UNIT-III

Agricultural Data Sources and Analysis

Sources of Agricultural Data

Agricultural Data Sources

Nature Of agricultural statistics may be classified in to the following major categories:

1. Land utilization and irrigation – land uses, irrigated area in kharif and rabi seasons etc

2. Forestry

3. Agricultural production – arable, plantations, livestock and fisheries

4. Agricultural prices and wages,

5. Agricultural organization and farming structure, e.g. persons employed in agriculture, their status, land held under various tenure, draught animals, implements, farm building etc.

6. Production and marketing – cost of production, input-out ratio, marketing changed, marketing spreadover etc.

7. General statistics- literacy, education, health, sanitation among the employees in agriculture

8. Weather and climate

9. Forecasting weather, crops, and prices etc.

Types of agricultural data

I Primary Data

Field work, collection of primary data- observation method, interview method, questionnaire method, schedule method.

II Secondary Data

It includes;

1. Land Utilization Statistics

It is available since 1884. Before 1950, in the form of five fold land use classification and after 1950-1951 nine fole classification implemented in India.

Land utilization of India (annual publication) – Indian Agricultural Statistics, issued by the Directorate of Economics and Statistics, Ministry of Agriculture, Govt. of India, New Delhi. It includes:

First volume,

i. total area under classification

ii. area irrigated in kharif and rabi seasons and the crops irrigated,

iii. area under each of the crop

Second volume

Statewise (five years) and districtwise (two years) classification area, area irrigated and area under crops.

2. Agricultural seasons and crop reports

Individual states publishes this statistics respect to the season and crop reports.

Agricultural year ending in 30 June in all states except

Assam – 31 March, Madhya Pradesh – 31 May.

i. Area statistics – Agricultural statistics of India

ii. Crop statistics – A. Food crops – cereals, pulses, sugarcane, condiments, pepper, chillies, ginger, cardamom etc, fruits and vegetables, other food crops. B. Non- food crops – Oil seeds (edible and non-edible), Fibres, Dyes and Tanning materials, Drugs and narcotics, green manuring crops, other non-food crops.

3. Area and production statistics

Estimates of area and production of principal crops published – Directorate of economics, Ministry of Food and Agriculture, Govt., of India published in two volumes (Summary tables and Detailed Tables)

4. Irrigation statistics

It includes;

i. net area irrigated sourcewise,

ii. gross area irrigated and

iii. distribution of gross irrigated area among various crops

The Land Revenue/Land Record Department and Irrigation/Public Works Department compile the irrigation data.

Under the instruction of Union Ministry of Agriculture, the states collects the required data;

i. crop acreage

ii. source of irrigation

iii.classification of wells- in use or abandoned, used for irrigation or domestic uses

iv. method of water supply (lift or flow, lift by electric pump or oil engine or traditional devices etc

v. capacity of irrigation and extent of irrigated area- for a canal, mileage, for a tank etc

5. Major Inputs

Besides irrigation, fertilizers, seeds, plant protection, machinery, and credit. Fertilizer reports can get from the state government. Fertilizer statistics publication started from 1956 and available up to 1971-72. These are compiled in regional development office at block level.

6. Agricultural prices

It covers wholesale, retail, and harvest prices as well as livestock products. It is collected by the agencies are;

a. Directorate of economics and statistics, Ministry of Food and Agriculture.

b. Directorate of Marketing and Inspection.

c. Indian Labour Bureau, Ministry of Labour.

d. National Sample Survey

e. Commodity Committees concerned with agricultural commodities

f. State Revenue, Agriculture and Marketing Departments and Statistical Bureau.

The important publications on prices are as;

a. Bulletin in Agricultural Prices

b. Wholesale Prices of Foodgrains (Weekly)

c. Agricultural Prices in India (Annual)

d. Agricultural Situation in India (Monthly Journal)

e. Farm Prices of Principal Crops (Agricultural Prices in India)

Other Statistics

i. Rainfall – Crop Calender and Agricultural Atlas

ii. Number and size of cultivators holding and details of ownership and tenancy – Land Revenue and Land Record Office

iii. Market intelligence

iv. Market surplus

v. Stocks

vi. Feed, seed and wastage rates

vii. Capital output and cost benefit ratio

viii. Demand projections

ix. Input-output ratio

x. Private agricultural investment

xi. Animal husbandry

xii. Agricultural trade

II. World Agricultural Statistics

1.Food and Agricultural Organisation – published Production Year Book to report annual world agricultural statistics. Other than this

2. United Nations Statistical Year Book

3. FAC Production and Trade Year Book

4. FAO Year Book of Forest Product Statistics

5. FAO Year Book of Fishery Statistics

6. FAO Monthly Bulletin of Agricultural Economics and Statistics

7. FAO State of Food and Agriculture

8. United Nations World Economic Survey of Asia and the Far East

9. United Nations Monthly Bulletin of Statistics

Land Use Survey Techniques

Land use survey is done to classify land according to the utilization made of it. It is conducted either by (i) Proximate sensing technique or (ii) remote sensing technique.

Proximate Sensing Technique

In the proximate sensing technique, the maps, diagrams and sketches are drawn by measuring the land with the help of survey quipments.

Remote Sensing Techniques

Aerial photographicsurvey and satellite images.

LAND USE SURVEY

LAND USE

Land use involves the management and modification of natural environment or wilderness in built environment such as settlements and semi-natural habitats such as arable fields, pastures and managed woods. (FAO) It also has been defined as the "total of arrangements, activities, and inputs that people undertake in a certain land cover type".

A land use classification is a classification providing information on land cover and the types of human activity involved in land use. It may also facilitate the assessment of environmental impacts on, and potential or alternative uses of land.

Nine Fold Land Use Classification

For the land use analysis in the study area, the nine-fold land use classification given by ministry of statistics, government of India was used. The nine-fold classifications are:

1. Forest Area

This includes all land classified either as forest under any legal enactment, or administered as forest, whether state owned or private, and whether wooded or maintained as potential forest land. The area of crops raised in the forest and grazing lands or areas open for grazing within the forests remain included under the forest area.

2. Area under Non-Agricultural Uses

This includes all land occupied by buildings, roads and railways or under water, like rivers and canals and other land put to uses other than agriculture.

3. Barren and Un-Cultivable Land

This includes all land covered by mountains, deserts etc. Land which cannot be under cultivation except at an exorbitant cost is classified as uncultivable whether such land is in isolated blocks or within cultivated holdings.

4. Permanent Pastures and Other Grazing Land

This includes all grazing land whether it is permanent pasture/ meadows or not. Village common grazing land is included under this category.

5. Land Under Miscellaneous Tree Crops and Grooves

This includes all cultivable land, which is not included in “Net area sown” but is put to some agricultural use. Land under casuring trees, thatching grasses, bamboo bushes and other grooves for fuel etc which are not included under ‘orchards’ are classified under this category.

6. Cultivable Wasteland

This includes land available for cultivation , whether taken up or not taken up for cultivation once, but not cultivated during the last five years or more in succession including the current years for some reason or the other, such land may be either fallow or covered with shrubs and jungles, which are not put to any use. They may be accessible or inaccessible and may lie in isolated blocks or within cultivated holdings. (5 and >5 years)

7 Fallow Lands Other than Current Fallows

This includes all land, which was taken up for cultivation but is temporarily out of cultivation for a period of not less than one year and not more than five years. (1-5 years)

8 Current Fallows

This represents cropped area, which is kept fallow during the current year.

9 Net Sown Area

This represents the total area sown with crops and orchards. Area sowed more than once in the same year is counted only once.

USGS (United States Geological Survey)

USGS land use classification includes Level I to Level V.

Nine major categories have been identified under Level I. These categories with their colour in the map are given below:

Level I

1. Urban or Built-up land (Red)
2. Agricultural land (Light Brown)
3. Rangeland (Light Orange)
4. Forest Land (Green)
5. Water (Dark Blue)
6. Wetland (Light Blue)
7. Barren Land (Grey)
8. Tundra (White)
9. Perennial Snow or Ice (White)

Each of these is further subdivided into different groups under Level II. For example, the Urban or Built-up area in Level I is subdivided into 7 subgroups as:

11. Residential

12. Commercial and Services

13. Industrial

14. Transportation, communication and Utilities

15. Industrial and Commercial Complexes

16. Mixed Urban or Built-up Land

17. Other Urban or Built-up Land

A similar sub grouping was identified for each of the other 8 major Level I Categories of Land use. Each of the Level II subgroup may further be subdivided wherever possible. For example under the Level I Urban or Built-up Land, the first subgroup under Level II is Residential. This is further subdivided into 7 subgroups under Level III as:

111. Single –family Units

112. Multi-family Units

113. Group Quarters

114. Residential Hotels

115. Mobile Home Parks

116. Transient Lodging

117. Other

A similar attempt for Agricultural Land is as follows:

Level I	**Level II**	**Level III**	**Level IV**
Agricultural Land	**21. Cropland and Pasture**	**211. Cropland**	**2111Pulses**
		212. Pasture	**2112Flowers**

Depending upon local condition additional categories may be included under Level III or it can be included under Level IV or even sometimes Level V.

NRSC

In India the National Remote Sensing Agency (now called National Remote Sensing Centre) conducted a land use survey in 1988-89 at the behest of Planning Commission and it identified 6 major classes and 22 sub classes of land use. The Six Major classes are :

1. Built-up Land
2. Agricultural Land
3. Forest
4. Wasteland
5. Waterbodies and
6. Others

Except the Built-up land use category, the other categories had been further subdivided into different categories and all the 22 categories are shown below:

1. Built-up
2. Agricultural Land
   a. Cropland
   b. Fallow land
   c. Plantations
3. Forest
   a. Evergreen/Semi-evergreen Forest

b. Deciduous Forest

c. Degraded Forest or Scrub

d. Forest Blank

e. Forest Plantations

f. Mangrove

4. Wasteland

a. Salt affected Land

b. Water affected Land

c. Marshy/Swampy Land

d. Gully/Ravenous Land

e. Land with or without scrub

f. Sandy area (coastal and desertic)

g. Barren rocky/stony waste/sheet rock area

5. Water bodies

a. River/Stream

b.Reservoir/Lakes/Tanks/Canal

6. Others

a. Shifting cultivation

b. Grassland/Grazing land

c. Snow-covered/Glacial area

Sampling and Land Use Data

Out of the huge population, if a limited selection of items or cases is made, it is called a sample. The limited sample is generally sufficient for making a generalization about the whole population. In many cases, the number of individuals in the population, e.g., the average yield of all the plots of an agricultural region or the pebbles ona sea-beach are so numerous that measuring of all of them would be almost impossible from a practical point of view. But if through sampling, a limited selection of fields for the measurement of yields would enable the observer to obtain the average yield of the fields in the entire region,

similarly, a limited selection of pebbles on the sea-beach will be sufficient for making a generalization about the pebbles on that coast.

Some of the commonly known and frequently used methods of sampling are;

1. Random Sampling

In the random sampling, the sample units are selected at random. Once the parent population has been defined, each item in that population has an equal chance of being included in any sample. In this method, proper care has to be taken to ensure that samples are selected at random.

2. Purposive Sampling

In the purposive sampling technique, the samples are selected with a definite purpose in view. For example, if the standard of nutrition of the rural population of a region or country, having vegetarian food habits, is to be determined, only the vegetarian food eating families will be taken as the samples for study. Similarly, if the change in the standard of living of the agricultural labourers and farmers of a component areal unit during a specific period of time is to be studied, the samples will be taken from the respective catergories, ignoring the rest of the population.

3. Systematic Sampling

In this method, a regular pattern of selection is made instead of choosing each individual separately. For instance, if a study of crop combination is to be made in 2000 villages of an areal unit and 20 sample villages are to be selected, the villages should be given a serial order, starting from 1 to 2000. After arranging the villages serially, every hundredth village of the list be chosen. The required sample villages will be reached quickly.

4. Stratified Sampling

When the population is heterogeneous with respect to variables under enquiry and can be divided into relatively homogeneous groups and subgroups, a stratified sampling technique can be adopted. This type of sampling is mostly applied when there are significant groups of known size within the parent population and it is desirable to make sure that each subgroup is fairly represented within the total sample.

5. Multistage Sampling

When the required sampling unit is reached through stages, it is called multistage sampling. For example, if 1000 families are to be selected for a land tenancy or socioeconomic survey of a meso or macro region, this can be done through multistage sampling, i.e., by first selecting a number of villages of the areal unit at random, and then selecting a number of families from each of the selected villages. This method of sampling is particularly useful for population covering large areas for which a list of individuals is not readily available or cannot be easily constructed.

Soil Survey Atlas

An atlas is a collection of maps; it is typically a bundle of maps of Earth or a region of Earth. Atlases have traditionally been bound into book form, but today many atlases are in multimedia formats. An atlas contains the soil details is known as soil survey atlas. (It is a collection of maps contains the soil types and other properties of soils)

Soil Science Society of America:

Soil survey - (i) The systematic examination, description, classification, and mapping of soils in an area. Soil surveys are classified according to the kind and intensity of field examination. (ii) The program of the National Cooperative Soil Survey that includes developing and implementing standards for describing, classifying, mapping, writing, and publishing information about soils of a specific area.

Soil survey, or soil mapping, is the process of classifying soil types and other soil properties in a given area and geo-encoding such information. It applies the principles of soil science, and draws heavily from geomorphology, theories of soil formation, physical geography, and analysis of vegetation and land use patterns. Primary data for the soil survey are acquired by field sampling and by remote sensing. Remote sensing principally uses aerial photography but LiDAR and other digital techniques steadily gaining in popularity. In the past, a soil scientist would take hard-copies of aerial photography, topo-sheets, and mapping keys into the field with them. Today, a growing number of soil scientists bring a rugidized tablet computer and GPS into the field with them. The tablet may be loaded with digital aerial photos, LiDAR, topography, soil geo-data-bases, mapping keys, and more.

The information in a soil survey can be used by the public as well as the scientific community. For example, farmers and ranchers can use it to help determine whether a particular soil type is suited for crops or livestock and what type of soil management might be required. An architect or engineer might use the engineering properties of a soil to determine whether or not it was suitable for a certain type of construction. A homeowner may even use the information for maintaining or constructing their garden, yard, or home.

Soil Survey Components

Typical information in a county soil survey includes:

- A brief overview of the county's geography.
- A general soil map with a brief description of each of the major soil types found in the county along with their characteristics.
- Detailed aerial photographs with specific soil types outlined and indexed.
- Photographs of some of the typical soils found in the area.

- Tables containing general information about the various soils such as total area, comparisons of production of typical crops and common range plants. They also include extensive interpretations for land use planning such as limitations for dwellings with and without basements, shallow excavations, small commercial buildings, septic tank adsorptions, suitability for development, construction, and water management. Tables also containing specific physical, chemical, and engineering properties such as soil depth, soil texture, particle size and distribution, plasticity, permeability, available water capacity, shrink-swell potential, corrosion properties, and erodibility.

The term **soil survey** may also be used to describe the published results. In the United States, these surveys were once published in book form for individual counties by the National Cooperative Soil Survey. Today, soil surveys are no longer published in book form; they are published to the web and can be freely accessed by the public on NRCS' Web Soil Survey (WSS) site, where a person can create a custom soil survey. By making the data and information available online, it allows for the rapid flow of the latest soil information to the user. In the past it could take years to publish a paper soil survey sometime making the published information almost obsolete. Many of the published manuscripts have been scanned for historical purposes.

Soil surveys commonly identify the more important soil characteristics that determine the limitations and qualities of the soil. These interpretations are designed to warn of possible soil related hazards in an area. Knowledge of soil landscapes, soil formation, and the various soil properties and function has expanded with a classification system oriented to the interpretations of the soil survey. Various divisions and subdivisions of the basic system of classification called soil taxonomy provide a basis for application of the information to engineering and agricultural uses of the soil. Information about soil properties provides a basis for assessing risks and hazards when making land use decisions. Additionally, during the soil inventory process, we learn the relationship of various landscapes features to soil geography. Identifying and mapping soil landscape relationships strengthen soil interpretations and the associated interpretations involving hydrology and landscape stability. The separation of geology and soils is not a clear division, but rather the interpretations enhance the delivery of information through the connection of soils to the landscape and the corresponding geology.

As part of NRCS website, current soil survey data and information in digital form is available to assist with analysis, evaluations, and decision making tasks for both the professional and private citizen.

Importance of Soil Survey

The information assembled in a **soil survey** can be used to predict or estimate the potentials and limitations of the **soils**' behaviour under different uses. As such, **soil surveys** can be used to plan the development of new lands or to evaluate the conversion of land to new uses.

Three main parts of Soil Survey

It consists of **three main parts**: text, maps and tables. It includes general information about the geology, topography, and climate of the area. Soil Survey includes the details – Depth of the soil, texture, porosity, moisture content, types of soil, soil erosion, fertility, content of the soil, etc.