-arable land besides providing day-to-day needs of farmer and livestock within the farming system. The system is known to be practiced in closely all highland corners of our country.

2.4. Characteristics of Farming Systems Approach

While the overall goal of FSA is to match technologies with farmer circumstances to ensure adoption and increase productivity, the conceptual aspects of the farming systems approach are still evolving. The following list provides the basic characteristics of FSA:

i) FSA is farmer-oriented

Research and extension starts with the understanding of the farmer and the farm family, his or her needs and priorities, his or her resource base, the environment within which s/he operates, and how s/he manipulates his or her resources to fulfill his or her household needs. In the process, problems/constraints

of fulfilling the farming household's objectives are identified. This involves focusing on groups of farmers whose problems are to be solved.

ii) FSA is system-oriented

The components of farming, i.e., cropping, livestock, etc. are to be seen as a part of a bigger farming system. Resource flows among the components or sub-systems make them inter-dependent. Therefore changes in one affect the other, positively or negatively. On the other hand, the farming system is part of a bigger regional system and therefore is influenced by factors outside the farming system. It is important therefore to understand such inter-dependencies and inter-relationships even when working on a single component.

iii) FSA is problem solving

In order to improve the efficiency of the system, it is important to understand the problems preventing farming households from fulfilling their objectives, exploiting the biological potential of the various enterprises as well as the underlying causes of such problems. Only such an understanding of the problems and their causes and priorities can help scientists and extension staff to generate appropriate technologies that are relevant to farmers.

iv) FSA is participatory

Partnerships with farmers whose problems are to be solved need to be established throughout the process: from diagnosis of problems to evaluating technologies and making recommendations. Such partnership allows scientists and extension staff to gather insight into the farming system to obtain first-hand information from farmers on the performance of technologies and farmers attitudes towards such technologies.

v) FSA is inter-disciplinary

Because every farmer is in fact an “interdisciplinary” person and farming requires combining the knowledge of various disciplines, team of scientists from various related and relevant disciplines need to work together during the various stages of the research process. It is also important to recognise the full participation of extension staff in the process. The FSA-TDT process is multidisciplinary in nature.

vi) FSA complements and guides on-station basic and applied research

FSA does not seek to replace basic and applied research, rather needs the support from basic and applied research. It packages the knowledge generated by the basic and applied research in designing technologies. At the same time it seeks to guide the basic and applied research to deal coherently with issues related to priority problems of the farming community. FSA provides feedback to the experimental station and enables the research staff to develop suitable technologies to address the farmers' problems. It is a practical way of testing, adapting and evaluating technologies with the farmer in the farmer's environment (Norman et al., 1986).

vii) FSA attempts to bring incremental changes

FSA aims at small, incremental changes in the existing farming systems as most farmers like to avoid risk and most small farmers may not have financial and managerial capability in dealing with big change.

viii) FSA closely links research with extension and other development agencies

Such linkages are absolutely necessary at the various stages of the research and extension process. This helps in better focusing of research, in getting assistance in implementation and evaluation, in receiving feedback, and in identifying input needs during the dissemination, and adoption. For effective design, implementation and dissemination, it is vital to establish the necessary forward and backward linkages with private sectors, as well as with policy makers.

ix) FSA enables better management of risk

Small farmers have effective strategies to manage risk. Because the research process starts from understanding of the farmers and their circumstances, scientists also gain a better understanding of the risks associated with farming and any potential technological solution. This helps in designing technologies that fit within the farmers' risk-management capability.

x) FSA deals with sustainability of resources and household economy

FSA recognises the need to preserve/improve the productivity of the natural resource-base for the future generation, and the farm itself is seen as a sustainable entity. Sustainability perspective could be easily integrated into the design as well as evaluation of technologies.

xi) FSA emphasises building upon Indigenous Technical Knowledge (ITK)

It is recognised that the “dawn of agriculture” was the result of research done by farmers, and over time farmers have perfected this without the help of science (Mettrick, 1993). FSA provides opportunities to researchers to better understand and appreciate the technical knowledge available to the farmers and build upon that knowledge base. For technology transfer to be efficient, farmers’ knowledge must be respected.

xii) FSA is dynamic and iterative approach

As agriculture is dynamic in nature due to continuously changing circumstances, research and extension must remain continuously tuned to such changes and assess the implications for technological need.

xiii) FSA attempts to reconcile national and farmer priorities

An effective research and extension programme should seek to match Government’s development objectives with farmer’s objectives. There is need to reconcile national priorities with that of the farmer in order to achieve the national developmental goal. The bottom-line is that FSA brings research, extension and farmers together to solve farmers’ priority problems and create new opportunities for research. FSA provides a systematic way of understanding the technical and socio-economic environment of farmers; it helps to identify constraints and to develop solutions to the problems farmers face. Then each ‘target group’ of farmers could be assessed against the stated developmental objectives for commonality in objectives and priorities.

2.5. Why the Farming Systems Approach (FSA) is gaining popularity

The FSA process is gaining popularity because it plays the following roles in research and development (Matata *et. al.* 2001):

- Identifies which recommendation from past technical component research is most relevant to local farmers’ present needs and, if necessary, adapts it to fit their particular circumstances;
- Feeds back unsolved technical problems to commodity and disciplinary researchers thereby providing a mechanism for setting priorities for on-station research based on observed farmer needs;
- Links farmers, researchers, extension workers non-governmental organisations and others in the final development of technology in local on-farm situations. It provides an empirical test for the technology under the farmer’s environment; the farmers contribute to the specification of design

parameters (technical, managerial, and economic) and both farmers, researchers, and extension staff are involved in the evaluation;

- Identifies extension needs and problems enabling extension to check the relevance and priorities of their work;
- Provides an assessment of the farm-level impact of policies, and input to policy formulation by identifying the non-technical problems which might hinder the adoption of the selected technology; and
- Enables better planning at the sectoral, regional and district levels.

2.6. Determinants of Farming Systems

The key categories of determinants influencing farming system are as follows:

(i) Natural Resources and Climate

The interaction of natural resources, climate and population determines the physical basis for farming systems. The increased variability of climate, and thus agricultural productivity, substantially increases the risk faced by farmers, with the concomitant reduction in investment and input use. Certain soil and water regimes are suitable only for given type of crops. Similarly, some of the physical and geographical features e.g. drainage characteristics, elevations and slopes as well as climatic factors e.g. total rainfall and its distribution, minimum and maximum temperature, humidity and intensity of sun light etc. are other factors which have to be taken in to considerations while making decision with respect to selection of enterprise for a farming systems.

(ii) Science and Technology

Investment in agricultural science and technology has expanded rapidly during the last four decades. During this period, major technical and institutional reforms occurred, which shaped the pattern of technology development and dissemination. The research driven growth in developing countries has been green revolution, where it achieved considerable achievement in the field of food grain production and for this the policy and other aspects supported the farming system for such achievement. Research has been focused principally upon intensifying crop and livestock production. There has been for less research on integrated technologies for diversifying the livelihoods of small farmers in developing countries and increasing the sustainability of land use. Despite these weaknesses, the natural and global research agenda is gradually moving from a focus on individual crop performance to a growing acceptance of the importance of increased system productivity. There has been emphasis in recent agriculture of targeting technologies towards women farmers and poorer households.

(iii) Trade Liberalization and Market Development

Markets have a critical role to play in agricultural development as they form the linkages between farm, rural and urban economics upon which the development processes depend. As a result of the reduction of impediments to international trade and investment, the process of trade liberalization is already generating changes in the structure of production at all levels-including small holder-farming systems in many developing countries. Not only the market development is accelerating, but patterns of production and natural resources usage are also changing profoundly in response to market forces. The availability of new production, post harvest and transport technologies will also change demand patterns due to delivery of new products or established products in new forms to markets, where they have been previously unattainable.

(iv) Policies, Institutions and Public goods

The development of dynamic farming systems requires a conducive policy environment. Moreover, the establishment of the farm- rural-urban linkages requires effective demand. Policy makers have increasingly shifted their attention to the potential to increase the efficiency of service delivery through the restructuring of institutions. The production incentives have dramatic effect on farming systems. Policies on land ownership, water management and taxation reform etc have a great bearing on types of farming system in a region or area.

(v) Information and Human Capital

The evolution of farming systems based upon increasing specialization (e.g. large scale broiler units) or integrated intensification (e.g. rice-fish-ducks) has required extra knowledge on the part of farm operators. The need for better information and enhanced human capital has also increased, as production systems have become more integrated with regional, national and international market systems. Lack of education, information and training is frequently a key limiting factor to smallholder development. Many observers anticipated an information revolution i.e. bridge gap of knowledge between scientists and farmers will be very key factor for agricultural growth of these small farmers. Whilst in the past many development efforts failed w o me n-because planners had a poor understanding of the role women play in farming and household food security-greater efforts are being m a de to take account of their actual situations. It is increasingly recognized and acknowledged by development workers that the empowerment of women is the key to raising levels of child and family nutrition, improving the production and distribution of food and agricultural products, and enhancing the living condition s of rural populations. It has been concluded that, if women in Africa received the same amount of education as me n, farm yield

would rise by between seven and 22 percent (FAO, 1990). Similarly, better access to credit, land and extension services would enable women to make an even greater contribution to eliminating rural hunger and poverty. As gender bias is progressively eliminated during coming years - often in the face of severe cultural and religious barriers productivity within many farming systems will be transformed.

(vi) Indigenous Technological Knowledge

Indigenous technical knowledge is the knowledge that people in a given community has developed over times, and continues to develop. It is based on experience, often tested over long period of use, adapted to local culture and environment, dynamic and changing, and lays emphasis on minimizing risks rather than maximizing profits. The ITK covers a wide spectrum – soil water and nutrient management; pasture and fodder management; crop cultivation; plant protection; farm equipment, farm power, post-harvest preservation and management; agro-forestry; bio-diversity conservation and also exploitation; animal rearing and health care; animal products preservation and management; fisheries and fish preservation; and ethnic foods and homestead management. Thus, the ITK of a farmer has a great influence in managing the farm and farming system.

CHAPTER THREE

3. FARMING SYSTEM RESEARCH



Objectives

By the end of this chapter, you should be able to;

- Define Farming Systems perspectives and allied terminologies;
- Identify between different types of Farming Systems, their components, and determinants
- Discuss the interaction of Farming System Approach to research and development;
- Explain the purpose, features of Farming Systems Research and;
- Describe the characteristics of Farming Systems Research.

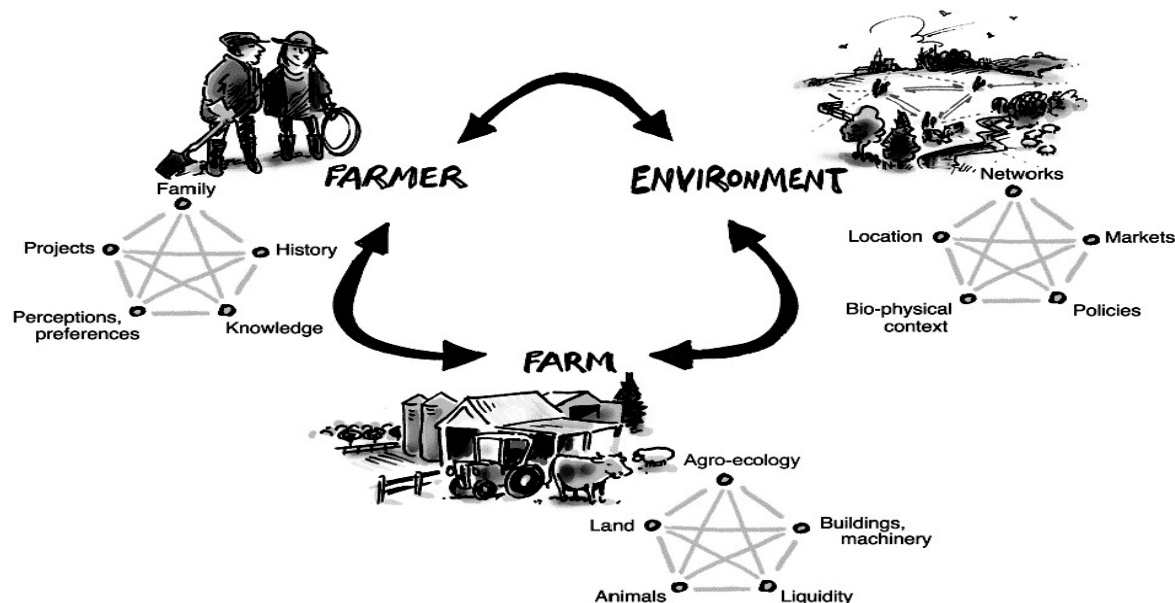
3.1. Farming Systems Perspectives and Allied Terminologies

3.1.1. Conceptual Definition

The concept of Farming Systems Perspective (FSP) implies seeing things from the farmers' viewpoint. Farmers' values, rationalities, customs, experiences, etc, therefore, are considered pivotal in the process of dealing with their circumstances. A professional from any research or development agency would be expected to emphasize what a farmer could possibly know and feel about certain situations in his or her environment. Here, it is generally noticeable that the severity and diversity of problems and opportunities understood by farmers are often different from those understood by outside parties.

FSP also urges that researchers and development practitioners use systems perspectives even when working on a single commodity and also uni-disciplinary problem. It means that inquiries should be sensitive to farming systems interactions, understand how farming systems operate, and use of this understanding in designing and evaluating new technologies that help to improve the benefit of even one product for the farmer. The concept has grown from farm boundaries to household systems and other environmental components. The following figure provides highlights of the major components and their interactions.

Figure 3.1: Farming Systems Components and their Interaction



Source: Adapted from Ika Darnhofer et al. (Undated)

During making inquiries about a specific enterprise (e.g. dairy production) or problem (e.g. Natural resource depletion), for instance, we have to see at least the interaction of farmers', the farm, and their environments' with the enterprise or the problem. Scholars used to focus on single enterprise or commodity when they needed to increase its yield. Failure to reach a satisfactory and client directed successes, however, led to appearance of an important development where technical scientists were increasingly sensitized to the complexity and variability of farmers' production environment. They recognized that this environment consisted of both physical and socioeconomic components.

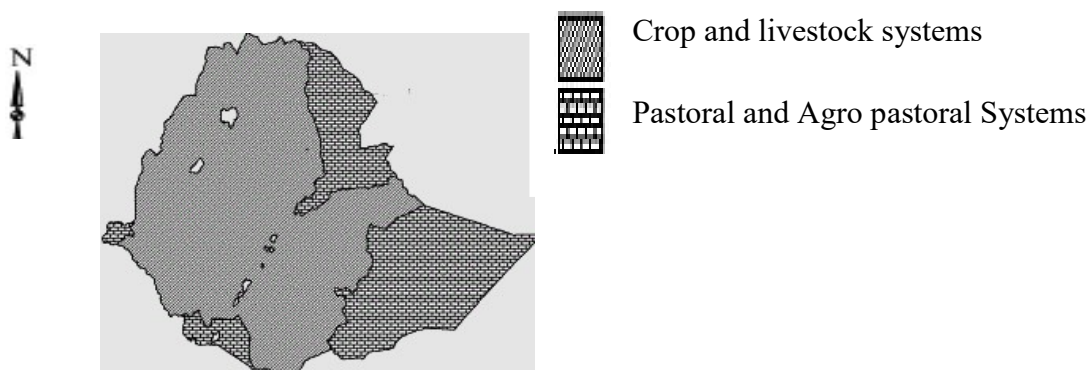
Accordingly, the farm began to be understood as one system. For example the livestock farming system approach proposed by animal scientists, considers the farmer, the herd and the resources as one socio-technical system. Economists, on the other hand, realized that farmers' behaviour could not be understood only through maximization of profit. For farmers and farm households, choices also take into account issues such as long-term preferences, security, lifestyle and quality of life.

Since small farmers are managing the farm household with multiple objectives and multiple enterprises, but with limited resources, the interaction between the various components is very critical in decision-making. Interactions may occur between the various components crop to crop, crop to livestock, farm household's on-farm to off-farm activities as they compete for the same resources. Interactions may also

arise from farmers' objectives and his/her attitude towards risk. The interactions are important to identify the trade-offs and compromises in the system while identifying and prioritizing problems in order to understand the process of resource allocation.

Farming system can be viewed as a unique and reasonably stable arrangement of farming enterprises that the household manages according to well-defined practices in response to the physical, biological, and socioeconomic environments and in accordance with the household's goals, preferences, and resources. More commonality is found within the system than between systems. The farming system is part of larger systems; e.g., the local community, and can be divided into subsystems; e.g., cropping systems. The figure below shows the major farming systems in Ethiopia.

Figure 3.2: Major Farming Systems in Ethiopia



Source: Amare et al. (2005)

In addition to the above classification, by the way, one can also divide those stable arrangements of enterprises based on various criteria. Based on the inputs, for instance, farming systems can be intensive or extensive. Classification by outputs can also be made as subsistent and commercial farming systems.

3.1.2. Allied Terminologies

The following terms are very commonly used in texts written on Farming Systems and related issues. That is why you find them frequently in this module too.

Farming: Farming is an activity carried out by households on holdings that represent managerial units organized for the economic production of crops and livestock

Households: The household is a social organization in which members normally live, sleep in the same place, and share their meals. They may or may not be a joint family. A joint family 'is one consisting of two or more lineally related kinfolk, their spouses, and offspring.

Enterprises: Enterprises mean activities undertaken to produce an output that contributes to total production or income of the farm family. Enterprises, in this context, typically concern crops, livestock, processing or otherwise upgrading agricultural commodities produced on the farm, productive non-agricultural activities carried out on the farm such as handicrafts, and productive off-farm activities of the household members.

Participation: Participation is said to be one of the most used and most confused words in development agenda now a days. There are different types of participation, and can be classified according to the degree of initiative and involvement of beneficiaries. These include:

- *Passive participation* - where most decisions are made by outsiders; mostly one way communication between outsiders and local people;
- *Functional participation* - to get something useful accomplished;
- *Empowering participation* - to give a community a greater decision-making role;
- *Active participation* - where there is two way communication; people get an opportunity to interact with outsiders and;
- *Self mobilized* - indigenous process initiated and controlled by local communities.

Note: Development project always begins with *passive participation* where beneficiaries basically welcome the project proposals and support them, but are generally cautious in relation to project management.

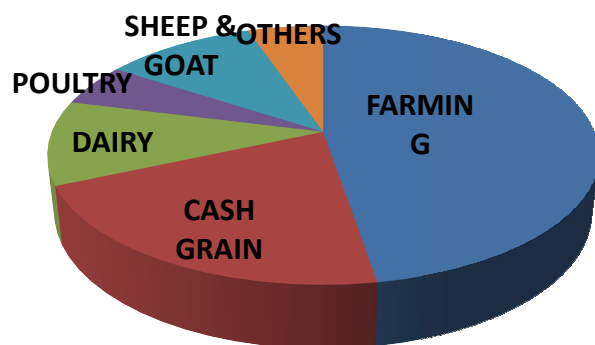
3.2. Types of Farming Systems

Farming systems can be classified based on such things as inputs and outputs. In this topic, we discover how farming systems can be classified based the composition of enterprises carried out on the farm, and interest of farmers', and technological inputs employed. Let's see these different types of farming systems.

3.2.1. Diversified Farming System

A farm on which no single product or source of income equals as much as 50% of the total receipt is called a diversified or general farm. On such a farm, the farmer depends on several sources of income.

Figure 3.3: Possible Sources of Income in Diversified Farming System



Source: Authors' own conceptualization (2013)

The advantages include;

- Better use of land, labour and capital: Better use of land through adoption of crop rotations, steady employment of farm and family labour and more profitable use of equipment are obtained in diversified farming;
- Business risk is reduced due to a crop failure or unfavourable market prices; and
- Regular and quicker returns are obtained from various enterprises throughout the year etc.

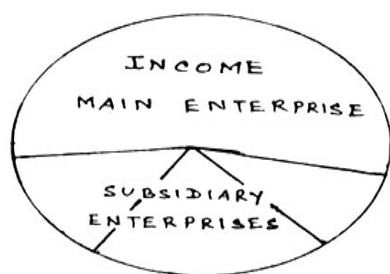
Some of the disadvantages are;

- Marketing is insufficient unless the producers arrange for the sale of their produce on co-operative basis;
- Because of various jobs in diversified farming a farmer can effectively supervise only limited number of workers;
- Better equipping of the farm is not possible because it is not economical to have expensive implements and machinery for each enterprise and;
- There are chances when some of the leaks in farm business may remain undetected due to diversity of operations etc.

3.2.2. Specialized Farming System

Under specialized farming, 50% or more income is derived from one single source. See the following figure.

Figure 3.4: Composition of Income Sources in Specialized Farming System



We may best consider specialization as the production of majorly one commodity for market, so that the farmer depends largely on a single source of income. This trend is evident when economic conditions are fairly uniform for a long period.

Source: Authors' own conceptualization (2013)

According to the definition, a farm on which 50% or more of the income are from sugarcane would be classified as sugarcane farming system, and the one yielding 50% or more of its income from vegetables would be called a vegetable farm. In Ethiopia, we may find evidences of such specializations.

The advantages of specialized farming system are:

- *Better use of land:* It is more profitable to grow a crop on a land best suited to it. For example, rice cultivation on a swampy land;
- *Better marketing:* Specialization allows better assembling, grading, processing, storing, transporting and financing of the produce;
- *Better management:* The fewer enterprise on a farm are liable to be less neglected and sources of wastage can easily be detected;
- *Less equipment and labour are needed:* A coffee farmer needs only special machinery and comparatively less labour for raising coffee than mixing many and;
- *Efficiency and skill is increased:* Specialization allows a man to be more efficient and expert at doing a few things etc.

The disadvantages are:

- There is a greater risk of failure of crop and market and may ruin farmers;
- Productive resources like land, labour and capital are not fully utilized;
- Fertility of soil cannot be maintained properly for lack of suitable rotation;
- By products of the farm cannot be fully utilized;

- Farm returns in cash are not generally received more than once a year and;
- General knowledge of farm enterprises becomes limited etc.

3.2.3. Mixed Farming System

Mixed farming is a combination of crop production with a sufficient amount of livestock production. It refers to that type of diversified agriculture in which a farmer invariably devotes to livestock production as a complementary enterprise. To differentiate mixed farming from diversified farming, there should be a substantial size of herds being kept by the farmers contributing to income and consumption of the household.

The advantages of mixed farming system include;

- It helps in maintaining soil fertility;
- It tends to give balanced labour load throughout the year for the farmer and his family;
- It permits the proper use of farm by-products;
- It provides for greater chances of intensive cultivation and;
- It often gets higher returns on farm business etc.

3.2.4. Ranching Farming System

The word ranching does not come under the specification provided for the farm, i.e. it is not in the control of any owner nor is it enclosed by any boundary. Ranching means practice of grazing animals specially sheep and goat, and is always on public land. Sometimes, such land is utilized for raising dairy stock. It is then known as dairy ranch. Ranching is very common in Australia and Tibet. In Ethiopia, there are still pocket areas where ranching is common (e.g. Somali region and most of the agro-pastoral areas). Ranching is gradually disappearing because of the increasing pressure on agricultural land.

3.2.5. Dry-land Farming System

Dry land farming generally refers to an area which receives less than 50 mm of annual rainfall. Areas where rainfall is up to 75 mm but is in coincidence with high temperature and greater wind velocity, resulting into a heavy loss of water may also be considered under this category. The major farm management problem in these tracts, where crops are entirely dependent upon rainfall, is the conservation of soil moisture. Farmers all over the world, where dry land farming is practiced help plants to save enough of water to mature the crop. By good tillage they increase the infiltration of such rain as received by the fields. They remove weeds to prevent the transpiration of moisture through their leaves.

3.2.6. Mechanized Farming System

The mechanical operation on a farm is called farm mechanization. It includes the use of manual implement, and modern machines used in various farm operations like tractor ploughing, tube-well irrigation, harvesting and threshing by combine harvesters and threshers, spraying by sprays and the like. In post-harvest operations, mechanization includes processing of products such as wheat milling, cold storage, oil expelling, cane crushing and so on. Dear learners; mechanized farming systems are common in, for instance, Arsi and Bale zones where large areas are cultivated by state and investors.

3.2.7. Marginal Farming System

The marginal farmer does not always consider economic criterion in evaluating crop performance, because his or her first concern is food for the farm family. As such, he or she has nothing to market except on occasions when things force them to get some cash. Marginal farming is characterized by the following factors:

- The farms or holding are tiny with greater pressure of population on the land;
- The resource structure is hopelessly poor with the result that the farmer cannot give a proper direction to the allocation and utilization of resources;
- The products are consumed directly by the household and not exchanged in market;
- There is a complementary relationship between enterprises as some of them will have to be raised for by-products for cattle maintenance without consideration for loss or profit and;
- Product price fluctuations have marginal effect on the production of crops, etc.

3.3. Components of Farming Systems

Components of farming systems are the enterprises that require due attention in the research & development processes, and they directly or indirectly influence household's management, preferences, and decision makings. The potential enterprises which are important in farming system in the way of making a significant impact of farm by generating adequate income and employment and providing livelihood security are as follows:

- **Crop Production:** Crop production is an important farming practice in countries like ours. Cropping systems based on climate, soil, size of plots, food habits, market incentives, technological and

institutional inputs available, and water availability have to be evolved for realizing the potential production levels through efficient use of available socio-economic and physical resources.

- **Dairy Farming Systems:** Dairy farming is an important source of income to farmers. Besides, dairy farming is an important source of milk for home consumption, farmyard manure, and fuel products. The later has attracted attention recently as biogas developments are underway.
- **Goat and Sheep Rearing Systems:** Sheep and goat rearing systems are very common in Ethiopia. Except in some cases, sheep is mostly reared in the highlands and mid altitudes, while goats are mostly seen in lowland areas of the country. is different from that adopted in other countries. In general, smaller units are mostly maintained
- **Poultry Production Systems:** Poultry is one of the fastest growing food industries in the world. Poultry meat accounts for about 27% of the total meat consumed worldwide and its consumption is growing at an average of 5% annually. Poultry industry in Ethiopia is relatively a new agricultural industry. Till very recently, it was considered a back yard profession in Ethiopia. Now, there are farms and farmers who generate income dominantly from poultry production.
- **Apiculture:** Apiculture is the science and culture of honeybees and their management. Apiculture, in Ethiopia, is mostly a subsidiary occupation and it is an additional source of income for farm families.
- **Agro-forestry Farming Systems:** Is a collective name for land use systems and technologies, in which woody perennials (trees, shrubs, palms, bamboos etc) are deliberately combined on the same land-management unit as agricultural crops and animals. Agro-forestry is important for meeting fodder, fuel wood and small timber of farmers, conserving soil and water, maintenance of soil fertility, controlling salinity and water logging, positive environment impact and alternate land use for marginal and degraded lands. Selection of proper land use systems conserve biophysical resources of non-arable land besides providing day-to-day needs of farmer and livestock within the farming system. The system is known to be practiced in closely all highland corners of our country.

3.4. Determinants of Farming Systems

Farming systems types are determined by a variety of factors, which allow analysts and development workers an opportunity to broadly categories areas and prescribe a loose set of possible projects, while acknowledging the heterogeneity that exists within these categories. The following sub-section will be a short review of the factors that determine a farming system.

a. Natural Resources and Climate

The interaction of natural resources, climate and population provides the physical basis for farming systems. A rapidly growing population in many developing countries, coupled with a strong emphasis on increased production by development agencies in the 1970s and 80s, has led to a tendency to intensify farming. This has placed an overwhelming pressure on woodlands and natural eco-systems, which has in turn threatened the biodiversity of many development regions. As a result, there has been a growing tension between the goals of development and conservation.

It is true that those areas which were abundant with streams and rivers, and producing fruits and vegetables once upon a time are now craving after drops of water at least once in a year since those water bodies are already gone. We have a situation whereby the changes in the global climate are leading to greater food insecurity, substantially increasing the risks to household livelihoods, which has tended to lead to greater intensification of agricultural production and thus placed a greater burden on the environment.

b. Science and Technology

There has been, in recent decades, a rapid expansion in investment in agricultural science and technology. Poorer smallholder farmers in marginal areas have not, however, had much opportunity to benefit from such investment. There has been little research into integrated technology for diversifying the livelihoods of smallholder farmers and increasing the sustainability of land use. The focus instead tends to be on the intensification of farming. Recent years have, however, seen a gradual shift in the global research agenda, as the importance of the smallholder farmer in rural development has become clearer. This is likely to be of importance to people-centred approaches to rural development, including the *Sustainable Livelihoods Approach (SLA)* as it attempts to build human capital and improve farm livelihoods in rural areas.

c. Trade Liberalization and Market Development

The 1980s International Money Fund and World Bank inspired structural adjustment programs in many developing economies. The short-term result of this has tended to be shortfalls in ensuring adequate services for more marginal smallholder farms as public goods have become speedily privatized and government intervention pulled back. The external market forces are likely to continue to have an enormous impact on the livelihoods of the rural poor. The Farming Systems approach and the Sustainable Livelihood Approach all make some attempts to ensure the sustainability of the livelihoods of farmers,

such that they will be able to fit in to larger changes in market conditions and government policy, and as such will not be heavily affected by changes in international agricultural trade policies.

d. Policies, Institutions, and Public Goods

There has recently been, on the international and national stages, a movement towards greater participation through decentralization of government and the privatization of services. However, there continues to be further marginalization of smallholders and female-headed households, as government services are not adequately replaced by the private sector and civil society has tended to be unable to cope with replacing the shortfall of services. Policy shifts have a dramatic effect on production incentives in farming systems.

This resonates with the criticisms of Sustainable Livelihoods that there needs to be a greater emphasis on the role of politics and public policy making, while the Farming Systems approach also recognizes the role of policies, institutions and public goods. Generally, it becomes clear that farming systems will change with the availability of policy, institutional and public goods support systems.

e. Information and Human Capital

The need for better information and enhanced human capital has been increasingly recognized and attempts have been made to deal with it through literacy programs and wider access to primary education in countries like ours, for instance during the Dergue reign. People may shift towards commodity specialized and mechanized farming systems as they get the capacity to deal with technological inputs. In this regard, women often tend to fall on the disadvantaged side. A gender sensitive information and capacity building revolution is, therefore, of paramount importance.

3.5. The Purpose and Features of FSR

3.5.1. The Purpose of FSR

The purpose of FSR is to generate technologies that are more appropriate for farmers and where possible, to improve policies and support services for production, to raise farm families' welfare, and to enhance society's goals. But, more specifically, FSR aims at increasing the productivity of farming system by generating technologies for particular group of farmers and by developing greater insight into which technologies fit where and why.

The later purpose concerns using scientific methods for generating hypotheses and then, by deduction, determining which technologies to use in a particular farm setting. Such an approach contrasts with an empirical approach that through trial and error arrives at suitable technologies for the conditions of specific farmer.

In short the purposes include addressing;

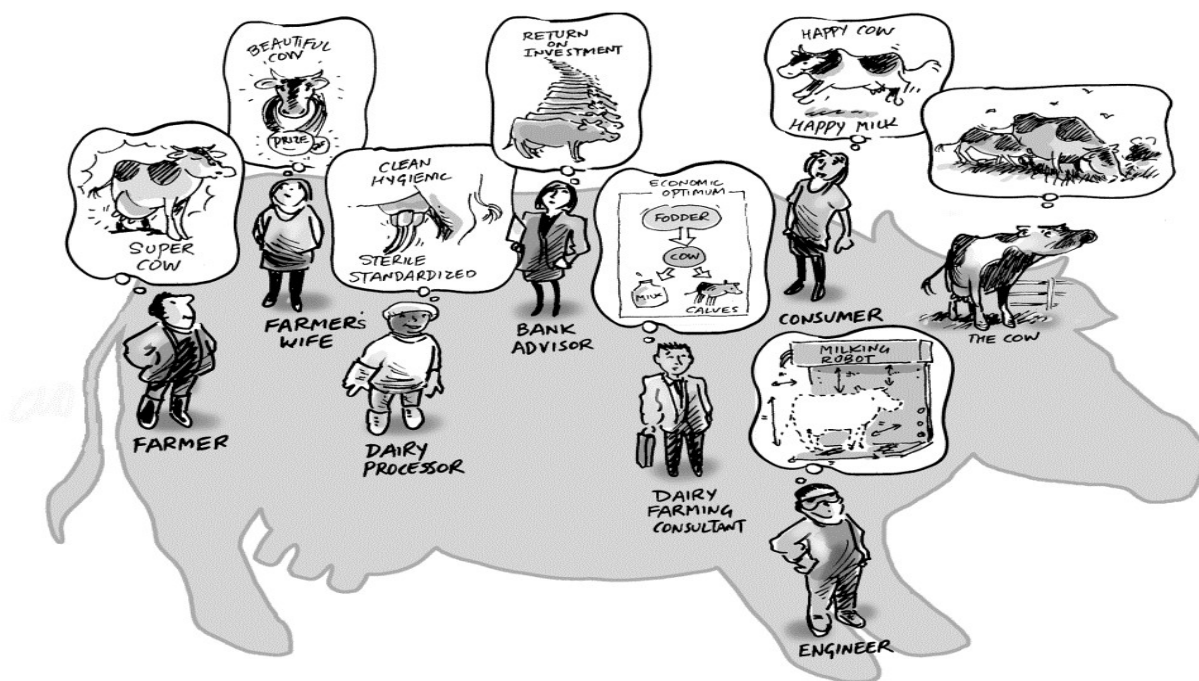
- The farm family - because the collective interests of the family are important, just not the interest of the head of the household as before;
- Agricultural production - because FSR concentrates on increasing crop and livestock yields and (overall farm output) and;
- Family welfare - because improved welfare is the ultimate goal of individual families just as societal interests are the ultimate concern of an enlightened government. Complementary and supplementary components of the farming household with farm characteristics.

To this end, the fundamental principle of FSR is that farmers could help in identifying the appropriate path to agricultural development. It is now recognized that with limited resources farmers can be involved productively in all stages of the FSR approach.

3.5.2. Features of FSR

The distinction between FSR and “conventional” research or reductionist approach can be summarized in the following way. FSR looks at the interactions taking place within the whole farm setting and measures the results in terms of farmers’ and society’s goals. Traditionally, conventional research or station based research separates tasks into progressively narrower subject areas to be studied more or less independently and then evaluates results by standards within the discipline, not by their contribution to the whole (Dillon *et al.*, 1978). Furthermore, FSR places relatively more importance, than in the past, on integrating the social sciences into the research and development process. This is accomplished by considering such factors as farmers’ preferences, community norms, markets, public policies, and support services (personal communication). For example look at the following figure that shows conceptual multi-disciplined approach in dairy production.

Figure 3.5: Concept of Multi-disciplined Approach in Dairy FSR



Source:

Adapted from Ika Darnhofer et al. (Undated)

By combining different disciplines a FSR approach integrates the forester's work by considering more objectives and means of improvement. For example: Integrating the extension service into the FSR process could result in the extension staff suggesting modifications to the technologies; these changes, in turn, could help the extension service serve farmers more effectively etc.

3.6. Characteristics of FSR

Many of the core activities of FSR can be operationalized in different ways. The approach is open to multiple interpretations. In spite of the variations in their perceptions about FSR among the practitioners, the approach has certain distinctive core characters. These are:

- **It is problem solving:** As an applied problem solving approach, it emphasizes on developing and transferring appropriate technologies to overcome production constraints through diagnosis of biophysical, socio-economic and institutional constraints that influence technological solutions;
- **It is holistic:** The whole farm is viewed as a system encompassing interacting sub-systems, and no potential enterprise is considered in isolation;
- **It acknowledges the location specificity of technological solutions:** Recognizing the location specific nature of agricultural production problems, it emphasizes on testing and adaptation of technological solutions based on agro-ecological and socio-economic specificities;

- **It defines specific client groups:** Emphasis is made on the identification of specific and relatively homogeneous groups of farmers with similar problems and circumstances for whom technology is to be developed as the specific client groups;
- **It is farmer participatory:** It revolves around the basic principle that successful agricultural research and development efforts should start and end with the farmers. Farmers' participation is ensured at different stages of technology generation and transfer processes such as system description, problem diagnosis, design and implementation of on- farm trials, and providing feedback;
- **It gives weight to ITK system:** The Indigenous Technical Knowledge (ITK), which is time tested at the farmer's level for sustainability through a dynamic process of integrating new innovations into the system as they arise, has to be properly understood by the scientists and utilized in their research activities;
- **It is concerned with 'Bottom-up' research strategy:** It begins with an understanding of existing farming system and the identification of key production constraints;
- **It is interdisciplinary:** It lays greater emphasis on interdisciplinary cooperation among the scientists from different areas of specialization to solve agricultural problems that are of concern to farmers;
- **It emphasizes extensive on-farm activities:** It involves problem analysis through diagnostic surveys, on-farm testing of the developed technologies, and providing feedback through evaluation to influence the research agenda of the experiment stations;
- **It is gender sensitive:** While explicitly acknowledging the gender-differentiated roles of farm family in agriculture, it emphasizes the critical review of farming systems in terms of activities analysis, access and control over resources and benefits and implication's in developing relevant research agenda;
- **It is dynamic:** It involves recurrent analysis of the farming systems, permitting continuous learning and adaptations;
- **It focuses on sustainability:** It seeks to harness the strengths of the existing farming practices, and to ensure that productivity gains are environmentally acceptable;
- **It complements experiment station research:** It only complements but does not substitute on station research. It has to draw upon the scientific knowledge and technologies generated at research stations.

Dear Learners, we feel that a substantial number of FSR characteristics have been described in the later part. But, you have to also bear in mind that the approach also changes with changing scenarios in the research and development processes. Some of the changes are seen in system level, livelihood focus, functional focus, stakeholders' focus and others- depicted in Table 3.6 below:

Table 3.6: Changes in Characteristics of FSR over the Last Few Decades

Characteristics	1970s	1980s	1990s	2000s
System Level:				
Farm				
Household				
Group/Community				
Districts/Zones/Catchments or Sector				
Livelihood Focus:				
Crops				
Crops-Livestock				
Multiple Household Livelihoods				
Functional Focus:				
Research				
Research & Extension				
Research, Extension, & Support Services				
Multisectorial & Infrastructure				
Stakeholder Focus:				
Public & Civil Society				
Public, Civil Society, & Private				
Other Foci:				
Gender				
Household Food Security				
Productivity & Resource Management				

Source
:
Adapted from

Dixon et al. (2001)

Generally, FSR has shifted from simply focusing on single enterprise to a concern on livelihood. The number and diversify of actors required to deal with such increasing complexities and analyzing multiple aspects of rural livelihoods will, also, increases at the same time.

3.7. Interactions of Farming System Approach to Research and Development

The farming system approach to research and rural development has two interrelated thrusts. One is to develop an understanding of the farm household, the environment in which it operates, and the constraints it faces, together with identifying and testing potential solutions to those constraints. The second thrusts involve the dissemination of the most promising solutions to other farm households facing similar problems. The central issue of the approach is that the analysis of farming systems within which the rural

poor live and work can provide powerful insights in to strategic priorities for the reduction of the poverty and hunger now affecting so many of their lives. In dealing with such concerns, this topic can be equated as centrally discussing the concept of FSR.

The concept of FSR was developed in 1970s in response to the observation that groups of small-scale farm families operating in harsh environment were not benefiting from the conventional agricultural research and extension strategies. The farming system, as a concept, takes into account the components of soil, water, crops, livestock, labour, capital, energy and other resources with the farm family at the centre managing agricultural and related activities. The farm family functions within the limitations of its capability and resources, socio-cultural setting and interaction of these components with physical, biological and economic factors. The term FSR in its broadest sense is any research that views the farm in a holistic manner and considers interactions (between components and of components with environment) in the system.

Here, Farming systems is defined by their physical, biological, and socioeconomic setting and by the farm families' goals and other attributes, access to resources, choices of productive activities (enterprises), and management practices. The systems approach applied to on-farm research considers farmers' systems as a whole, which means;

- Studying the many facets of the farm household and its setting through close and frequent contact with household members on their farms;
- considering problems and opportunities as they influence the whole farm;
- Setting priorities accordingly;
- Recognizing the linkages of subsystems within the farming system and considering them when dealing with any of the system and;
- Evaluating research and development results in terms of the whole farming system and the interests of society.

CHAPTER FOUR

FARMING SYSTEM RESEARCH AND PERFORMANCE CRITERIA



Objectives

By the end of this Unit, you should be able to;

- Describe the specific activities of FSR, its procedures and methodologies
- Compare and contrast between FSR strategies and that of other conventional approaches
- Identify the important issues to be considered during farming system analysis
- Apply the criteria that are used to evaluate the performance of FSR

4.1 FSR Activities: Procedures and Methodologies

Well, the approach to FSR varies according to the organization's mandates and settings. Accordingly, it may be designed for single commodity or more. Approaches also may vary by the physical, biological, and socioeconomic characteristics of the target areas and groups, as well as by the preferences of FSR administrators and researchers. Some approaches are comprehensive, taking many factors as variable, including public policy; but more frequently, FSR works within existing conditions or assumes only modest changes in the existing conditions.

Generally, FSR is conducted by the following three possible ways:

- (a) On-farm Adaptive Research;
- (b) On-station studies;
- (c) Study of farming system by modelling, and using suitable computer soft ware.

A. On-farm research: On-farm research refers to the research which is conducted at farmers' field in relatively large plots compared to conventional on-station research with active participation of the farmers and with the hope that technology generated through the combined efforts of researchers and farmers will be realistic to the socio-economic environment of the resource poor group and the problematic situations that the farmers practically face during the process of farming.

B. On-station FSR: On-station experiments on farming system perspectives are conducted at the research station by taking into consideration the farmers problems, resource availability with farmers such as land, labour, capital etc. and farm constraints (physical and bio-physical) into consideration.

C. FSR through System Modelling: This begins with the analysis of the systems, its circumstances and purposes. Defining the model gives insight into the working of the system. So far, the farming systems research has been rather inadequate or slow, particularly in less developed countries. Perhaps the only way

by which improvement can be achieved is by the construction and application of suitable whole farm models (Dent, 1990). Recent computer software development may provide the basis for a start in modelling of whole farm systems even with incomplete conceptual understanding and data sets.

Now, let us see the specific activities that are carried out as part of on-farm research processes. They are; target and research area selection, diagnostic stage, planning stage, testing stage, recommendation and dissemination stage.

1. Target and Research Area Selection: Using national and regional objectives, key decision makers including those from the FSR team selects one or more target areas. Then, the FSR team divides the target area into sub-areas with relatively uniform characteristics and selects a research area representative of the selected sub-areas. The team continues by choosing the target group farmers who have common environments and common production patterns and farming practices. This group of farmers might be those with a particular cropping, livestock, or mixed (e.g., crops and livestock) pattern; alternatively, the approach could be based more on environmental conditions.

Remember: such classifications are usually adequate for identifying problems and opportunities of sufficient magnitude to justify the research effort. Where practical, the FSR team tries to apply the research results to farmers operating under similar conditions beyond the target area.

2. Diagnostic Stage: In this stage, efforts are made to determine the constraints that the homogenous group of farmers face in increasing the farm productivity, the circumstances in which farmers work, the weakness, strength, the opportunities and the threats with the farmers. The main aim is to understand the farming system; to prepare an inventory of farm resources, production constraints and support services. Talking to knowledgeable people, examining relevant secondary sources of information, surveys and technical monitoring are the chief strategies of this stage. In general, however, the methods used should be based on criterion of the lowest possible cost commensurate with the degree of understanding that is necessary. Note: extra accuracy takes resources and time.

3. Planning stage: The priority for research is identified from the diagnostic stage. Planning or design stage is recognized as crucial to the success of FSR in technology generation. Overall, farmer's problems are readily identified. Range of strategies is identified that are thought to be relevant in dealing with constraints. The factors taken in to considerations to check sustainability of the strategies obviously are:

technical feasibility, economic viability, and social acceptability. It is also in this stage that a suitable plan of action will be formulated.

4. Testing stage: The objective of this stage is to evaluate the improved practices flowing from the design or planning stage to the farm. The evaluation criteria should be those found important to farmers in the diagnostic stage. Usually the performance of the improved technology drops when it moves from the artificial conditions of the experimental station to the farm and drops even further when farmers manage and implement the final trials. In this stage most promising strategies identified at the design stage are evaluated under local farmers' conditions.

Note: At the testing stage, compromises have to be made in the experimental design i.e., farm trials need to be less complex than those undertaken on experiment stations because of costs, worries about too much land being asked from farmers and the desirability of interaction between farmers and researchers. Researcher-farmer interaction is less likely when experiment become too complex. We place a lot of more emphasis on replication across farmers' fields rather than within farmers' fields at this stage of testing.

5. Recommendation and Dissemination stage: The acceptable new technology is promoted to wider area. Once the technology or product is ready for extension, necessary supplies and support services must be ensured by the policy makers and planners and other involved such as extension workers and researchers.

After the technology has been demonstrated and promoted to all the farmers in the target group, it is important that their experiences with it are monitored. The improvement suggested may not always suit the farmers' situation, especially as circumstances may change over time. There may be a need to go for number of options rather than single recommendation. Feedback of the farmers' reaction to the technology will determine if technology is suitable and also when changes are needed. This review phase is vital since it emphasizes the continuous nature of needed improvements.

4.2. FSR Strategies

Dear Learners, as you may presume, there are alternative ways of doing FSR and FSR practitioners have not settled on a common approach. Consequently, experts advise those beginning FSR activities to be flexible so they can make changes as they gain experience and new information becomes known. In this section, we discuss some of the issues to consider in deciding on an FSR strategy.

1. *How much change?*

Agricultural researchers frequently debate the issue of how much change to introduce into farmers' systems such as changes to the farmers' cropping and livestock patterns, management practices, and the farming environment. Changes could range from improved seed and pest management to better farm-to-market roads and price supports for grains.



Dear Learners: the recommendations derived from FSR will be sometimes intended to address very complex problems and hence they will be shaped depending on multiple pre-requisites. Do you have any point to be considered by the FSR team in shaping such recommendations?

Ok, such an intention might be followed if the FSR teams answer “yes” to the following questions:

- Are farmers willing to consider major changes to their systems? This is based on how farmers are active participant and have exposure of the world;
- Is the research team capable of dealing with the complexities of the whole farm? This is based on ability of FSR team who are from multi-disciplines;
- Is the government prepared to respond to suggested changes across a broad range of possibilities? This depends on government policy support;
- Are few opportunities apparent for materially improving the farmers' conditions without having to initiate major change?

If the answer for above question is ‘no’ the other extreme takes the farmers' cropping or livestock patterns about as they are and works on improving the *efficiency of farmers' practices*. The reasons for working with existing patterns are

- The above four conditions are not present.
- Some forms of quick results are needed to capture the interests of the farmers, the researchers, and funding organizations
- Farmers with limited resources are evaluated as being particularly cautious about accepting new crops or livestock on a significant scale, especially when the change reduces production of one of their traditional food sources.

2. *How soon to change?*

How soon to attempt change? Frequently comes up when discussing FSR. Because of the diversity of farming systems and the risks of doing something that will cause irreversible damage, some researchers delay research and implementation of results until a careful study of farmers' conditions is completed. These researchers feel that this approach allows them time to gain a good understanding of farmers' conditions and the research potential, to gather base-line data for evaluating the effectiveness of their programs, and to design an integrated research and development program. Pursuing this approach, however, might take one or more years before on-farm research begins.

Other researchers associated primarily with cropping systems research propose to introduce change quickly using on-farm experiments to gain an understanding of how the farmers and the environment respond to change. In the process, the FSR team will uncover opportunities for further research and improvement. Opportunities for change by this process may be less than optimum, but such opportunities often interest farmers. Moreover, introducing change in this way sometimes yields greater returns from scarce research funds than more precise and drawn out procedures.

3. Where the ideas for change originate?

Much of the research in developing countries has been conducted on experiment stations, which generated technologies that were subsequently brought to farmers for acceptance or rejection. In contrast, FSR emphasizes early contact with farm households to learn about their conditions so that improvements can be developed in response to their needs. The approach requires understanding the farm households through on-farm research in which farmers collaborate.

4. What type of research?

Another aspect of the foregoing issue is the debate over the desired mix of site specific and generally applicable research. Several writers have described this issue in terms of the integration of "upstream" and "downstream" research. "Upstream" research is characterized as being partly basic, broadly general, and supportive; whereas, "downstream" research is characterized as being site specific, primarily adaptive, and useful without long delay for target groups of farmers.

Generally, the above discussion might suggest an excessive number of factors to consider in planning an appropriate strategy for an FSR. Because, as it is been indicated, most small farmers will probably not want to risk much at first. In time and with adequate success, farmers may become interested in more substantive changes.

4.3. System Analysis & Performance Criteria

Dear Learners: in doing FSR, members of the researchers' team attempt to understand and analyze a farm-household system prior to opting for any kind of changes or modifications. This requires assessment of farmers' environment, household as integrating unit of FSR, and household resources as well as the unique outcomes resulting from interaction of its elements. Besides, there are fairly designed criteria to tell how far the team is successful in applying the FSR and the farmers utilized the changes proposed through the research. Well, let's start with the relevant issues relevant to be considered in Farmers' environment? *Keep reading.*

4.3.1. Farmers' Environment

The farmers' environment can be divided into the physical, biological, economic, and social settings. While many facets of these environments can be used in FSR, some are more critical than others are. The sections that follow cover what we have found to be the more important facets. Of course, individual situations and the experience of the FSR team will dictate which factors to emphasize.

A. Physical Setting

The more important physical factors are **climate, water, and land**.

- Under climate, the research team analyzes primarily; temperature and rainfall as recorded at the nearest weather station. For temperature, the average monthly values, and the lows and highs during critical periods in the growing season are important.
- Rainfall analysis includes the study of monthly means and the time of the beginning and ending of the rainy season. Where irrigation is practiced, stream flow records should be analyzed. For these types of data, the longer the records, the better.
- The study of land takes location, slope, soil type, whether rain-fed or irrigated and other factors into account like slope and wind direction etc.

B. Biological Setting

The biological setting includes those factors that influence the health and vitality of plants and animals and the quality of harvested products. Most commonly, the team identifies prevailing diseases and insects, according to the plants or animals being damaged or harmed. Other biological factors are considered too. Insects can be a serious destroyer of harvested grains. Weeds are particularly important in humid, tropical areas primarily as they interfere with plant growth; but, in some cases, weeds are allowed to grow and are

used as animal fodder. Rodents and birds are other biological factors to consider. In some cases, birds e.g., the African weaverbird-can devastate crops, especially if the crops are grown out of the normal sequence.

C. Economic Setting

Several aspects of the economic setting influence the farming system.

- Access to markets during critical periods is particularly important for increasing farmers' production. These critical periods correspond with the need to obtain credit, purchase inputs for production, and the marketing of crops. In marketing, pricing, storage, and reliable transportation are especially important when the farmers grow perishable crops. When investigating these factors, the FSR team should obtain information on any services that might be needed to support new technologies. For example, the roles of agricultural chemicals in small amounts or repair services for farmers' equipment.
- Other information that the team may gather concerns such items as processing facilities for farm products; the performances of extension service and cooperatives or farmers organizations; seasonal wage rates; labour supplies; opportunities for off-farm employment sources and costs of traction; government regulation; and channels of information. By the way, information itself is becoming commoditized particularly in commercial farming.

D. Social Setting

The specific nature of the social factors that FSR&D team needs to consider is less subjective to generalization than the above considerations because conditions vary so widely from location to location. Nevertheless, the team needs to keep a number of social factors in mind-particularly those social factors that in farmers' acceptance of new technologies. These factors concerns societal norms and customs related to land ownership and use, division of labour within society and the family, rights and obligations according to sex and age descent and inheritance systems, and other community norms and customs as they support or restrict individual and cooperative efforts.

- For e.g. religion play key role in agriculture since it contains cultural ideas about relationship people and nature. Consider Orthodox and camel, pigs and Islam.
- Norms and customs; norm means acceptable behaviour of society, while custom is the ways people actually behave. In any way, you should consider what is accepted and what is not in community in bringing new technologies or ideas.

4.3.2. The Household as an Integrating Unit

The farm household is a key element in FSR. Much of what FSR attempts to accomplish is integration of the many factors influencing the farmers' choices of enterprises and methods of production, given the environment and the households' resources. This means, the farm family is the ultimate integrator & the FSR team is a helper in the process.

FSR methodology provides the framework for bringing the farmers and the team together. Consequently, the team needs to gain as much understanding as is practical about the farm family and the way it operates. The following are also specific elements to be considered in that regard.

- **Characteristics:** These are facts about farmers, such their sex, age, education, literacy, and ethnic background;
- **Knowledge:** This relates to what farmers know; for FRS the team focuses on such items as the farmers' knowledge of alternative management practices, cropping patterns, sources of inputs, information, and markets.
- **Beliefs:** This concern what farmers think is true, whether correct or not, based on the farmers' experiences and common knowledge. Beliefs, in turn, may influence the farmers' attitudes, behaviours, and goals. For example, even though farmers may be treated fairly when seeking credit, the anticipation of being treated unfairly may keep farmers from seeking credit.
- **Attitudes:** These relate to farmers' feelings, emotions, and sentiments and may have a strong influence over farmers' decisions to accept or reject new technologies
- **Behaviour:** Often farmers' past behaviour may predict how farmers will react in the future. Behaviour relevant to FSR concerns past actions such as farmers' work on and off the farm and visits to communities outside the region, marketing practices, use of credit, and adoption of new technologies.
- **Goals:** These reflect what the farm family desires, i.e., what it is seeking. A goal is conditioned by the family's beliefs about what is attainable, as well as its sentiments, and is based, in part, on the norms of the community and farmers' general level of welfare. This is one of the types of special studies that the FSR team might undertake itself or commissions others to do.

There are basically; two major goals that farmers try to attain by using the technologies; profit maximization on market-oriented farms and household sustenance on subsistence-oriented farms. By profit, maximization is meant maximization of net gain measured as total benefit less total cost. Profit is usually but not necessarily measured in money terms.

Household sustenance through the production of food and fibre for household consumption provides the primary objective of all other farms but, as noted previously, it is increasingly modified by the need also to generate some level of cash income. Only estates and some subsistence farms are found, respectively, at the extremes of aiming only for profit maximization or full subsistence; most farms of these and other types are located somewhere between these extremes along the profit-sustenance continuum.

Beyond the priority objectives of ensuring sufficient food and cash for the farm household, subsistence and semi-subsistence farmers generally have a number of secondary objectives. These are likely to include such things as having security in their livelihood, having the opportunity to observe socio-cultural customs and obligations, and having a satisfactory amount of leisure time.

4.3.3. The Household's Resources

Conceptually, the household's resources can be described as comprising **land, labour, capital, and management**. There are important aspects of these four factors an FSR team should consider depending on the situation. Below, some factors that FSR practitioners have found useful are listed.

Land- Characteristics ascribed to the farmer's land, include

- Size of holdings
- Fragmentation of the holdings - e.g., whether the holdings are a single unit or are broken into pieces
- Ownership - e.g., sole owner, joint husband and wife ownership, communal owner, long-standing - tenancy, and short-term tenancy
- permanency of use - e.g., permanent, shifting, or nomadic
- Landlord-tenant relationships - e.g., share of crops retained by the farmers, access to milk by the one who tends the herds, and division of inputs as between tenant and owner
- Land quality - e.g., soil depth, texture, and presence of toxic substances
- Terrain - e.g., slope, terraced or not, and concave or convex cross sections when on hillside
- Water availability - e.g., nearness of ponds or streams for livestock, irrigated or rain-fed farming, and dependability of supply
- Location - e.g., access to markets and other services.

Labour- The family's labour includes members of the household who are capable of working and the family's participation in cooperative efforts. Some relevant characteristics are;

- number, age, and sex of the family members

- division of effort among the members according to preferences, individual profits, and customs
- general level of productivity and health
- division of time between farming and other activities - on the farm and off the farm
- extent and nature of cooperative efforts in terms of obligations to others as well as help from others
- Other responsibilities and factors that influence the way farm households allocate their time and effort.

Capital- This factor refers to physical and financial assets that include;

- tools and equipment
- buildings and improvements to the land
- livestock and other assets capable of being sold to meet the farmers' needs or wishes
- cash from sale of crops, animal products, handicrafts, and from other sources
- Access to credit

Management - The skills of the household in organizing and carrying out the many farming tasks is a valuable resource. Management represents a considerable asset to the family and determines the household's efficiency in using its land, labour, and capital.

4.4 Performance Criteria for System's Property

Dear Learners: at the end of analyzing and attempting changes in the system as a result of FSR, one needs to assess the performance of the modified system i.e., the recommended one. There are nine main properties a system might possess, thus requiring a set of nine criteria by which these system properties may be assessed. The nine properties of farm systems and activities which need to be assessed are: Productivity, Profitability, Stability, Diversity, Flexibility, Time-dispersion, Sustainability, Complementarities, and environmental compatibility.

A. Productivity

Productivity is primarily a measure of the relative suitability of a system or activity in a particular agro-ecological environment. On commercial farms, it is an indicator of relative efficiency of resource use and management performance. It is an underlying condition for profitability but should not necessarily be taken as a desirable attribute or objective in itself.

B. Profitability

Financial profitability becomes a less important performance criterion as analysis moves towards the subsistence end of the farm-type continuum. Financial profit as a criterion for measuring the performance

of farm-household systems is often unreliable. This is because, on small farms money profit is often generated at the expense of weakening or distorting the system through such factors as increasing household exposure to debt for purchased farm inputs, the danger of fostering an exploitative. Moreover, non-sustainable rate of resource use (causing soil degradation), reduction in the level of reliability of household food supply and it is increasing risk.

C. Stability

System stability refers to the absence or minimization of year-to-year fluctuations in either production or value of output. (The latter also implies either stability in input costs, yields and prices or counterbalancing movements in these influences on value of output.) Where conditions are favourable, price and production instability can often be countered by more careful activity selection (e.g., of drought-tolerant varieties, pest-immune crops); by diversification of activities; by seeking greater flexibility in product use or disposal; by multiple cropping over both space and time; and by increasing on-farm storage capacity and post-harvest handling efficiency.

D. Diversity

Diversity corresponds to 'not having all one's eggs in a single basket. It refers to a strategy of increasing the number of activities in a system and/or their separate products in order (i) to reduce overall system risk of income or family-sustenance failure and/or (ii) to increase overall production/profit (averaged over time) through a better use of available resources. A high diversity level is conducive to system stability (but diversity might conceivably be achieved at the cost of a reduction in average profit).

F. Flexibility

The property of flexibility of product use provides a second dimension to diversification: it refers to the availability of alternative ways of product disposal. There are a maximum of four ways: consume/use, sell/barter, store or process. A product for which all of these possibilities exist is intuitively preferable, other things equal, to one, which can only be eaten or must be immediately sold. Further, the quality of process permits repetition of the consume-sell-store-process alternatives at second, third or higher degree, but very few agricultural products are in fact farm-processed beyond a second-degree stage. This also applies to such animal products as milk/butter, skins/leather and wool/cloth.

G. Time-dispersion

Time-dispersion of production or income refers to the degree to which a given production or income pattern is predictably dispersed (or, conversely, concentrated) over time - over a season or, more usually, the operating year. It is a measure of the uniformity of within-year production/income flow. (Production,

price or income stability, discussed above refers to the risky or unpredictability of these variables between years or locations.)

I. Complementarities and environmental compatibility

When applied to activities, this last of the nine properties requires that any crop or livestock component of a system be capable of structural integration with all other components of the system and its environment in terms of management practices, resources and technologies used, and disposal of products/by-products. Such structural integration is especially important in relation to long-term activities where bad decisions made regarding one activity and their adverse effects on other activities might not be easily rectified. This probably is a statement of the obvious. However, the more that is learned about the residual effects of herbicides and pesticides and their further effects lower down the food chain, the more apparent it becomes that this property of systems and their components has been neglected in the past.

Chapter 5:

5. Farming systems in sub Saharan Africa/ Ethiopia

5.1 Characteristics of the region

The problem of poverty and how to reduce it remains the most pressing dilemma in the international development debate. More specifically, two questions are at the heart of much of academic research and public policy for development, namely: what is it that makes Sub-Saharan Africa (SSA) the poorest region in the world and what can be done to deliver the sustainable and broad-based economic growth required to address this? This paper seeks to provide an introduction to current debates on these two interrelated questions.

We do not pretend to provide a comprehensive overview of a vast and ever changing body of academic literature and government policy. Rather, the paper has two main objectives. Firstly, we highlight the principal drivers and maintainers of poverty in SSA as we see them (building on a holistic approach to defining poverty) and, secondly, we critically discuss selected policies for economic development and poverty reduction. In addition, while there are many commonalities between countries in the region, there is also a great deal of diversity that a regional focus overlooks. Indeed, one of the main failings of development policies advocated by aid agencies has been an overly prescriptive, one-size-fits-all mentality that does not take country-specific constraints into account. Thus, in order to trace the drivers and maintainers of poverty and associated poverty reduction policy options from a country perspective, two country case studies (of Nigeria and Tanzania) are also discussed (see Appendix A).

All too often, debates about policies for poverty reduction in SSA are either overly pessimistic about the tractability of the problem or too readily neglect the politics that shape public policy and its results in the region. We seek to chart a course between these extremes by dividing the drivers and maintainers of poverty into two broad categories: socio-economic factors (such as risk and vulnerability and low capabilities) and political economy factors (such as non-developmental politics, corruption and the ‘resource curse’). This approach aims to identify issues that can (at least partially) be addressed through public policy while also situating them in their broad political and institutional context. In particular, in many states in SSA, informal institutions (‘rules of the game’) are equally if not more important than formal ones. Such states often have a politics dominated by informal, patrimonial relations whilst at the same time maintaining the pretence of separation between the public and private spheres and are therefore often described as ‘hybrid’ or ‘neopatrimonial’ states. The resource curse, where resource endowments lead to adverse political incentives, policy failure and underperformance is a prime example of the interact

ion of the formal and informal, resulting in anti-poor outcomes. This unique political and institutional picture does not mean that SSA is stuck in an intractable poverty trap. It is, however, crucial to understanding why states in the region remain so poor and should also be taken into account in trying to address it.

In discussing policies for poverty reduction we again divide our discussion into two interrelated sets of policies: those with a direct poverty focus and those that seek to stimulate economic growth, raise incomes and – more indirectly – to reduce poverty. Both elements are essential for poverty reduction: no substantial and lasting poverty reduction is possible without economic growth, and growth alone will not reduce poverty without pro-poor linkages (such as growth that provides gains to the agricultural sector, where most of SSA's poor work).

The discussion of poverty focused policies begins by considering the alphabet soup of policy instruments for poverty reduction widely adopted in the last twenty years, from Structural Adjustment Programmes (SAPs) to Poverty Reduction Strategies (PRSs) and the Millennium Development Goals (MDGs). While the current consensus in these areas rightly stresses the central importance of 'ownership' of the development process by national governments in SSA, other actors such as aid agencies should not retreat from the field of debate: quite the opposite. Countries in SSA need support in formulating and debating the best policy choices. We therefore review some of the main 'pro-poor' policy issues in the associated policy debates (the need to build capacities or human capital, the importance of pro-poor linkages for growth and the possible role for social protection) and the main growth-focused policies such as those that seek to promote trade, investment, industrial development and infrastructure as well as a set of issues that are central to providing the 'enabling environment' for economic growth (such as regulation and access to finance). We do not consider these to be mutually exclusive policy options. Although there are clearly trade-offs to be made, the key contribution of this discussion is to stress the sheer breadth of areas in which national governments and those seeking to support them need to develop capacity and implement good policy in order to deliver poverty reduction.

How should these policies for poverty reduction be implemented? Aid agencies seek to do so, principally, through the delivery of Overseas Development Assistance (ODA) and its associated conditionalities. We therefore provide a brief overview of the main strands of the aid effectiveness debate. Despite the progress that has been made in agreeing a common (if somewhat narrow) set of aid effectiveness indicators and

targets through the Paris Declaration (PD), we highlight three key challenges for aid to SSA: (i) the international aid architecture has become increasingly diffuse, with the proliferation of many channels for aid delivery, thereby promoting fragmentation and undermining aid management efforts at national level; (ii) the proportion of aid to SSA delivered through government systems has flat lined in recent years and its predictability remains weak; and (iii) evidence suggests that there are limits to many countries' ability to absorb and spend substantial additional aid inflows. In particular, as long as donor countries seek to continue to maintain strong vertical linkages between their aid money and the associated outcomes which it aims to achieve (i.e. through arrangements that ensure earmarking of one form or another such as vertical funds), its effectiveness will be compromised.

Alongside the emphasis on national ownership and national priorities there is also a hope that African initiatives, such as New Partnership for Africa's Development (NEPAD) and African Peer Review Mechanism (APRM), will foster incentives to change the behavior of national elites to promote reforms that are supportive of pro-poor growth. Whilst undoubtedly donors will still have a central role to play in Africa's poverty reduction strategies for some time yet, there is an attempt currently to place African governments, its people and particularly the poor at the centre of the poverty reduction and pro-poor growth agendas.

SSA is afflicted by many forms of poverty. HDI scores in most countries of SSA have stagnated or declined since 1990, leaving this region as the poorest in the world. Indeed, 28 of the 31 low human-development countries are in SSA (UNDP, 2006: 265). Analysis of income poverty is similarly disappointing. Since 1990, income poverty has fallen in all regions of the world except SSA, where there has been an increase both in the incidence and absolute number of people living in income poverty. This sees some 300 million people in SSA – almost half of the region's population – living on less than US\$1 a day (UNDP, 2006: 269).

For some in SSA, poverty is dynamic and transitory, resulting in different sectors and groups of the population moving in and out of poverty over time. For instance, there are points in the life cycle when poverty is more likely, and this is often correlated to dependency ratios. Poverty is more common in young families, for example, when asset ownership is lower and dependency ratios are higher. For others in SSA, poverty is chronic rather than transitory. This means poverty is experienced for most of one's life, and often passed onto one's children (CPRC, 2004: 3). In fact, all 16 of the countries considered 'desperately deprived' by the Chronic Poverty Research Centre (CPRC) are found in SSA (CPRC, 2004: 65).

5.2. The socio-economic drivers and maintainers of poverty in SSA

A. Risk and vulnerability

People everywhere face risks and vulnerabilities but poor people, especially those living in rural areas dependant on agriculture and in tropical ecologies (Diamond, 1999), face more than others. This is true of a large proportion of SSA's population. There are a number of risks and vulnerabilities that drive and maintain poverty in SSA, including harvest failure, market failure and volatility, conflict, and health shocks.

B. Harvest failure

Harvest failure is a key risk for rural households in SSA (Sinha and Lipton, 1999). Africa's geography and agro-ecology (prone to drought as well as intense rain) combine with inefficient agricultural technologies and inadequate agricultural support and result in environmental degradation, unmanaged pests and poor access to inputs, which increase vulnerability. Harvest failure not only affects crop-dependent households, but the wider rural economy (including households dependent on non-farm income sources) as well as national well-being and stability. It also can have long-term effects as people sell assets as a coping strategy. National budgets are also destabilised as trade (and national income) is reduced and relief has to be imported.

The food crisis experienced in southern Africa in 2001-03 is a case in point. Heavy rains in the late growing season in 2001 triggered a harvest failure of maize, the region's main staple (Wiggins, 2005: 3). an immediate impact was felt by crop-dependent households. But harvest failure was not the only cause of this food crisis, for institutional weaknesses, political factors, donor policies, and economic inequalities also contributed (Booth et al, 2006: 58). Together they led to a significant increase in prices across the region (e.g., a four-fold increase in Malawi), causing acute problems for the poor. In fact, it is estimated that in late 2002 the lives and livelihoods of as many as 16 million people in Lesotho, Malawi, Mozambique, Swaziland, Zambia and Zimbabwe were threatened (Wiggins, 2005: 2; Maunder and Wiggins, 2007: 4).

C. Market failure and market volatility

Market failure and market volatility increase the prevalence of poverty in SSA. This is because, in many instances, the poor do not possess the level of assets (both physical and human capital assets) required to protect themselves from shocks resulting from markets. Market fragmentation – inadequate institutional

and infrastructural linkages (e.g. railway, roads, landline and mobile telecommunications) between local, national and international markets – means that markets are poorly integrated, over both time and space. This not only affects physical markets but reduces producers' and traders' access to information that signals price changes, which limits their ability to change their patterns of production and trade to avoid economic shocks. The advantages of rural infrastructure and markets is seen in Tanzania, where households within 100 meters of a year-around road that has a regular bus service, earn on average one-third more per capita than the rural average (IFAD 2001: 164 in Bird et al., 2002: 12).

Market volatility is driven by international economic shifts or more localized market failures. International market volatility in key staples and commodities (e.g. coffee, sugar, cocoa, tea) can lead to higher prices (as in Uganda in the late 1990s) but also to low prices, which cause extreme hardship for producers. The catastrophic impact of the collapse of coffee prices in recent years in Ethiopia, Burundi and Uganda is demonstrative of this (CPRC, 2004: 45). But price volatility can also be a poverty driver for urban and net consumer households. This is because the cost of their basket of goods increases as the price of staples, including fuel oil, rises. Such price rises have a similar impact on national budgets as well, as the 1970s oil crisis did throughout SSA, and mass importations of maize had in southern Africa in the 1990s.

D. Conflict

A strong association is found between high levels of conflict and multidimensional poverty. For example, between 1997 and 2006, nearly 40% of low human-development states globally were found to be affected by armed conflict, compared with less than 2% of high and a third of medium human-development states (Ploughshares, 2007). This is significant because African countries are prone to conflict. In 2006 Africa, with 13% of the global population, had over 40% of the world's violent conflicts; eleven countries were affected directly (Ploughshares, 2007).

Violent conflict has direct, immediate and devastating impacts, including injury, battlefield and civilian deaths, the destruction of household assets and displacement. It has indirect and long-term poverty impacts by increasing dependency ratios, resulting from an absence of men and an increase in the proportion of disabled and elderly, as well as women and children. It destroys public infrastructure and assets, disrupts livelihoods and reduces savings, undermines law and order and political processes, and causes social and cultural erosion and dislocation. It has generated millions of African refugees (over 3

million in 2006), which are costly for host countries as they put pressure on domestic resources, jobs, and services (see Stewart and Fitzgerald, 2000; Goodhand, 2001: 13-14).

E. Health shocks

Sudden or prolonged ill health often results in a downward spiral of asset loss and impoverishment as people are forced to abandon productive activities. The relationship between ill health and poverty is complex and works in both directions: illness can cause poverty and poverty can contribute to poor health (Grant, 2005).

Health statistics in SSA are alarming. The under-five mortality rate in 2005 was 166/1000 – a figure that has hardly improved in two decades and is twice the developing world's average. Poor maternal health is a scandal, with the odds that a SSA woman will die from complications during pregnancy and childbirth at 1 in 16 – compared with a developed-world rate of 1 in 3800 (United Nations Department of Public Information, 2007: 2). Life expectancy in SSA is today lower than it was three decades ago, with an average life expectancy of about 50 years in 2000-05 (UNDP, 2007: 265).

Untreated sickness contributes significantly to low life expectancy. For example, seasonal conditions (such as diarrhoea, water- and mosquito-borne diseases) result in poor health outcomes, and given that they commonly coincide with the rainy season and therefore the most highly labour-demanding agricultural season, such illnesses can have broader poverty implications.

The HIV/AIDS pandemic has reduced life expectancy and contributed to high levels of mortality. The number of people dying from AIDS in SSA continues to increase, reaching 2 million in 2006, as does the number of new cases and the number of people requiring treatment for advanced infection (United Nations Department of Public Information, 2007: 2). HIV/AIDS has an impact on households' livelihoods and labour productivity and on the ability of households and communities to cope (Van de Waal and Whiteside, 2003). Households affected by HIV/AIDS commonly have less income, reduced food security and are more vulnerable to other shocks, such as drought (Harvey, 2004). Dependency ratios (dependents as a proportion of the working population) in SSA are the highest in the world, with the dependency ratio 0.8 (young) and 0.1 (old) in 2004 (World Bank, 2006a). This is partly driven by the HIV/AIDS epidemic in SSA. HIV/AIDS is also putting considerable strain on public service delivery and government budgets, and on social cohesion and stability.

F. Low capabilities

A different way of thinking about the causes of poverty is to think in terms of capabilities. These, according to Sen (1999), reflect a person's freedom or ability to choose the way (s) he wishes to live. These include the capacity to be free from hunger, to become educated, and to earn a decent living and as such, they are interconnected and mutually reinforcing. People trapped in persistent poverty tend to experience multiple 'capability deprivations' concurrently. That is, they are illiterate, have inadequate nutrition, poor human rights, and insufficient income and livelihood opportunities, which taken together drive and maintain their poverty and ensure it passes across generations (CPRC, 2004: 40).

People in SSA suffer from capability deprivations in a range of dimensions. For example, in the conflict-affected communities of northern Uganda, livelihood and income-generating opportunities are extremely limited because people are forced to flee into internally displaced persons (IDP) camps. Living conditions in these are cramped; water and sanitation facilities are inadequate. These poor living conditions, accompanied by the inadequate provision of public services lead to poor health, which affects, among other things, educational outcomes. Poor health and education levels, combined with insecurity and weak governance, make it difficult to enact change (United Nations, 2006a; Brown, 2006; Boas and Hatloy, 2006). This multidimensional deprivation is not unique to Uganda. Indeed, it is found in a range of other conflict-affected regions of SSA (for example, Democratic Republic of Congo, Central African Republic, Chad, Somalia, Sudan) (United Nations, 2006b). It is also found to a lesser degree in states where conflict is more low level, such as Swaziland and Zimbabwe, where rights are not protected and services are not provided (education, health, agriculture extension, for example) and people have reduced capacity to improve their lives.

G. Inequality, exclusion and adverse incorporation

Inequality, exclusion and adverse incorporation are key drivers and maintainers of poverty. Inequality, which is generally defined as the proportion of, and gaps between, the rich and the poor, can exist and contribute to poverty in a range of dimensions. Inequalities in income and other economic indicators, such as asset ownership, are often persistent, deeply rooted and typically a result of political forces that enable powerful groups to protect their wealth, and of market imperfections that make it difficult for those who have low incomes and low savings to accumulate capital. Importantly, then, in any society there is a generally positive relationship between high levels of income inequality and low school enrolment, low life expectancy, high fertility, corruption, insecure property rights and macroeconomic instability, which

demonstrates the multidimensional impact of income inequality (Inter-Regional Inequality Facility, 2006: 2).

H. Limited livelihood opportunities

Taken together, risk and vulnerability, low capacities, inequality, exclusion, adverse incorporation and limited livelihood opportunities combine to keep many Africans poor. An organized, visionary, consistent and determined effort to reverse these and other contributors of poverty is therefore needed. Going beyond that, development initiatives and pro-poor economic growth is necessary to raise income levels provide all people with the capacity to aspire and improve their lives, and to reduce inequalities and vulnerability to risk. This requires commitment by leaders, policy formulation, an effective civil service, the rule of law and other governance reforms. Donors have attempted to kick-start this development process where it is weak, and to support it where it exists, but with mixed results. Before analyzing the role of donors, though, we will explore the role that domestic governance plays in maintaining high levels of poverty in Africa.

5.3. The political-economy drivers and maintainers of poverty in SSA

1. corruption
2. Weak nation and weak state
3. Weak civil society
4. Violation of human right
5. Resource scarcity

5.2 Classification of farming systems in the region

Major farming systems in Sub-Saharan Africa

For the purpose of this analysis, 15 broad farming systems have been identified (see Map)⁹. The main characteristics of the major farming systems, including the land area and agricultural population as a proportion of regional totals, principal livelihoods and the prevalence of poverty, are shown in Table 2.1. The Urban Based Farming System is not mapped. A brief description of each farming system appears in the following paragraphs, and five are analysed in greater depth in subsequent sections.

Irrigated Farming System

This farming system comprises large-scale irrigation schemes such as the Gezira Scheme in Sudan, extensive riverine and flood recession-based irrigation, West African fadama areas and the Wabi Shebelle in Somalia. It covers only 35 million ha (1.4 percent) of the land area in the region, but accounts for nearly 2 million ha (29 percent) of the irrigated surface¹⁰ and supports an agricultural population of 7 million (nearly 2 percent of the regional total). The remainder of the irrigated area in the region occurs within other farming systems - notably the Large Commercial and Smallholder System in South Africa and Namibia, and the Rice-Tree Crop System in Madagascar.

The Irrigated Farming System is quite complex, especially in respect of institutional aspects. In many cases, irrigated cropping is supplemented by rainfed cropping or animal husbandry (the Gezira is one notable exception). Water control may be full or partial. Irrigated holdings vary in size from 22 ha per household in the Gezira scheme to less than 1 ha. Crop failure is generally not a problem, but livelihoods are vulnerable to water shortages, scheme breakdowns and deteriorating input/output price ratios. Many state-run schemes are currently in crisis, but if institutional problems can be solved, future agricultural growth potential is good. The incidence of poverty is lower than in other farming systems and absolute numbers of poor are small.

Tree Crop Farming System

This farming system runs from Côte d'Ivoire to Ghana, and from Nigeria and Cameroon to Gabon, with smaller pockets in Congo and Angola, largely in the humid zone. The system occupies 73 million ha (three percent) of the region's land area, but accounts for 10 million ha (6 percent) of total cultivated area and supports an agricultural population of nearly 25 million (7 percent of the regional total).

The backbone of the system is the production of industrial tree crops; notably cocoa, coffee, oil palm and rubber. Food crops are inter-planted between tree crops and are grown mainly for subsistence; few cattle are raised. There are also commercial tree crop estates (particularly for oil palm and rubber) in these areas, providing services to smallholder tree crop farmers through nucleus estate and outgrower schemes. Since neither tree crop nor food crop failure is common, price fluctuations for industrial crops constitute the main source of vulnerability. Socio-economic differentiation is considerable. The incidence of poverty is limited to moderate, and tends to be concentrated among very small farmers and agricultural workers, but growth potential is moderately high.

This farming system occupies 263 million ha (11 percent) of the total land in the region, accounts for six million ha (4 percent) of cultivation and supports an agricultural population of 28 million (7 percent of the region). It is found in the humid forest zone of the Congo Democratic Republic, the Congo Republic, Southeast Cameroon, Equatorial Guinea, Gabon, Southern Tanzania and the northern tips of Zambia, Mozambique and Angola.

Farmers practice shifting cultivation; clearing a new field from the forest every year, cropping it for 2 to 5 years (first cereals or groundnuts, then cassava) and then abandoning it to bush fallow for 7 to 20 years. With increasing population density, however, the fallow periods are progressively being reduced. Cassava is the main staple, complemented by maize, sorghum, beans and cocoyams. Cattle and small ruminant populations are low, as is human population density. Physical isolation plus lack of roads and markets pose serious problems. Forest products and wild game are the main source of cash, which is in very short supply because few households have cash crops and market outlets are distant. Poverty is extensive, and in places very severe. Agricultural growth potential is moderate, thanks to the existence of large uncultivated areas and high rainfall, but yield increases in the near future are expected to be modest. Development requires careful management of environmental risks, including soil fragility and loss of wildlife habitats.

Rice-Tree Crop Farming System

This farming system is located in Madagascar - mostly in the moist subhumid and humid agro-ecological zones. It accounts for only 31 million ha of land area and 2.2 million ha of cropland (both one percent of the total in the region), yet it supports an agricultural population of seven million (two percent of the regional total). Though farm size is small, there is a significant amount of irrigation - equivalent to 10 percent of the region's total irrigated area. Banana and coffee cultivation is complemented by rice, maize, cassava and legumes. Cattle numbers are relatively low.

Poverty is of moderate prevalence. From a resource and climatic perspective the agricultural growth potential is high. However, actual agricultural growth and the poverty reduction potential are both considered fairly low in the short term, due to small farm size, shortage of appropriate technologies, and poor development of markets and off-farm activities.

Highland Perennial Farming System

This farming system, found in Ethiopia, Uganda, Rwanda and Burundi, covers 32 million ha (only 1 percent) of the land area of the region, mostly in the subhumid and humid agro-ecological zones, but accounts for 6 million ha (4 percent) of the cultivated area and has an agricultural population of 30 million (8 percent of the regional total). This system supports the highest rural population density (more than one person per ha of land) in the region. Land use is intense and holdings are very small (average cultivated area per household is just under one ha, but more than 50 percent of holdings are smaller than 0.5 ha). The farming system is based on perennial crops such as banana, plantain, enset¹¹ and coffee, complemented by cassava, sweet potato, beans and cereals. Eleven million cattle are kept, for milk, manure, bridewealth, savings and social security. The main trends are diminishing farm size, declining soil fertility, and increasing poverty and hunger. People cope by working the land more intensively, but returns to labour are low.

Poverty is high, both in terms of severity and absolute numbers. Despite favourable natural resources and climate, both the overall agricultural growth potential and the poverty reduction potential are considered fairly low, due to very small farm size, absence of under-utilised resources, shortage of appropriate technologies, poor infrastructure, and markets and few opportunities for off-farm activities.

Highland Temperate Mixed Farming System

This farming system occupies 44 million ha (only two percent) of the land area of the region and accounts for six million ha (4 percent) of cultivated area, but supports an agricultural population of 28 million (7 percent of the total in the region). Most of the system is located at altitudes between 1800 and 3000 metres in the highlands and mountains of Ethiopia. Smaller areas are found in Eritrea, Lesotho, Angola, Cameroon and Nigeria, generally in subhumid or humid agro-ecological zones. Average population density is high and average farm size is small (1 to 2 ha). Cattle are numerous (estimated population of 17 million) and are kept for ploughing, milk, manure, bridewealth, savings and emergency sale. Small grains such as wheat and barley are the main staples, complemented by peas, lentils, broad beans, rape, tef (in Ethiopia) and Irish potatoes. The main sources of cash are from the sale of sheep and goats, wool, local barley beer, Irish potatoes, pulses and oilseeds. Some households have access to soldiers' salaries (Ethiopia and Eritrea) or remittances (Lesotho), but these mountain areas offer few local opportunities for off-farm employment. Typically there is a single cropping season, although some parts of Ethiopia have a

second, shorter season. There are major problems in the farming system: for instance, soil fertility is declining because of erosion and a shortage of biomass; and cereal production is suffering from a lack of inputs. There is, however, considerable potential for diversification into higher-value temperate crops.

Household vulnerability stems mainly from the risky climate: early and late frosts at high altitudes can severely reduce yields, and crop failures are not uncommon in cold and wet years. As with other food-crop based farming systems, a hungry season occurs from planting time until the main grain harvest. Poverty incidence is moderate to extensive - in comparison with other systems in Africa - except for the periodic droughts which afflict the Horn of Africa¹². The potential for poverty reduction and for agricultural growth potential is only moderate.

Root Crop Farming System

This farming system is situated in, and extends from, Sierra Leone to Côte d'Ivoire, Ghana, Togo, Benin, Nigeria and Cameroon, typically in the moist subhumid and humid agro-ecological zones. The area is bounded by the Tree Crop and Forest Based Farming Systems on the southern, wetter side and by the Cereal-Root Crop Mixed Farming System on the northern, drier side. There is a similar strip in Central and Southern Africa, on the south side of the forest zone - in Angola, Zambia, Southern Tanzania and Northern Mozambique - and a small area in Southern Madagascar. The system accounts for 282 million ha (around 11 percent) of the land area of the region, 28 million ha (16 percent) of the cultivated area and 44 million (11 percent) of the agricultural population of the region. Rainfall is either bimodal or nearly continuous and risk of crop failure is low. The system contains around 17 million cattle.

The prevalence of poverty is limited to moderate. Agricultural growth potential and poverty reduction potential are moderate; technologies for this system are not yet fully developed. Nonetheless, market prospects for export of oil palm products are attractive, urban demand for root crops is growing, and linkages between agriculture and off-farm activities are relatively better than elsewhere.

Cereal-Root Crop Mixed Farming System

This farming system extends from Guinea through Northern Côte d'Ivoire to Ghana, Togo, Benin and the mid-belt states of Nigeria to Northern Cameroon; and there is a similar zone in Central and Southern Africa. It accounts for 312 million ha (13 percent) of the land area of the region - predominantly in the dry subhumid zone - 31 million ha (18 percent) of the cultivated area and supports an agricultural population

of 59 million (15 percent of the region). Cattle are numerous - some 42 million head. Although the system shares a number of climatic characteristics with the Maize Mixed System, other characteristics set it apart, namely; lower altitude, higher temperatures, lower population density, abundant cultivated land, higher livestock numbers per household, and poorer transport and communications infrastructure. Although cereals such as maize, sorghum and millet are widespread, wherever animal traction is absent root crops such as yams and cassava are more important than cereals. Intercropping is common, and a wide range of crops is grown and marketed.

The main source of vulnerability is drought. Poverty incidence is limited, numbers of poor people are modest and the potential for poverty reduction is moderate. Agricultural growth prospects are excellent and, as described in the relevant section below, this system could become the bread basket of Africa and an important source of export earnings.

Maize Mixed Farming System

This farming system is the most important food production system in East and Southern Africa, extending across plateau and highland areas at altitudes of 800 to 1500 metres, from Kenya and Tanzania to Zambia, Malawi, Zimbabwe, South Africa, Swaziland and Lesotho¹³. It accounts for 246 million ha (10 percent) of the land area, 32 million ha (19 percent) of the cultivated area and an agricultural population of 60 million (15 percent of the regional total). Climate varies from dry subhumid to moist subhumid. The most typical areas have monomodal rainfall, but some areas experience bimodal rainfall.

Population density is moderately high and average farm sizes are rather modest - often less than two ha. The farming system also contains scattered irrigation schemes, but these are mostly small-scale and amount to only six percent of the irrigated area in the region. Where a bimodal rainfall pattern occurs farmers have two cropping seasons, but in drier areas they usually harvest only once a year from a given field. The main staple is maize and the main cash sources are migrant remittances, cattle, small ruminants, tobacco, coffee and cotton, plus the sale of food crops such as maize and pulses. About 36 million cattle are kept for ploughing, breeding, milk, farm manure, bridewealth, savings and emergency sale. In spite of scattered settlement patterns, community institutions and market linkages in the maize belt are relatively better developed than in other farming systems.

Socio-economic differentiation is considerable, due mainly to migration, and the whole system is currently in crisis as input use has fallen sharply due to the shortage of seed, fertiliser and agro-chemicals, plus the

high price of fertiliser relative to the maize price. As a result, yields have fallen and soil fertility is declining, while smallholders are reverting to extensive production practices. The main sources of vulnerability are drought and market volatility. There is a moderate incidence of chronic poverty, linked to small farm size and absence of draught oxen and migrant remittances. Recently transitory poverty has sharply increased as a result of retrenchment of off-farm workers coupled with policy reforms affecting maize. In spite of the current crisis, long term agricultural growth prospects are relatively good and the potential for reduction of poverty is high.

Large Commercial and Smallholder Farming System

This farming system extends across the northern part of the Republic of South Africa and the southern part of Namibia, mostly in semiarid and dry subhumid zones, and accounts for 123 million ha (5 percent) of the land in the region, 12 million ha (7 percent) of the cultivated land and 17 million (4 percent) of the agricultural population. It comprises two distinct types of farms: scattered smallholder farming in the homelands and large-scale commercialised farming. Both types are largely mixed cereal-livestock systems, with maize dominating in the north and east, and sorghum and millet in the west. Both cattle (an estimated 11 million head) and small ruminants are raised in this system, but the level of crop-livestock integration is only modest.

Although the overall prevalence of poverty is moderate, it is often severe among smallholder families who often survive by means of off-farm income from employment, principally in other sectors outside the area. Vulnerability is high, since a considerable part of the farming system has poor soils and is drought-prone. Chronic and extensive poverty exists among smallholder families. Agricultural growth prospects are moderate, and there is a low-medium potential for poverty reduction.

Agro-Pastoral Millet/Sorghum Farming System

This farming system occupies 198 million ha (8 percent) of the land of the region, generally in the semiarid zone of West Africa from Senegal to Niger, and in substantial areas of East and Southern Africa from Somalia and Ethiopia to South Africa. It has an agricultural population of 33 million (8 percent) and their density is modest, but pressure on the limited amount of cultivated land is very high. Crops and livestock are of similar importance. Nearly 22 million ha are used for crops - 12 percent of the cultivated land in the region. Rainfed sorghum and pearl millet are the main sources of food and are rarely marketed, whereas sesame and pulses are sometimes sold. Land preparation is by oxen or camel, while hoe

cultivation is common along riverbanks. The system contains nearly 25 million head of cattle as well as sheep and goats. Livestock are kept for subsistence (milk and milk products), offspring, transportation (camels, donkeys), land preparation (oxen, camels), sale or exchange, savings, bridewealth and insurance against crop failure. The population generally lives permanently in villages, although part of their herds may continue to migrate seasonally in the care of herdboys.

The main source of vulnerability is drought, leading to crop failure, weak animals and the distress sale of assets. Poverty is extensive, and often severe. The potential for poverty reduction is only moderate. Agricultural growth potential is also modest and presents important challenges.

Pastoral Farming System

This system is located in the arid and semiarid zones extending from Mauritania to the northern parts of Mali, Niger, Chad, Sudan, Ethiopia, Eritrea, Kenya and Uganda. There are also pastoral areas in the arid zones of Namibia and in parts of Botswana and Southern Angola. The system occupies 346 million ha (14 percent) of the regional land area, but accounts for only 27 million (7 percent) of the agricultural population and 21 million cattle, as well as sheep, goats and camels. During the driest period of the year, Sahelian pastoralists move south to the Cereal-Root Crop Mixed System areas and they return north during the rainy season.

The main source of vulnerability is the great climatic variability and consequently high incidence of drought. Socio-economic differentiation is considerable - many herders have lost most of their animals due to droughts or stock theft. Poverty incidence is extensive, but the potential for poverty reduction is low. Agricultural growth potential is also modest.

Sparse (Arid) Farming System

Despite covering some 429 million ha (17 percent) of the land area of the region, this system is found mainly in six countries: Sudan, Niger, Chad, Mauritania, Botswana and Namibia. It is of limited significance from the point of view of agriculture, and has a human population of around six million - 1.5 percent of the regional agricultural population - and a cattle population of eight million. Because the wadis and their surrounding areas are considered part of the Pastoral System, grazing within the actual Sparse (Arid) System is limited. There are some scattered irrigation settlements in these arid areas (and thus about 0.7 million ha of cultivation), in most cases used by pastoralists to supplement their livelihoods.¹⁴

Poverty is extensive and often severe, especially after droughts. The potential for both agricultural growth and poverty reduction is low.

Coastal Artisanal Fishing Farming System

In East Africa, the system stretches southward from Kenya to Mozambique and includes coastal areas of Zanzibar, Comoros and Madagascar. In West Africa it stretches southward from the Gambia and the Casamance region of Senegal, along the coast of Guinea Bissau, Sierra Leone, Liberia, Côte d'Ivoire and Ghana, to Nigeria, Cameroon and Gabon. The system occupies almost 38 million (two percent) of the land and accounts for 13 million (three percent) of the agricultural population in the region; with a fairly high average population density. Households that depend on lake and river fishing are not included in this system.

The livelihood system is based on artisanal fishing supplemented by crop production, sometimes in multi-storied tree crop gardens with root crops under coconuts, fruit trees and cashews, plus some animal production. Cultivated area amounts to five million ha (three percent of the regional total). Some four percent of cultivated land is irrigated. Artisanal fishing includes sea fishing from boats, seine net fishing from beaches, setting of nets and traps along estuaries and in shallow lagoons, and catching of crustaceans in mangrove swamps. Poultry and goats are the main domestic animals. Cattle keeping is rare, due to, inter alia, tsetse infestation, and land preparation is by hand. Off-farm opportunities are connected with tourist resorts along the beaches and with large tree crop estates. In West Africa, because of the humid climate, there is more swamp rice and little or no cashewnut.

Although socio-economic differentiation is considerable, the current prevalence of poverty is only moderate. The potential for poverty reduction is considered low, and agricultural growth potential is only modest.

Urban Based Farming System

Within the estimated total urban population of over 200 million in the region, there is a significant number of farmers in cities and large towns. In some cities it is estimated that 10 percent or more of the population are engaged in urban agriculture¹⁵. Overall, it is estimated that there are around 11 million agricultural producers in urban areas. This farming system is very heterogeneous; ranging from small-scale but capital-intensive market-oriented commercial vegetable growing, dairy farming and livestock fattening,

and part-time farming by the urban poor to cover part of their subsistence requirements. The level of crop-livestock integration is often low, and there are some environmental and food quality concerns associated with urban farming.

The potential for poverty reduction is low, mainly because the absolute number of poor is low. Agricultural growth is likely to take place spontaneously, in response to urban market demand for fresh produce, even in the absence of public sector support. Unless curbed by concerns over negative environmental effects, rapid adoption of improved technologies can be expected. Overall, this is a very dynamic farming system that has considerable growth potential.

Chapter Six: The concept of Sustainable Livelihood

Chapter objectives:

After the completion of this chapter the students will be expected to:

- ✓ Define livelihoods and sustainable livelihoods
- ✓ Discuss the major principles of sustainable livelihoods
- ✓ Identify the main determinants of livelihoods

6.1. Concepts of sustainable livelihoods Approaches

The idea of sustainability was first introduced by the Brundtland Commission on Environment and Development, and the 1992 United Nations Conference on Environment and Development expanded the concept, advocating for the achievement of sustainable livelihoods as a broad goal for poverty eradication.

The rural development agenda of the 1990s has been characterized by sustainable livelihoods with two main themes: a strong emphasis on the environment and the protection of natural resources and a continued focus on macro policy, liberalization, the role of government in relation to the private sector and the importance of effective public management (a particular concern of advocates of agriculture sector programmes).

The new livelihood approaches attempt to delink the concepts 'rural' and 'agricultural' and widening the scope of rural development activity. There are three insights into poverty which underpin the approach of sustainable development. The first is the realization that while economic growth may be essential for poverty reduction, there is no an automatic relationship between the two since it all depends on the capabilities of the poor to take advantage of expanding economic opportunities. Secondly, there is the realization that poverty — as conceived by the poor themselves — is not just a question of low income, but also includes other dimensions such as bad health, illiteracy, lack of social services, etc., as well as a state of vulnerability and feelings of powerlessness in general. Finally, it is now recognized that the poor themselves often know their situation and needs best and must, therefore, be involved in the design of policies and project intended to better their lot.

Thus, the livelihoods approach is a way of thinking about the objectives, scope and priorities for development, particularly poverty elimination. A specific livelihoods framework and objectives have been developed to assist with implementation. In essence it is a way of putting people at the centre of development, thereby increasing the effectiveness of development assistance.

The concept of Sustainable Livelihood (SL) is an attempt to go beyond the conventional definitions and approaches to poverty eradication. The concept of poverty reduction had been found to be too narrow because it focused only on certain aspects or manifestations of poverty, such as low income, and did not consider other vital aspects of poverty such as vulnerability and social exclusion. It is now recognized that more attention must be paid to the various factors and processes which either constrain or enhance poor people's ability to make a living in an economically, ecologically, and socially sustainable manner.

Why a Livelihood perspective?

- ✓ **There is no automatic r/p b/n economic growth & poverty though EG is essential:** It depends on the capabilities of the poor to take advantage of expanding economic opportunities.
- ✓ **Poverty, as conceived by the poor, is not just a question of low income, but also:** bad health, illiteracy, lack of social services, etc., as well as a state of vulnerability and feelings of powerlessness in general.
- ✓ **It is now recognized that the poor themselves often know their situation and needs best:** They must involve in the design of policies and strategies

Livelihood is:

- ✓ A set of economic activities, involving self-employment and/or wage-employment
- ✓ by using one's endowments (human and material)
- ✓ to generate adequate resources (cash and non-cash)
- ✓ for meeting the requirements of self and the household,
- ✓ Usually carried out repeatedly and as such become a way of life.

Drawing on Chambers and Conway (1992) the IDS (Institute of Development Studies) team defined livelihoods as: ***A livelihood comprises the capabilities, assets (including both material and social resources) and activities required for a means of living.***

Livelihood as a theoretical framework to understand poverty and food security emerged in the late 1990s being initiated by many scholars (Scoones 1998, Carney 1998, Pretty 1998, Ellis 1998, 2000).

A livelihood is sustainable when it can:

- ☛ **Cope with, and recover from stress and shocks (drought, flood, war, etc.),**
- ☛ **Maintain or enhance its capabilities and assets, while not undermining the natural resource base”.**

☛ **Has net positive impact for the livelihood of others now or in the future locally or globally.**

This, in turn, can be disaggregated to highlight different sub-components. Five key elements of the definition can be recognized. The first three focus on livelihoods, linking concerns over work and employment with poverty reduction with broader issues of adequacy, security, well-being and capability. The last two elements add the sustainability dimension, looking, in turn, at the resilience of livelihoods and the natural resource base on which, in part, they depend.







- I. **Creation of working days** – This relates to the ability of a particular combination of livelihood strategies to create gainful employment for a certain portion of the year. This may be on or off-farm, part of a wage labour system or subsistence production. Sen (1975: 5) notes three aspects of employment – **income** (a wage for the employed), **production** (employment providing a consumable output) and **recognition** (where employment provides recognition for being engaged in something worthwhile). In terms of the income/production aspects, various target levels have been suggested, but 200 days a year appears to be widely used as a minimum level to create a livelihood (Lipton 1991; 1993).
- II. **Poverty reduction** – The poverty level is a key criterion in the assessment of livelihoods. Various measures can be used to develop an absolute ‘poverty line’ measure based on income or consumption levels. Alternatively, relative poverty and inequality can be assessed using Gini coefficient measures.
- III. **Well-being and capabilities** – The notions of ‘well-being’ and ‘capability’ provide a wider definitional scope for the livelihoods concept. Capabilities as ‘what people can do or be with their entitlements’, a concept which encompasses far more than the material concerns of food intake or income. Such ideas represent more than the human capital which allows people to do things, but also the intrinsically valued elements of ‘capability’ or ‘well-being’. Chambers (1997) argues that such a well-being approach to poverty and livelihood analysis may allow people themselves to define the criteria which are important. This may result in a range of sustainable livelihood outcome criteria, including diverse factors such as self-esteem, security, happiness, stress, vulnerability, power, exclusion, as well as more conventionally measured material concerns (Chambers 1989).
- IV. **Livelihood adaptation, vulnerability and resilience** – The ability of a livelihood to be able to cope with and recover from stresses and shocks is central to the definition of sustainable livelihoods. Such resilience in the face of stresses and shocks is key to both livelihood adaptation and coping (Davies 1996). A livelihood comprises the capabilities, assets (including both material and social resources) and activities required for a means of living (Chambers and Conway, 1992). Assessing resilience and the ability to positively adapt or successfully cope requires an analysis of a range of factors, including an evaluation of historical experiences of responses to various shocks and stresses. Different types of shock or stress, in

turn, may result in different responses, including avoidance, repartitioning, resistance or tolerance mechanisms (Payne and Lipton 1994: 15).

- V. **Natural resource base sustainability** – Most rural livelihoods are reliant on the natural resource base at least to some extent. Following Conway (1985), Holling (1993) and others, natural resource base sustainability refers to the ability of a system to maintain productivity when subject to disturbing forces, whether a ‘stress’ (a small, regular, predictable disturbance with a cumulative effect) or a ‘shock’ (a large infrequent, unpredictable disturbance with immediate impact). This implies avoiding depleting stocks of natural resources to a level which results in an effectively permanent decline in the rate at which the natural resource base yields useful products or services for livelihoods. Measuring natural resource sustainability is notoriously difficult, as it is critical to link indicators of resource depletion or accumulation (e.g. soil fertility levels, vegetation cover etc.) to both the temporal dynamics of system resilience (i.e. the ability to recover from disturbance) and livelihood needs (i.e. an assessment of whether natural resource change results in ‘effectively permanent declines in useful products or services’).

6.2. Sustainable livelihoods objectives

The sustainable livelihoods approach is broad and encompassing. It can, however, be distilled to six core objectives. It aims to increase the sustainability of poor people’s livelihoods through promoting:

-  Improved access to high-quality education, information, technologies and training and better nutrition and health;
-  A more supportive and cohesive social environment;
-  More secure access to, and better management of, natural resources;
-  Better access to basic and facilitating infrastructure;
-  More secure access to financial resources; and
-  A policy and institutional environment that supports multiple livelihood strategies and promotes equitable access to competitive markets for all.

6.3. Core principles of sustainable livelihoods

This part outlines these principles and explains why they make such an important contribution to the overall value of the approach.

1. People-centered

The livelihoods approach puts people at the centre of development. This focus on people is equally important at higher levels (when thinking about the achievement of objectives such as poverty reduction, economic reform or sustainable development) as it is at the micro or community level (where in many cases it is already well entrenched).

At a practical level, this means that the approach likely to be:

- ❖ Starts with an analysis of people's livelihoods and how these have been changing over time
- ❖ Fully involves people and respects their views; assume homogeneity in social group
- ❖ Focuses on the impact of different policy and institutional arrangements upon people and upon the dimensions of poverty they define:
 - stresses the importance of influencing these policies and institutional arrangements so the relevant social divisions may promote the agenda of the poor (a key step is political participation by poor people themselves); include those relating to class,
 - Works to support people to achieve their own livelihood goals (though taking into account caste, age, ethnic origin, considerations regarding sustainability).

Sustainable poverty reduction will be achieved only if external support (i.e. support from outside the household) works with people in a way that is congruent with their current livelihood strategies, social environments and ability to adapt.

- ❖ People – rather than the resources they use or the governments that serve them – are the priority concern. Adhering to this principle may well translate into providing support to resource management or good governance (for example). But it is the underlying motivation of supporting people's livelihoods that should determine the shape of the support and provide the basis for evaluating its success.

2. Holistic

The livelihoods approach attempts to identify the most pressing constraints faced by, and promising opportunities open to, people regardless of where (i.e. in which sector, geographical space or level, from the local through to the international) these occur. It builds upon people's own definitions of these constraints and opportunities and, where feasible, it then supports people to address/realize them. It aspires to provide a way of thinking about livelihoods. The word 'multiple' is used that is manageable and that helps improve development effectiveness. Here because it helps:

- ✓ It is non-sectoral and applicable across geographical areas and social groups.
- ✓ It recognizes multiple influences on people, and seeks to understand the relationships between different people adopt different these influences and their joint impact upon livelihoods.
- ✓ It recognizes multiple actors (from the private sector to national level ministries, from community- different livelihood objectives, based organizations to newly emerging decentralized government bodies).
- ✓ It acknowledges the multiple livelihood strategies that people adopt to secure their livelihoods.
- ✓ It seeks to achieve multiple livelihood outcomes, to be determined and negotiated by people range of different activities and themselves. In this way it attempts to gain a realistic understanding of what shapes people's livelihoods and how the various influencing factors can be adjusted so that, taken together, they produce more beneficial livelihood outcomes.

3. Dynamic

People's livelihoods and the institutions that shape them are highly dynamic. It seeks to understand and learn from change so that it can support positive patterns of change and help mitigate negative patterns. It explicitly recognizes the effects on livelihoods of external shocks and more predictable, but not necessarily less damaging, trends. Attempting to capture and build upon such livelihood dynamism significantly increases the scope of livelihood analysis. It calls for ongoing investigation and an effort to uncover the nature of complex, two-way cause and effect relationships and iterative chains of events.

4. Built on strengths

An important principle of this approach is that it starts with an analysis of strengths, rather than needs. This does not mean that it places undue focus on the better endowed members of the community. Rather, it implies recognition of everyone's inherent potential, whether this derives from their strong social networks, their access to physical resources and infrastructure, their ability to influence core institutions or any other factor that has poverty-reducing potential. In 'livelihoods focused' development efforts, a key objective will be to remove the constraints to the realization of potential. Thus people will be assisted to become more robust, stronger and better able to achieve their own objectives

5. Macro-micro links

Development activity tends to focus at either the macro or the micro level. The livelihoods approach attempts to bridge this gap, emphasizing the importance of macro level policy and institutions to the livelihood options of communities and individuals. It also stresses the need for higher level policy

development and planning to be informed by lessons learnt and insights gained at the local level. This will simultaneously give local people a stake in policy and increase overall effectiveness. It is, though, a difficult task to achieve. Much macro policy is developed in isolation from the people it affects. Indeed, understanding of the effects of policies on people (what actually happens as opposed to what is assumed will happen) and people on policies (the policy making process itself) are remarkably limited. Both these areas will need to be better understood if the full value of the livelihoods approach is to be realized.

6. Sustainability

The concept of ‘sustainable rural livelihoods’ is increasingly central to the debate about rural development, poverty reduction and environmental management (scones, 1998).

While it is common to hear and use the short-hand ‘livelihoods approach’ (i.e. omitting ‘sustainable’), the notion of sustainability is key to this approach. It should not be ignored or marginalized:

Livelihoods are sustainable when they:

- Are resilient in the face of external shocks and stresses;
- Are not dependent upon external support (or if they are, this support itself should be economically and institutionally sustainable);
- Maintain the long-term productivity of natural resources; and
- Do not undermine the livelihoods of, or compromise the livelihood options open to, others.

Sustainable development is the kind of development that meets the needs of the present without compromising the ability of future generations to meet their own needs. Sustainable development has three basic dimensions; environmental, economic, and social.

- **Economic:** An economically sustainable system must be able to produce goods and services on a continuing basis, to maintain manageable levels of government and external debt, and to avoid extreme sectoral imbalances which damage agricultural or industrial production.
- **Environmental:** An environmentally sustainable system must maintain a stable resource base, avoiding over-exploitation of renewable resource systems or environmental sink functions, and depleting non-renewable resources only to the extent that investment is made in adequate substitutes. This includes maintenance of biodiversity, atmospheric stability, and other ecosystem functions not ordinarily classed as economic resources.

- **Social:** A socially sustainable system must achieve distributional equity, adequate provision of social services including health and education, gender equity, and political accountability and participation.

6.4. Determinants of livelihoods

There are numerous initial determinants of livelihood strategy. Many livelihoods are largely predetermined by accident of birth. Livelihoods of this sort may be ascriptive: for instance, children may be born into a caste with an assigned role as potters, shepherds, or washer people. Gender as socially defined is also a pervasive ascriptive determinant of livelihood activities. Or not necessarily ascriptively, a person may be born, socialised and apprenticed into an inherited livelihood - as a cultivator with land and tools, a pastoralist with animals, a forest dweller with trees, a fisherperson with boat and tackle, or a shopkeeper with shop and stock; and each of these may in turn create a new household or households in the same occupation.

Many livelihoods are also less singular or predetermined. Some people improvise livelihoods with degrees of desperation, what they do being largely determined by the social, economic and ecological environment in which they find themselves. A person or household may also choose a livelihood, especially through education and migration.

Those who are better off usually have a wider choice than those who are worse off, and a wider choice is usually generated by economic growth. In a future of accelerating change, adaptable capabilities to exploit new opportunities may be both more needed and more prevalent.

Dear students, based on the objectives of this chapter you are expected to answer the following questions:

- ☛ How do you define livelihoods and sustainable livelihoods?
- ☛ What are the major principles of sustainable livelihoods?
- ☛ Identify the main determinants of livelihoods.

Dear students, after the completion of this chapter you are expected to:

- Define what livelihood zone, livelihood zoning and livelihood zone map are.
- Explain the Purpose and determinants of livelihood zone.
- Identify the steps of livelihood zoning.

7.1. Meaning of Livelihood Zoning

A livelihood zone is an area within which people share broadly the same pattern of livelihood, including options for obtaining food and income and market opportunities. A livelihood zoning is essential for the following reasons:

- It provides geographic orientation of livelihood systems to inform food security analysis and assistance targeting
- It provides the basis for identifying geographically relevant food security monitoring indicators
- It provides a sampling frame for on the ground assessments and assistance targeting

Livelihood Zone Map – divides the country into homogenous zones within which people share broadly the same pattern of livelihood. It provides geographical orientation of livelihood systems and a sampling frame for future livelihood zone profiling and livelihood baseline development.

Patterns of livelihood clearly vary from one area to another, which is why the preparation of a livelihood zone map can be a useful first step for many types of livelihoods-based analysis. Local factors such as climate, soil, access to markets etc. all influence livelihood patterns. For example, people living in a fertile highland area have very different options from those living in a semi-arid lowland area. In highland areas, people generally pursue an agricultural pattern of livelihood, whereas in the lowlands they grow few crops and are either pastoralists or agro-pastoralists. Those living in a coastal or lakeside zone may follow a livelihood based upon fishing or combining fishing with other activities, and so on.

Agro-ecology is one aspect of geography which determines patterns of livelihoods. Another factor is market access. Market access affects the ability of people to sell their production (crops or livestock or other items) and the price they obtain for these goods. Since patterns of livelihood depend so much upon geography, it makes sense to divide a country or a region into a number of livelihood zones. These we can define as areas within which people share broadly the same pattern of livelihood (i.e. broadly the same production system -agriculture or pastoralism for example - as well as broadly the same patterns of trade/exchange).

Livelihood zoning involves more than just the drawing of maps. A livelihood zone map is of little use unless it is accompanied by a basic description of the patterns of livelihood in each zone, and ideally by an analysis of the underlying reasons for differences between zones. This means analysing in some detail the production and trade/exchange options in each of the zones and the influence that the underlying geography has on each of these.

However, geography is not the only thing that determines the pattern of livelihood. Geography tends to define the different livelihood options, but the extent to which people exploit these options depends upon a number of factors, of which wealth is generally the most important. In an agricultural zone, for example, different people will own different amounts of land, and may obtain different yields, often because they can afford improved seeds, fertiliser, pesticides and herbicides, while others cannot. Similarly, in a pastoral zone, not everybody owns or has access to the same number of animals, and not everybody can afford veterinary or other services. These are examples of how household wealth affects the pattern of livelihood within a zone, and any analysis of food security or livelihood must take these differences in wealth into account. Often, therefore, a wealth breakdown is the next step in the analysis, following the livelihood zoning exercise.

7.2. Purpose of Livelihood zoning

While administrative boundaries are important as political lines of demarcation, they do not necessarily contain within them homogenous areas of livelihood activity. Livelihood zoning provides this important extra layer, defining areas within which people share broadly the same options for meeting their basic needs.

Livelihood zones, in conjunction with administrative boundaries, provide a logical basis for the geographical targeting of policies, development planning, service distribution, and humanitarian There is increasing interest in using livelihoods analysis as the 'lens' through which to view a number of problems ranging from emergency response to disaster mitigation to longer term development. This interest rests upon two basic observations:

- That information about a given area or community can only be properly interpreted if it is put into context with how people live.
- Those interventions can only be designed and managed in ways appropriate to local circumstances if the planner knows about local livelihoods and whether or not a proposed intervention will build upon or undermine existing strategies.

7.3. Determinants of a Livelihood Zone

Geography, production and markets

Most livelihoods are complex, and are shaped by a wide range of factors. In order to simplify the process of defining livelihood zones, it is suggested that the analyst focus on three primary factors.

- ✓ **Geography:** There are two classes of geographical factors: natural and man-made (corresponding to natural and physical capital in the DIFD framework). The most important natural factors are topography (i.e. the physical features of an area, including mountains, coasts, rivers, plains), altitude, soil, climate (i.e. temperature and rainfall) and vegetation. The most important man-made factors are those related to infrastructure (roads, railways, telecommunications).
- ✓ **Production:** There are several types of rural production system, with the most basic division being between agricultural, agro-pastoral and pastoral systems. The system of production is determined by a range of factors, of which geography is clearly the most important. Marketing system (e.g. demand for one product as compared to another, the experience and capital resources of traders), the financial and banking system (e.g. availability and affordability of credit) and government policy (e.g. development policy, pricing policy, policy on the provision of production inputs, etc.). It is quite possible for two livelihood zones to be similar geographically, but one to be based, for example, upon food and livestock production, while another is given over to the production of sugarcane because agro-ecological conditions are favourable, farmers in the zone are encouraged to grow the crop, there is a processing factory nearby and there are good roads/railways to transport the final product to market.

The market system determines the ability to sell primary production, to trade goods and services and to find employment (whether in the formal or the informal sector), all of which have a profound influence on the pattern of livelihood.

Three factors are particularly important; these are **a) the demand for products, goods, services and labour, b) an efficient system for marketing**, and **c) the existence of basic infrastructure** to support market and trading activities. The existence of demand (a) is obviously a key factor. Proximity to a large urban centre, for example, often has a profound influence on rural patterns of livelihood (e.g. because of urban demand for rural produce such as fruit and vegetables or urban demand for unskilled casual labour). The efficiency of the marketing system (b) is also important. This is determined by a number of factors, including the experience of traders, their access to capital, credit and equipment (e.g. trucks, storage depots), and government policy and legislation affecting trade (e.g. systems of licensing, taxation, duty, etc.). Finally, the existence of basic infrastructure (c), especially transport and communications, has an obvious and important influence on the market system.

Taken together, these three factors by and large determine the economic operations of households within a particular livelihood zone. They also determine their vulnerability to particular hazards such as drought, conflict or market dislocation, since vulnerability is a function of a) the normal activities of households and b) the activities they turn to in response to a hazard. These, like the normal activities, are determined by the same three factors of geography, production and markets/trade.

Factors Not Taken Into Account When Defining Livelihood Zones

Two types of factors are not taken into account when defining livelihood zones. These are:

1. **The hazards to which different areas may be exposed.** Many rural areas are exposed to a range of hazards which may either be natural (e.g. drought or flood) or man-made (e.g. conflict or market dislocation). Hazard exposure is clearly a factor that affects patterns of livelihood, since people will tend to adopt certain strategies either to mitigate the effects of a particular hazard (e.g. cultivation along a river margin to mitigate the effects of drought), or to increase their resilience or ability to recover from a hazard (e.g. the accumulation of livestock that can be sold in a crisis). By and large these types of response will be captured by the analysis of the production system, and it is not, therefore, necessary to include hazard exposure as a fourth factor defining livelihood zone boundaries (although it is, of course, important to include information on hazards as part of the description of the livelihood zone).

Supposing, however, there is a difference in the pattern of hazard exposure within a single zone that is otherwise broadly homogenous in terms of livelihood. If, for example, the northern half of a particular zone tends to be more drought-prone than the south. This by itself does not justify a division of the zone into two, since both areas share a similar pattern of livelihood and a similar vulnerability to drought, which is the most important consideration at this stage of the analysis. If, in a particular year, the north suffers a drought while the south does not, then, obviously, separate analyses of outcome will be required for the north and for the south, but this is not an analysis that requires the division of the zone into two at the stage of compiling the basic livelihood zone map.

2. **The level of service provision within a particular zone.** It is not, for example, usual to divide a livelihood zone into two because one part has better health or education services than another. Why not, when, as has already been stated, a livelihood may be defined as the sum of ways in which households obtain the things necessary for life, including health care and education? To explain this it is necessary to go back to the reason for preparing a livelihood zone map, which is to assist with emergency and development decision-making. In these cases we may be trying to answer questions such as; how will people in different areas be affected by a hazard (e.g. drought), and what might be their need for food and/or economic assistance? Or how best can we design development interventions that will support rather than undermine existing livelihood strategies? These are questions that are best answered through an

understanding of the economic operations of individual households, not in relation to existing levels of local service provision.

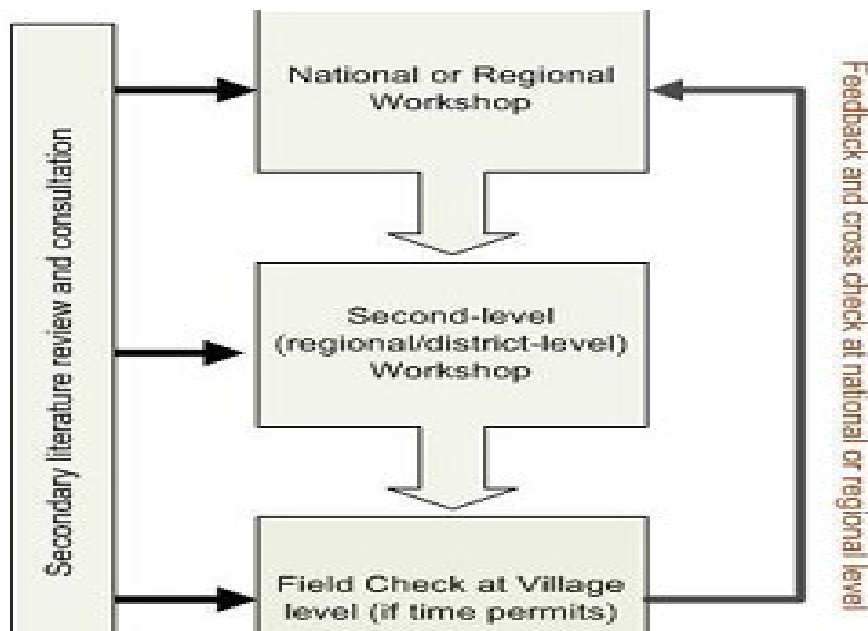
This is not to say that mapping levels of service provision would not be a useful activity in its own right. However, rather than incorporating this into the definition of individual livelihood zones, the most useful procedure might be to overlay maps of service provision onto the final livelihood zone map. This would help to identify which parts of which zones are poorly served, perhaps highlighting priority areas for intervention in the health and education sectors.

7.4.Steps in livelihood zoning

This section provides a guide to the steps required to produce a livelihood zone map. The process relies heavily on key informants. We have already indicated that conducting a livelihood zoning is not about manipulating secondary data in a computer or using one single existing type of map. Instead, livelihood zoning is an iterative process, gathering information from key informants, verifying data with the field, then cross-checking with secondary sources. The process involves a clear structure as elaborated below.

Livelihood zoning begins with a workshop to obtain a preliminary map and zone descriptions. This initial workshop will be held either at national or regional level. Questions that arise at this level can then be followed up at a second level during consultations with key informants and possibly some village visits. After this, it is wise to return to the first level to agree any changes with partners and to get a consensus on the ‘final’ map. It is important to emphasize at all stages, however, that there can always be further changes to the map as a result of future more detailed fieldwork.

Fig. 1: Steps in livelihood zoning



Preparing for a Livelihood Zoning Workshop

- ✓ Pre-workshop activities for facilitators
 - Select and organise a venue
 - Invite participants
 - Purchase workshop materials
 - Compile secondary materials
 - Review secondary materials
 - Meet with selected key informants to discuss livelihood zones

Who should be invited?

Participants in a livelihood zoning workshop should include technical staff from relevant line ministries (e.g. agriculture, livestock, meteorology, natural resources, fishing), NGOs and international organisations. Participants need to have a broad knowledge of the country or region. When selecting them, it is useful to include people who grew up, or have been based for part of their working life, in one or other parts of the country. It is also useful to include some participants from Local Administration in workshop. The maximum number of participants in the workshop should be 20 people, plus 1-2 facilitators to lead the exercise. Any more than this number becomes unmanageable and the quality of output suffers.

Information and materials required

The following secondary source information should be obtained before the workshop.

1. List of administrative units and population

2. Maps:
 - ✓ Regional maps showing administrative divisions down to level
 - ✓ Agro ecological/land use maps
 - ✓ Soil maps
 - ✓ Vegetation maps
 - ✓ Population density map
3. Rainfall data for major weather stations, by month, long term average (last 20-30 years)
4. List of crops actually grown in order of importance by district and seasonal crop calendars
5. List of livestock types in order of importance by district
6. Any other general descriptions of the geography and economy of the country or region.

WORKSHOP PROGRAMME

- ✓ **Introduction**
- ✓ **Listing productive systems**

A plenary session to list the broad productive systems that can be found in the country or region is a useful starting point (e.g. agricultural, agro-pastoral, pastoral, labor-based, hunter gatherer).

- ✓ **Mapping productive systems**

The next step is to draw the productive systems that you have listed on a large map that just shows the basic administrative boundaries

- ✓ **Introducing market access**

One way to introduce the topic of market access and trade is to overlay towns, roads, and railways on the production system map that you have just drawn. Consider the main sources of household income for each zone and markets for products sold (including labor) and products purchased. Outline key trade routes (where people sell things and the subsequent flow of goods, and where they buy things and their original source) and employment markets.

- ✓ **Develop descriptions of the livelihood zones**

Describe the main characteristics of each livelihood zone. The format includes sections to describe the main category of livelihood, the main characteristics of the production system, topography, vegetation, other natural resources, climate, market access, hazards (and their frequency) and household level response strategies.

- ✓ **Refine livelihood zone boundaries**

Using a map of the lowest available administrative level and the most recent census of population by administrative level, assign each administrative unit to a livelihood zone.

N.B:

- ❖ **Make sure that you have achieved the objectives of the chapter stated under the first section.**

Appendix 1

CATEGORIES OF PRODUCTION SYSTEM

Main categories of production system	Main characteristics	Additional notes
Agriculture	<p>Main types of Agricultural Livelihood Zones:</p> <ul style="list-style-type: none"> • Rainfed and/or Irrigated • Food crop and/or Cash crop • Crop surplus or crop deficit zone • Hand and/or animal/mechanical traction • Short or long rains dependent • Lowland – highland – mid-highland • High potential – low potential • Fertile or infertile soils • Sparse or densely populated 	In this type of zone, the main activity is crop production, typically supplemented by livestock keeping but on a small scale (e.g. 1 or 2 dairy cattle and poultry for most households) Rank the main crops consumed and the main crops sold.
Pastoral	<p>Indicate:</p> <ul style="list-style-type: none"> • Agro-ecological zone 	Pastoral livelihoods are those where the core or main activity is the raising of livestock. Rank the main types of livestock based on their importance to household food and income.
Agro-Pastoral	<p>Indicate:</p> <ul style="list-style-type: none"> • Whether crops are more/less important than livestock • Any of the agricultural or pastoral Characteristics 	Agro-pastoralists both herd livestock and grow crops
Labor Based	<p>Indicate:</p> <ul style="list-style-type: none"> • Plantation / Ranch / Urban • Local work / seasonal migration / long-term migration 	In this type of zone the majority of people derive their income from labor and purchase most of their food. This will apply to many workers employed

	• Type of plantation (tea etc.)	full time on large commercial ranches and plantations (e.g. tea or coffee estates).
Other (e.g. Mining, Trading)	Indicate: • Main characteristics	Include any other types of livelihood pattern not listed above.

Appendix 2: Livelihood zoning format

Place	Date
--------------	-------------

Name and position of the people completing this form	
Name	Position

DESCRIPTION OF LIVELIHOOD ZONE

This form provides space for only one livelihood zone. If more than one is to be covered, a second copy of the form will be required.

Main category of livelihood: e.g. Agriculture, Pastoral, Agro-Pastoral, Fishing, Labor Based, Hunter-Gatherer, Mining, Trading	
Topography, e.g. mountainous, hilly, plains, riverine, akeshore.	
Vegetation: e.g. forest, bush scrub, grassland	
Population density & land-holding size: Give a range: e.g. arable land is a typical land holding in this zone	
Production conditions: Soils e.g. fertile, infertile, sandy, clay, laterite	
Rainfall (mm per year): e.g. 500–700 mm	
Seasons: e.g. dry season Oct-March, wet season April-Sept	
Temperature: e.g. max 30–35oC March, min 15–20oC July	
Main characteristics of the production system Agriculture: Rainfed/irrigated, surplus/deficit, hand/animal traction; Pastoral: Type of water source; Agro-Pastoral: Relative importance of crops/livestock; Fishing: sea/lake/river/pond, offshore/inshore, nets/lines; Labor-Based: plantation/ranch/urban, local/distant, seasonal/year-round.	
Main crops consumed: Rank in order of importance for home consumption	1. 2. 3.

Main crops sold (food or cash crops): Rank in order of importance for home income	
Other important economic activities: e.g. mining, wild food gathering, fishing	
Main food sources for better-off and poor households: Rank in order of importance	
Main cash income sources for better off and poor households: Rank in order of importance	

MARKETS

Identify the main markets for each product. The aim is to describe the trade route, hence name the market where the good is first sold to, then any important intermediate markets, and then the destination market where the good finally ends up. (E.g. local markets -> Bale Robe -> Addis Ababa).

Main crops sold	Trade route
1.	
2.	

Main grains bought when own stocks run out	Trade route
1	
2	
Is market access good or bad in this zone?	
Why? <i>e.g. good/bad roads, close to/far from an urban center</i>	

LABOR

How much of the total casual labor performed by people from the zone is undertaken in different locations (e.g. 70% local rural area, 20% local towns, 10% outside of zone)

Local rural area	Local towns	Outside zone	Total
			100%
If outside zone, where do people go (and in which months)?			

HAZARDS

This section is for the hazards that affect household access to food and income.

Hazard (ranked) <i>e.g. drought (see checklist below)</i>	Frequency <i>e.g. 1 year in 3, every year, but severe 1 year in 5, etc.</i>
1.	
2	
3	

Checklist of hazards				
Drought Frost/Hail	Wind Crop diseases	Crop Pests Wild Animals	Livestock disease Conflict/Raiding	Cash crop marketing* HIV/AIDS
Frequencies				
Every year	Every other year	1 year in 3	1 year in 5	1 year in 10

RESPONSE STRATEGIES

What are the main strategies used by households to cope with the above hazards (e.g. sale of livestock, migration in search of labor, increase in remittances, collection of wild foods, self-employment etc.

Poor households	Better-off households
1	
2	
3	
Frequency and type of food distribution (or other outside interventions)	

Chapter Eight

8. Sustainable livelihood Analysis

8.1. The Sustainable Livelihood framework: an analytical tool to implement SLA

Framework is a ‘particular way of viewing the world’. The livelihoods framework is a way of understanding how households derive their livelihoods by drawing on capabilities and assets to develop livelihood strategies composed of a range of activities. The framework defines and categorizes the different types of assets and entitlements which households have access to. The framework examines the different factors in the local and wider environment that influence household livelihood security. The framework looks at the connections between the local or micro situation and actors, institutions and processes at work in the wider world.

Working with a framework requires understanding its different elements and the connections between them. Because people view the world in different ways and theorize the relations between things differently, frameworks are constantly contested, adapted and refined. Even where people agree on fundamental core concepts, they may use different terms to describe them. They may emphasize different elements, or think about the interactions between the elements in different ways. In this course we use a model that uses common livelihoods concepts.

The **framework** is a tool used to: analyze peoples livelihoods and identify the factors that keep them in poverty identify the constraints to that prevent them from achieving a sustainable livelihood identify appropriate entry points that are likely to impact on the greatest number of people. It helps understand and analyze the livelihoods of the poor. It is also useful in assessing the effectiveness of existing efforts to reduce poverty. Like all frameworks, it is a simplification; the full diversity and richness of livelihoods can be understood only by qualitative and participatory analysis at a local level. Structure and analyze the development situation, how policies and services are affecting it; provide a holistic overview of how different elements in development are being addressed.

- It's one way of organizing the complex issues surrounding poverty
- it gives a step by steps procedure for livelihood analysis
- a conceptual/analytical tool for understanding complex rural livelihoods
- Provides a comprehensive and practice orientated framework to understand complex local realities. Can be used in evaluating the *status quo* or in planning.
- Presents the main factors that affect people's livelihoods and the relationships between these.
- In the research context it is most useful as an organizing framework to help us thin systematically, holistically and reflectively about rural livelihoods
- It gives a checklist of important issues to consider; can assist in identifying obstacles, constraints, opportunities that influence the role that forest products play.

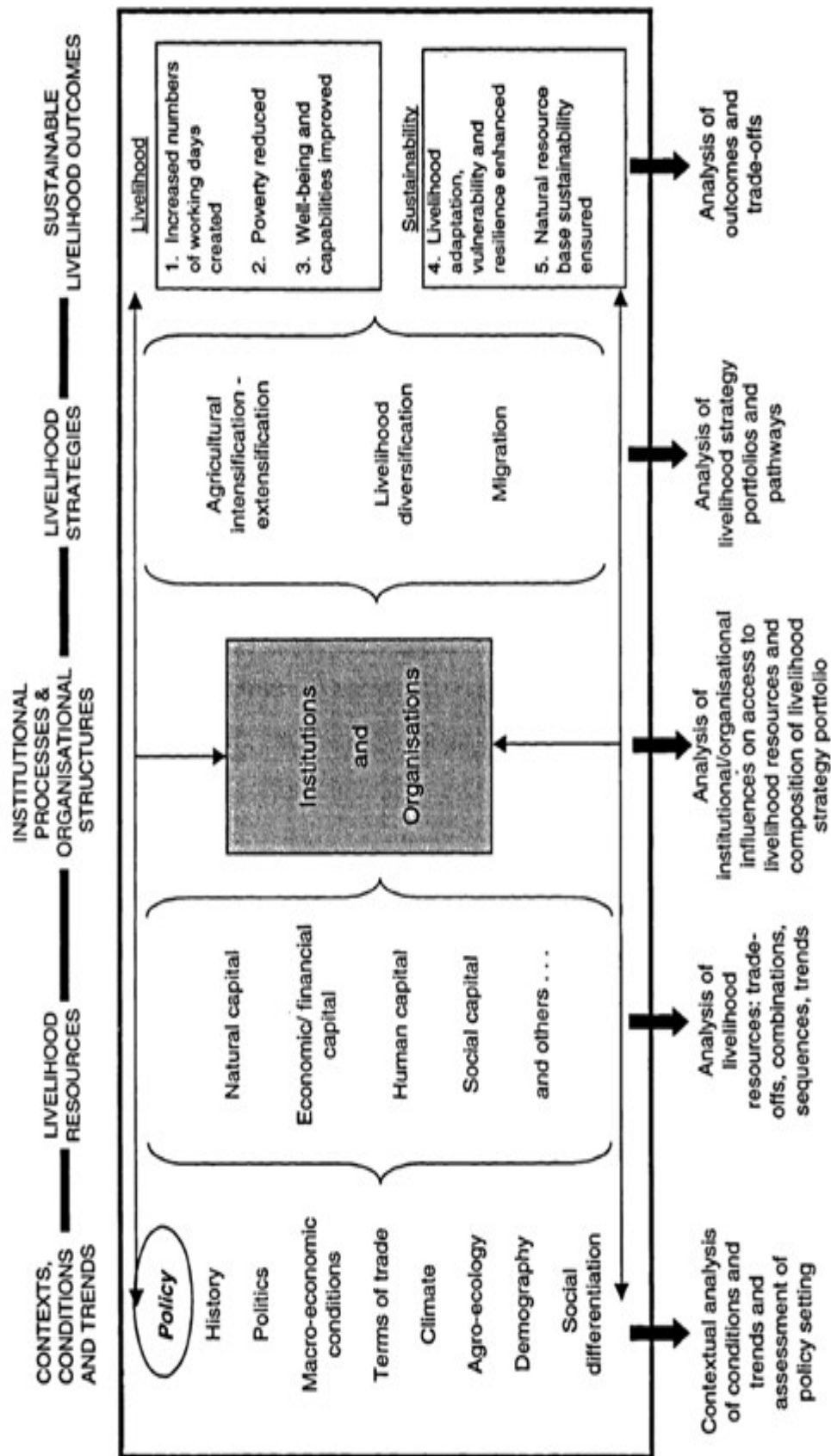
The framework can be applied at a range of different scales – from individual, to household, to household cluster, to extended kin grouping, to village, region or even nation, with sustainable livelihood outcomes assessed at different levels. The specification of the scale of analysis is therefore critical, as is an analysis of the interactions between levels in terms of net livelihood effects, both positive and negative.

The key question to be asked in any analysis of sustainable livelihoods is:

Given a particular context (of policy setting², politics, history, agro-ecology and socio-economic conditions), what combination of livelihood resources (different types of 'capital') result in the ability to follow what combination of livelihood strategies (agricultural intensification/extensification, livelihood diversification and migration) with what outcomes? Of particular interest in this framework are the institutional processes (embedded in a matrix of formal and informal institutions and organizations) which mediate the ability to carry out such strategies and achieve (or not) such outcomes.

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Figure 1: Sustainable rural livelihoods: a framework for analysis



8.2. COMPONENTS OF SUSTAINABLE LIVELIHOOD FRAMEWORK

1. Sustainable Livelihood Assets

Assets are the building blocks of a sustainable livelihood. By building assets, individuals and households develop their capacity to cope with the challenges they encounter and to meet their needs on a sustained basis. The framework draws attention to the variety of assets that contribute to making a sustainable livelihood and to ways in which they are interdependent (*refer your handout on chapter one*).

2. Vulnerability Context (context, trend and seasonality)

The *Vulnerability Context* frames the external environment in which people exist. People's livelihoods and the wider availability of assets are fundamentally affected by critical **trends** as well as by **shocks** and **seasonality** – over which they have limited or no control. The box below provides examples (this is not a complete list):

Trends	Shocks	Seasonality
<ul style="list-style-type: none">• Population trends• Resource trends (including conflict)• National/international economic trends• Trends in governance (including politics)• Technological trends	<ul style="list-style-type: none">• Human health shocks• Natural shocks• Economic shocks• Conflict• Crop/livestock health shocks	<ul style="list-style-type: none">• Of prices• Of production• Of health• Of employment opportunities

The factors that make up the *Vulnerability Context* are important because they have a direct impact upon people's asset status and the options that are open to them in pursuit of beneficial livelihood outcomes.

- **Shocks** can destroy assets directly (in the case of floods, storms, civil conflict, etc.). They can also force people to abandon their home areas and dispose of assets (such as land) prematurely as part of coping strategies. Recent events have highlighted the impact that international economic shocks, including rapid changes in exchange rates and terms of trade, can have on the very poor.

- **Trends** may (or may not) be more benign, though they are more predictable. They have a particularly important influence on rates of return (economic or otherwise) to chosen livelihood strategies.

- **Seasonal shifts** in prices, employment opportunities and food availability are one of the greatest and most enduring sources of hardship for poor people in developing countries.

Not all the trends listed above are negative or cause vulnerability. For example, economic indicators can move in favorable directions, diseases can be eradicated and new technologies may be very valuable to poor people. However, use of the term *Vulnerability Context* draws attention to the fact that this complex of influences is directly or indirectly responsible for many of the hardships faced by the poorest people in the world. It is common for there to be a vicious circle in action. The inherent fragility of poor people's livelihoods makes them unable to cope with stresses, whether predictable or not. It also makes them less able to manipulate or influence their environment to reduce those stresses; as a result they become increasingly vulnerable and even when trends move in the right direction, the poorest are often unable to benefit because they lack assets and strong institutions working in their favor.

The factors that create and perpetuate vulnerability and poverty can be seen at two levels: that of individuals and their circumstances, and that of the broader context. This aspect of the framework directs attention to the contextual and systemic factors that contribute to the occurrence of poverty. It points out the need to seek changes at the organizational, community and policy levels in addition to building the assets of individuals and households.

3. Institutions and organizations

So far we have been looking at selected elements of the framework – the livelihood resources which combine to allow various strategies to be pursued and different outcomes to be realized. But how is this process bound together? What structures and processes mediate the complex and highly differentiated process of achieving a sustainable livelihood?

Most previous approaches to looking at rural livelihoods have only cursorily asked these questions. In part this has been a disciplinary bias whereby economic analysis has concentrated on exploring the quantitative relationships between measurable variables. For example, the agricultural economics and related literature has many examples of detailed analysis of the relationships between, for instance, economic assets, indicators of agricultural intensification and poverty levels. This remains important, and remains a significant component of work on sustainable livelihoods. But, unless we understand the social structures and processes through which sustainable livelihoods are achieved, a description of the relationships between variables and outcomes is somewhat limiting. For this reason, the framework outlined in Figure 1 has given particular emphasis to the study of institutions and organizations.

A broad definition of institutions, derived from the sociological and anthropological literature is taken here. This sees institutions as 'regularized practices (or patterns of behavior) structured by rules and norms of society which have persistent and widespread use'. Institutions may thus be formal and informal, often fluid and ambiguous, and

usually subject to multiple interpretations by different actors. Power relations are embedded within institutional forms, making contestation over institutional practices, rules and norms always important. Institutions are also dynamic, continually being shaped and reshaped over time. They are thus part of a process of social negotiation, rather than fixed ‘objects’ or ‘bounded social systems’. Institutions (in North’s terms the ‘rules of the game’) therefore are distinguished from organizations (the players) (North 1990), the interplay of both being important in the framework (Figure 1). According to Davies (1997: 24):

“Institutions are the social cement which link stakeholders to access to capital of different kinds to the means of exercising power and so define the gateways through which they pass on the route to positive or negative [livelihood] adaptation”

So what? You may ask why institutions really matter for the policy and practice of development for sustainable livelihoods. A number of inter-related reasons can be forwarded:

- Understanding institutional processes allows the identification of restrictions/barriers and opportunities (or ‘gateways’) to sustainable livelihoods. Since formal and informal institutions (ranging from tenure regimes to labour sharing systems to market networks or credit arrangements) mediate access to livelihood resources and in turn affect the composition of portfolios of livelihood strategies, an understanding of institutions and organizations is therefore, key to designing interventions which improve sustainable livelihood outcomes.
- An institutional approach sheds light on the social processes which underlie livelihood sustainability. Achieving sustainable livelihoods is not a deterministic affair; contestations, negotiations and trade-offs are evident at every turn. An insight into social relationships, their institutional forms (both formal and informal) and the power dynamics embedded in these is therefore vital. Interventions in support of sustainable livelihoods therefore must be attuned to such complexity, if suitable institutional entry points are to be found.
- An approach which emphasizes both formal and informal institutions and underlying rules and norms suggests a complex and ‘messy’ institutional matrix mediating the processes of livelihood change (cf. Leach et al 1997; Cousins 1997). For example, an analysis of an institutional matrix would look at which combinations of the wide range of informal and formal institutions and organizations operating at different levels – from within the household to the national (sometimes international) level – particularly influence different people’s abilities to pursue combinations of different livelihood strategies, with what results for sustainable livelihood outcomes. Describing such an institutional matrix in any setting is, not surprisingly, far from an easy task. However, the recognition of such complexity allows scope for innovation in planned interventions at different levels, going beyond the conventional support for formal organizations or institutional mechanisms to look at combinations of formal and informal approaches.

4. Livelihood strategies

The livelihoods approach seeks to promote choice, opportunity and diversity. This is nowhere more apparent than in its treatment of livelihood strategies – the overarching term used to denote the range and combination of activities and choices that people make/undertake in order to achieve their livelihood goals (including productive activities, investment strategies, reproductive choices, etc.)

Diversity, straddling and linkages

Recent studies have drawn attention to the enormous diversity of livelihood strategies at every level – within geographic areas, across sectors, within households and over time. This is not a question of people moving from one form of employment or ‘own-account’ activity (farming, fishing) to another. Rather, it is a dynamic process in which they combine activities to meet their various needs at different times. A common manifestation of this at the household level is ‘straddling’ whereby different members of the household live and work in different places, temporarily (e.g. seasonal migration) or permanently. Social patterns such as this clearly complicate analysis underline the importance of viewing households and communities within their wider context. Since goods, financial resources and people are all mobile, an accurate picture of livelihoods cannot be gained if artificial boundaries are drawn. Thus links between urban and rural centers will need to be explored, as will the implications for decision-making and asset usage of split families.

5. Livelihood outcomes

Livelihood Outcomes are the achievements or outputs of *Livelihood Strategies*. It is the end result of the interaction of various elements in a system. Depending on how the four components of livelihood explained above interact, livelihood outcomes can be desirable or undesirable. Some of the desirable outcomes are listed below:

- **More income:** Although income measures of poverty have been much criticized, people certainly continue to seek a simple increase in net returns to the activities they undertake and overall increases in the amount of money coming into the household (or their own pocket). Increased income also relates to the idea of the economic sustainability of livelihoods.
- **Increased well-being:** In addition to income and things that money can buy, people value non-material goods. Their sense of well-being is affected by numerous factors, possibly including: their self-esteem, sense of control and inclusion, physical security of household members, their health status, access to services, political enfranchisement, maintenance of their cultural heritage, etc.
- **Reduced vulnerability:** Poor people are often forced to live very precariously, with no cushion against the adverse effects of the *Vulnerability Context*; their livelihoods are to all intents and unsustainable. For such people, reducing their vulnerability to the downside and increasing the overall social sustainability of their livelihoods may well take precedence over seeking to maximize the upside.

- **Improved food security:** Food insecurity is a core dimension of vulnerability. It appears as a separate category in the framework in order to emphasize its fundamental importance, and because this helps to locate the activities of those governments and donors that focus on food security. It is also worth noting that participatory poverty assessments have shown hunger and dietary inadequacy to be a distinct dimension of deprivation.
- **More sustainable use of the natural resource base:** Environmental sustainability, or sustainability of the natural resource base, is not the only dimension of sustainability that is important.

Poverty, a “poor” livelihood outcome, is one example of undesirable livelihood outcome which is:

- Operated in a fragile or unbalanced set of livelihood assets
- Unable to sustain to shocks, changes or trends
- Not supported, or actively obstructed by policies, institutions and processes that do not allow assets to be used as they might
- Livelihood options combined in a “bad” or unsustainable strategy