MASTER SAMPLING FRAME(MSF)

FOR

AGRICULTURAL STATISTICS

Module 1 - Session 4:

Requirements to building an MSF

2017

Objectives of the presentation

At the end of this session, the audience will:

- Be familiar with the recommended steps when developing an MSF

- Understand the background information, competencies, time and resources investments required when implementing an MSF

Outline

- Main Steps in the construction of an MSF

- Requirement for setting up and using an MSF:
    - Background information

    - Competencies

    - Time and resources investments required

1 General guidelines on implementing a Master Sampling Frame

Steps in the construction of an MSF

- For practical issues, 8 steps have been developed to guide the implementation of MSF

- These steps are not prescriptive, however they will help to guide the team in charge of this task

8 steps to identify the suitable frame

- **1**. **Conduct**

A thorough review of the statistical methods and operations, including censuses and surveys, used for agriculture in the country.

2. Review
Other censuses and surveys in the country with a focus on sample frames. Examples are the population census, national household surveys and price collections for the Consumer Price Index
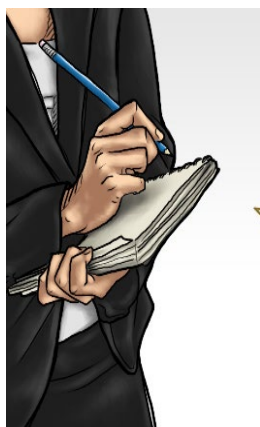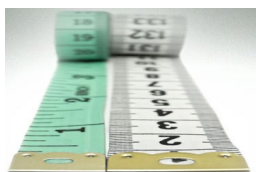
3. **Review**

Administrative data and other possible sources building and/or updating a list farms or agricultural holders.

4. **Obtain**
Information on census or survey systems in countries of similar size, form of agriculture and capabilities

8 steps to identify the suitable frame (cont'd)

5. Benchmark
To other countries with similar statistical methods, operations and data sources to build off their experiences in implementing an MSF

6 Obtain

Background information on the country's requirements for data on agriculture

6. Identify

Overlaps in the statistical systems where resources can be combined to build an MSF

8. Determine
The requirements for geo-referencing agricultural and/or population census EAs. Identify how this can assist other parties in the national statistical system

Steps in the construction of an MSF

Final choice of MSF

Following the 8 steps, there should be enough information to make a first recommendation on the choice of frame (list or area) or on a form of multiple frame sampling.

- Seek a peer review of the frame selection process; revise as necessary.

Begin implementation in a portion of the country.

Steps in the construction of an MSF (cont'd)

Final choice of MSF

...first recommendation on the choice of frame (list or area) or on a form of multiple frame sampling.

- The final choice of MSF should consider the following costs:

Costs of frame development and data collection

Costs required for maintenance and updating

and also

Steps in the construction of an MSF (cont'd)

Final choice of MSF

…first recommendation on the choice of frame (list or area) or on a form of multiple frame sampling.

- The proposals should be realistic and reflect national capabilities, and include an indicative budget and timeframe for implementation.

- An effective MSF will facilitate the integration of agriculture into the national statistical system and will benefit the entire statistical system

2 Background information, competencies, time and resources investments

Requirement for setting up an MSF

- In addition to the steps already described in the section 1, the availability of some information, competencies and facilities may fast-track the process of setting up an MSF. Only the main one are described below.

- Those information are mainly about:
  - The Scope of Information required
  - The description of the structure of agriculture (base on secondary data, administrative sources)

- The competencies mainly concern:
  - The staff in charge of the design and implementation of the surveys
  - The field staff

2.1. Background information required to develop and use the MSF

- When determining the statistics needed, the followings should be considered:

    - **Discussion framework**: consultations with policymakers and other stakeholders.

    - **Data needed**: The minimum set of core data provided by the GS is a starting point, and countries can tailor it to suit their own needs

    - **Scope of Information required**: For each data item, it will also be necessary to obtain the **coverage**, **level of detail, frequency**, and **scope** for which data are required.

2.1. Background information required to develop and use the MSF: *Scope of Information required*

For each data item, an expert review of the following characteristics should be undertaken:

- **Coverage.** Are estimates needed only at the national level, or also by production area or administrative regions such as provinces or counties?

- **Level of detail.** It is important to well define level of information to be collected. The information of interest need to be define:

  - Holder level: social, economic (production, yield…) ,

  - Community level: infrastructure, extension services, market facilities…

2.1. Background information required to develop and use the MSF: *Scope of Information required*

For each item, an expert review of the following characteristics should be undertaken:

- **Frequency.** Estimates for some data items may be needed more than once during the year; some once a year; and others periodically.

- **Scope.** In some countries, household plots make a significant contribution to food supplies. The coverage of own production must be defined for each item. A major decision, however, is whether household plots should also be included.

- **Availability of auxiliary data.** Are there other data sources, such as a population or agricultural census, or data from administrative reporting systems for each item that could be used to develop the MSF?

2.1. Background information required to develop and use the MSF: *the structure of agriculture*

- In addition to the *Scope of Information required,* the availability of information regarding the structure of agriculture in the country is also useful in building the MSF

- The structure of the agriculture could be described by the followings:

  - **Geographic distribution:** how widespread are the agricultural activities? Rampant (common across the country) or concentrated in specific administrative regions?

    - o This will guide in the stratification either by land cover or by location and type of agriculture using administrative data

2.1. Background information required to develop and use the MSF: _the structure of agriculture_

The structure of the agriculture could be describe by the followings:

- **Size distribution:** when the distribution of holders, regarding some variables of interest*, is skewed (mainly to the right), it is advisable to refer to an area frame. the error due to the sampling procedure may be reduce using Deming approach (Deming , 1960)

- **Percentage of holdings with the item of interest**: this information is useful to identify whether the proportion of the population that possess the item of interest is rare or not. Indeed from this information, The conclusion is that:

  - A frame should be designed separately from the MSF for the minor or rare data items

  - The list frame for rare items will be more efficient than the area frame only if auxiliary data showing the presence of the item and relative size is available.

*the area of maize or the number of livestock by farm or household

2.1. Background information required to develop and use the MSF:
the structure of agriculture

- **Structure of the holding:**

  - this information is very useful to determine the choice of sampling unit for the area frame,

  - and to determine the cost function (related to the workload) for either area frame or list frame surveys. The structure of the holding is define by:

    o The average number of parcels per holding,

    o Average parcel sizes,

    o Average field sizes,

    o Distance between holder's location and operated land.

2.1. Background information required to develop and use the MSF:
the structure of agriculture

- **Use of single-stage vs multi-stage sampling:** the final choice may depend on the two components: variability between PSUs and variability within PSUs.

  - Census data or data from administrative reporting systems can be used to examine these sources of variability.

  - If these data are not available, then expert judgement on the distributions can be used as described above.

  - However, the relative costs of developing a single-stage sample as opposed to those from two-stage sampling may indicate that multi-sampling is preferable.

2.2 Competencies, time and resources investments

As already mentioned, the final choice of MSF should consider the following costs:
- Costs of frame development and data collection
- Costs required for maintenance and updating

Although, these costs depend on each country, the following slides provide some information on the type of investments and competencies required to develop and maintain an area and list frame in the context of creating an MSF.

2.2 Competencies, time and resources investments – Area Frame

Investments/needs in the context of an Area Frame	
Human resources specialized in GIS and other Geosciences	• Must possess the following abilities or competencies : ✓ Interpreting satellite images or aerial photographs ✓ Building and maintaining of the area frame ✓ Using GIS/GPS technologies
Human resources specialized in statistics and agriculture	• Must possess skills, abilities or competencies in the followings: ✓ Statistical and sampling procedures related to area frames ✓ Data processing (data editing, cleaning…) ✓ Tabulation and analysis of the results ✓ Data dissemination
Human resource involved in field work	• Must be recruited according to the following criteria ✓ Capacity to understand collecting tools including the use of GPS ✓ Good physical aptitude ✓ Knowledge of local language and traditions
Materials and infrastructures	• Purchase of GIS and GPS technologies/software • Access to good quality satellite images or aerial photographs • Infrastructure for land coverage interpretation • Other regular investments such as general survey infrastructure, logistics for sending and receiving survey materials, paper and electronic questionnaires, vehicles, communications, etc

2.2 Competencies, time and resources investments – List Frame

Investments/needs in the context of a List Frame	

Human resources specialized in statistics and agriculture	• Must possess skills, ability or competencies in the followings:
	  ✓ Statistical and sampling procedures related to list frames
	  ✓ Data processing (data editing, cleaning...)
	  ✓ Tabulation and analysis of the results
	  ✓ Data dissemination

Human resource involved in field work	• Must be recruited according to the following criteria
	  ✓ Capacity to understand collection tools including listing activities
	  ✓ Knowledge of local language and traditions
	  ✓ Good physical aptitude

Materials and infrastructures	• Regular investments such as general survey infrastructure, logistics for sending and receiving survey materials, paper and electronic questionnaires, vehicles, communications, etc
Additional resources for updating the list frame	• Regular access to up-to-date administrative data or listing procedures to update the list of commercial farms • Regular listing of households to identify household holdings

Example from NEPAL – Cost for the 2011/2012 National Sample Census of Agriculture

S.No.	Cost	Budget NPR	Budget US$*	Remarks
1	Pilot Agriculture Census	8,000,000.00	80,000.00	
2	Machinery, equipment	1,500,000.00	15,000.00	Computers, printers, photocopiers, scanners, cameras
3	Consultancy and other services	2,200,000.00	22,000.00	
4	Frame building	1,500,000.00	15,000.00	Data collection for the frame was done at the time of the household listing operation during the 2011population census. This cost is only for the frame building.
5	Printing	5,500,000.00	55,000.00	Questionnaire forms, manuals, control forms, administration forms, financial administration forms and other materials
6	Logistics	5,000,000.00	50,000.00	Enumerators' bags, clip boards, calculators, torch lights, back packs, black and red dot pens
7	Training	6,000,000.00	60,000.00	
8	Transportation	4,000,000.00	40,000.00	
9	Media campaigning	2,500,000.00	25,000.00	AM/FM Radio, television, newspapers, posters, pamphlet, leaflet, folders, banners, etc.
10	Field operation	90,000,000.00	900,000.00	Including central level supervision
11	Data processing	6,000,000.00	60,000.00	
12	Report printing	6,000,000.00	60,000.00	85 reports of different levels
13	Result dissemination at different levels	3,200,000.00	32,000.00	At the national and district level
14	Miscellaneous	2,000,000.00	20,000.00	
15	Total	143,400,000.00	1,434,000.00	

Conclusion and summary

GS Vision for developing the MSF

The Global Strategy provides a long-term vision for how the MSF should be developed

- It is recognized that countries possess different levels of capacity, and accordingly proposes several alternative methods.

- The GS recognizes the need to link economic and social dimensions to those relating to land cover and the environment.

- Therefore, the vision begins by recommending that satellite imagery of the country's land must be obtained
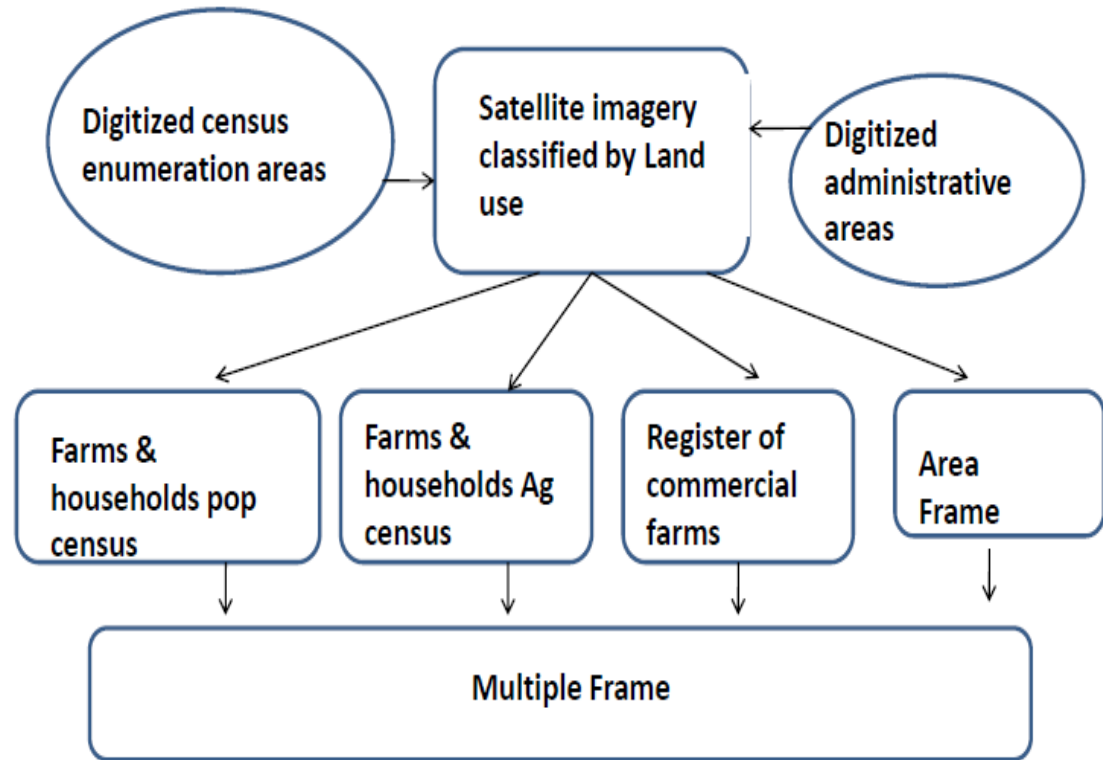
Conclusion and summary

An MSF may be generally a Multiple Frame combining:

- **Area frame(s) based on:**
  - Satellite imagery classified by land use – At country, regional level
  - Geo-reference boundaries of Administrative areas—boundaries of cities, towns, villages, counties, townships, etc
  - Geo-reference census enumeration areas

- **List Frame (s) based on:**
  - PHC (Households/Farms)
  - Agric Census (Households/holdings/holders)
  - Admin data (Commercial farms)
  - List of geographical areas (EAs/Villages…)

Conclusion and summary

- While statistical theory is the basic guide, considerable expert judgement is also necessary to determine the best frame (area, list, or multiple) and the stages of sample selection (single- or multiple-stage).

- Every country have to establish his specific diagnostic before decide to build and use an MSF.

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- See: http://www.gsars.org

Thank You