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INTEGRATED SOIL FERTILITY MANAGEMENT: FARMING SYSTEM ANALYSIS

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PLAN

Farming systems

The farming system approach

What is farming system analysis (FSA)?

Why FSA?

Requirements for and elements of FSA

Steps required in FSA

Where we are on FSA and ISFM

Where we intend to be on FSA and ISFM

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FARMING SYSTEM

Farming system is a **complex inter-related** matrix of soils, plants, animals, implements, labour, capital and **inter-dependent** farming enterprises.

The farm is viewed in a holistic manner (multi-disciplinary approach)

A farming system includes all components (cropland, cropping systems and livestock, common grazing land and woodlots managed by several farmers in a community and off-farm activities) of a farm enterprise, within a framework of markets for land, labour, production inputs, farm products, credit and knowledge.

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DIFFERENT FARMING SYSTEMS

Crop-based farming systems

Animal-based farming systems

Mixed farming systems

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FARMING SYSTEM APPROACH

Simmonds (1984) clarified the farming system approach as:

- An academic activity comprising of theory, concepts, principles and approaches
- It creates an opportunity for developing diversified models for different types and categories of farmers
- New farming system models can be developed by means of on-farm research and extension

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FARMING SYSTEM APPROACH

Biggs (1984) explained the concept of farming system approach as follows:

- ❑ It requires commonly homogenous type of farmers
- ❑ It is an inter-disciplinary approach
- ❑ It is a bottom-up planning
- ❑ It is an approach to developing farm household systems
- ❑ It is built on the principles of productivity, profitability, stability and sustainability
- ❑ It complements component oriented approach to development

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OBJECTIVES OF FARMING SYSTEM APPROACH

- To develop farm-household systems of rural communities on a sustainable basis
- To improve efficiency in farm production
- To raise farm and family income
- To increase welfare of farm families and satisfy basic needs

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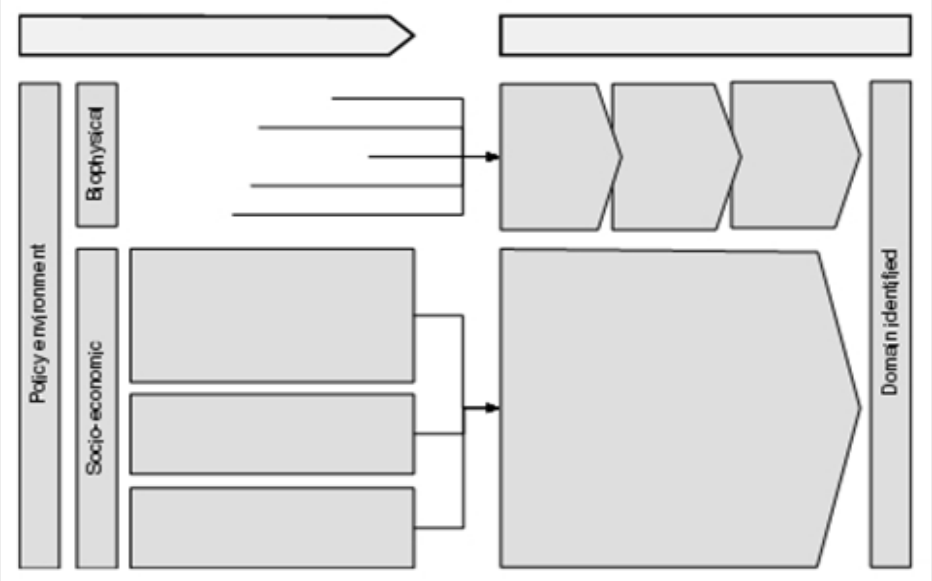
FARMING SYSTEM ANALYSIS

- Involves a thorough analysis of the biophysical environment as well as socio-economic factors and aspects of policy that impact on farming.

- Understanding relationship between different enterprises within the system

- Opportunities and constraints are identified leading to the identification of domains for field activities



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WHY FARMING SYSTEM ANALYSIS?

- Smallholder farming systems are found within diverse biophysical and socio-economic environments, and households develop different livelihood strategies according to the opportunities and constraints in each environment.

- Households differ in resource endowment (land/livestock owned), production orientation (food security/marketing), objectives (survival/profit), etnicity, education, past experience, management skills and attitudes towards risks.

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WHY FARMING SYSTEM ANALYSIS?

- FSA provides the information and data required to design, plan, implement, monitor and evaluate interventions to improve the productivity and sustainability of a particular farming system.

- Because of the diversity of fields and farmers, FSA is a useful tool for assessing opportunities for ISFM in SSA.

- The information resulting from FSA may be used by extension workers, agronomists, policy markers, economists or a multi-disciplinary team of workers.

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REQUIREMENTS FOR AND ELEMENTS OF FSA

Requirements

- FSA should be carried out before starting any other field activities
- Farmers are the subject and not the object of investigation, and participate fully in the study
- The study captures the impact of gender on access to resources and markets, identifying opportunities and constraints to ISFM adoption associated with gender
- The diversity of farming systems within a particular domain is captured and analysed.

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REQUIREMENTS FOR AND ELEMENTS OF FSA

Requirements

- Maps (soil, geology, vegetation, political and administrative boundaries)
- Agriculture and other statistics for the local district office,
- a global positioning system (GPS) device that provides the means to georeference and later map data points (e.g. farm locations, input suppliers etc.)

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REQUIREMENTS FOR AND ELEMENTS OF FSA

Elements

- History of past activities
- Collection of biophysical data,
- Identification of dominant farming systems in each location
- Clustering farmers in groups
- Land:Labour ratio
- Assessment of risk

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HISTORY OF PAST ACTIVITIES

Previous management practices

Rate of adoption of previous technologies

Barriers to technology transfer

Lessons learnt from previous interventions

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COLLECTION OF BIOPHYSICAL DATA

Climate data

Soil nutrient status

Soil water deficits

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IDENTIFICATION OF DOMINANT FARMING SYSTEMS IN EACH DOMAIN

Required for the development of specific interventions based on resources endowment

Required to guide agro-technology transfer

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CLUSTERING FARMERS IN GROUPS

All the diversity in fields and farmers encountered in an area can not be treated individually

Farmers can be grouped together in clusters according to the characteristics (income, experience, use of inputs etc.) of well identified farming systems, the contribution of off-farm activities to household income, and ownership of livestock.

This helps extension workers to identify target groups and then plan activities and programs designed to meet specific objectives

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LAND:LABOUR RATIO

Farm households with a low land:labour ratio (i.e. < 1 ha per household member) are more likely to have poor food self-sufficiency (< 3 months) and to rely on off-farm activities for more than 50% of total income.

Farm households with a high land:labour ratio (i.e. > 1 ha per household member) are more likely to have better food security (> 5 months) and to rely on off-farm activities for less than 50% of total income.

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ASSESSMENT OF RISK

The FSA team should make an assessment of the major risk factors and rank them according to their influence on farm profitability. Major factors may include:

- ✓ Drought during the main cropping season (frequency, magnitude, effect on crop yield)
- ✓ Late rains (frequency, effect on crop yields)
- ✓ Crop price volatility,
- ✓ Input prices and availability, and
- ✓ Labour availability at peak periods of demand.

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CROPPING SYSTEM ANALYSIS

What is a cropping system?

crop or crop combinations + spatial arrangement in space and time + resources /management to maximize growth and production

types of cropping systems SSA

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STEPS IN CROPPING SYSTEM ANALYSIS

- Field inspection
  - To gain overall impression of soil fertility and its effects on crop production
- Estimation of yield gaps
  - Identification of potential entry points for ISFM
- Frequency and timing of visits
- Farm record keeping
- Use of a cropping calendar
- Use of participatory budgeting

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SOIL FERTILITY ASSESSMENT

Flows of resources between and within farms

Deficiency symptoms

Indicator plants

Soil sampling

Soil analysis and data interpretation

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MARKETS AND SOCIO-ECONOMIC DRIVERS/DETERMINANTS OF FARMING SYSTEMS

Compared to biophysical factors, limited attention has been given to socio-economic and policy factors that might influence the ability of farmers in a selected domain to adopt ISFM practices

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MARKETS AND SOCIO-ECONOMIC DRIVERS/DETERMINANTS OF FARMING SYSTEMS

- Policy environment and the role of government
  - Agricultural subsidies
  - ISFM knowledge (research and extension)
  - Access to market information and quality control
  - Infrastructure (e.g road network)
  - Land tenure policies (e.g adoption of agroforestry)

- Markets
  - Input markets
  - Credit markets
  - Crop insurance
  - Labour markets
  - Output markets

Are these facilities available to all and at what cost?

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EX ANTE ANALYSIS OF ISFM TECHNOLOGY PERFORMANCE

An ex ante analysis is an assessment of the anticipated effects of biophysical components of ISFM (e.g. fertilizer used in combination with hybrid maize seed), based only on information available before the programme promoting the component is undertaken

- Agronomic efficiency (nutrient uptake and utilization efficiencies)
- Economic incentives (value/cost ratio; profitability)
- Market performance

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SCALING UP AND SCALING OUT ADOPTION OF ISFM SOLUTIONS

Development of a communication strategy (stakeholders or actors involved)

- input suppliers
- output markets
- credit providers
- policy makers
- extension workers
- general public

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SCALING UP AND SCALING OUT ADOPTION OF ISFM SOLUTIONS

Development of extension materials

- communicating directly with farmers
- extension service providers
- Use of the media (choice depends on certain factors)

Use of information and communication technologies (ICT)

- mobile phones (weather forecasts, market information, etc.)
- computers for internet access
- video
- data storage

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WHERE WE ARE ON ISFM

- Limited climate and soil data
- Limited expertise of FSA for soil fertility management
- Limited research and dissemination of results on ISFM at different spatial scales
- Lack of critical mass of experts on ISFM

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WHERE WE INTEND TO BE ON FSA AND ISFM

Produce national and regional databases of crop nutrient response trials and an interrogation interface for future users of the database

Create opportunities for the collection and use of biophysical and socio-economic data to guide decision making on ISFM at different spatial scales

Increase the critical mass of experts required to drive research and disseminate information on ISFM

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Material based mainly in:

Fairhurst, T. (ed.) (2012) Handbook for Integrated Soil Fertility Management. Africa Soil Health Consortium, Nairobi. Accessible from this link

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EDULINK

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