CHAPTER - III

METHODOLOGY

This chapter includes area of study, data needed, collection of data and analytical tools used for fulfillment of the objectives of the study.

3.1 Area of Study

The study was confined to newly formed Chhattisgarh State. Chhattisgarh State is divided in three agro climatic zones namely Chhattisgarh Plain, Northern Hills and Bastar Plateau. The distribution details of study area by agro climatic zones is given as

<table>
<thead>
<tr>
<th>S.No.</th>
<th>Agro-Climatic Zones</th>
<th>Districts</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>Chhattisgarh Plains</td>
<td>Raipur, Mahasamund, Dhamtari, Durg, Rajnandgaon, Kabirdham, Bilaspur, Korba, Janjgir – Champa, Raigarh, Kanker</td>
</tr>
<tr>
<td>2.</td>
<td>Northern Hills</td>
<td>Jashpur, Surguja, Korea</td>
</tr>
<tr>
<td>3.</td>
<td>Bastar Plateau</td>
<td>Bastar, Dantewada</td>
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</tbody>
</table>

3.1.1 Chhattisgarh Plains

Chhattisgarh Plain lies between the latitude ranging from 19°47’ to 23° 07’ North and longitude from 79°33’ to 83°50’ East. The Chhattisgarh Plain agro climatic zone includes 16 districts but study was limited under old 11 undivided districts i.e. Raipur, Mahasamund, Dhamtari, Durg, Rajnandgaon, Kabirdham, Bilaspur, Korba, Janjgir – Champa, Raigarh and Kanker, According to village paper area
covered by this zone is 46.71 lakh hectares that is 49% of the total geographical area of the state.

Physiographically, agro climatic zone is situated in the eastern Plateau. The primary land forms found in the agro climatic zone are hill range with isolated hill stocks, inter hill valley.

The climate of the agro climatic zone is hot sub humid having annual rain fall in the range of 1200 mm to 1600 mm. In this zone, agriculture is mainly depend on rainfall, which is erratic in distribution leading to high intensity rainfall alternating with period of moisture stress.

In Chhattisgarh Plains soils varies from lateritic type heavy clay, which includes Entisols, Inceptisols, Alfisols and Vertisols. The soil is characterized by fine textures i.e. loamy to sandy, sandy loamy, silty clay, clayey. The soil structure varies from sub angular blocky to angular blocky with non sticky to very sticky consistency.

The soils of the zone so developed have been classified into four soil orders that widely differ in their production potential and management requirements. They are locally called, Bhata, Matasi, Dorsa and Kanhar,

3.1.2 Northern Hills

Northern Hills lies between the latitude ranging from 22° to 24°11’ North and longitude from 80° to 84° East. The Northern Hills agro climatic zone includes 5 districts but study was limited under old 3 undivided districts i.e. Jashpur, Surguja, and Korea with area of 23.52 lakh hectares which is 25.15% of the total geographical area of the state.

Physiographically, agro climatic zone is situated in the eastern Plateau and is bounded by MAIKAL ranges in north-
west and Raipur and Bilaspur Districts boundaries in south. The land forms are hill ranges; inter hill valley, flood Plains and inland valleys.

The climate of the agro climatic zone is hot and sub humid having annual rain fall in the range of 1000 mm to 1600 mm. Tropical moisture deciduous forests are the natural vegetation. Rainfed agriculture is the traditional farming practices in the zone.

Soils of the Northern Hills have been identified with the existing farming situation, which give some idea about their production potential. The soils, as most commonly described are identified locally on account of their occurrence, management and use. They are: (a) Eroded hilly soils which are covered mostly by forest, (b) Goda/Tikra soils, (c) Goda Chanwar (d) Chanwar and (e) Bahra soils. Chanwar soils are low land bunded fields where rice is grown. In Bahra soils, water flows continuously till January.

### 3.1.3 Bastar Plateau

Agro-Climatic Bastar Plateau Zone lies between the latitude ranging from 17°44’ to 20°30’ North and longitude from 82°15’ to 82°20’ East.

The Bastar Plateau agro climatic zone includes 6 districts but study was limited under old 2 undivided districts i.e. Bastar and Dantewada with area of 23.29 lakh hectares which is 25.90% of the total geographical area of the state.

Physiographically, the Bastar Plateau agro climatic zone is a part of Dandyakaranya upland, which is characterized by undulating topography with well marked elevations and depression with complex and heterogeneous setting.
The climate of the zone is hot and sub humid, with hot summer and cool winter. The zone receives an annual rainfall of 1300 mm to 1600 mm mostly in the month of July and August. The zone is flats in some parts while most of it undulating with slopes of varying magnitude.

In Bastar, the land is undulating land hence the soils vary considerably from top of the hillock to the valley. The soil types in Bastar district vary from *Marhan* (*Entisols*) to *Gabhar* (*Vertisols*). *Gabhar* is the valley portion of the undulating terrain. In between these two lies *Tikra* (*Inceptisols*) and *Mal* (*Alfisols*).

### 3.2 Collection of Data

The cross sectional time series data for the year 2000-01 to 2008-09 were used for fulfillment of the objectives of the study.

The time series cross sectional data were recorded from the official records and publications of the Directorate of Agriculture, Commissioner of Land Records and Settlement and Department of Economics and Statistics. The cross section time series data were recorded on land use pattern, area, production and productivity of major crops namely Paddy, Wheat, Maize, Kodo-Kutki, Pigeonpea, Chickpea, Urd, Moong, Lathyrus, Kulthi, Soybean, Groundnut, Sesamum, Linseed and Rape Seed & Mustard grown in Chhattisgarh State, use of fertilizer, use of insecticides and pesticides, area coverage under improved varieties of major crops, irrigated area, use of farm implements etc. for analyzing the changes occurred in agriculture.

### 3.3 Analytical tools and models

The results were reported by applying the simple statistical tools such as averages & percentages, moving averages and triennium ending averages. Multiple regression analysis for
contribution of fertilizers applications, irrigation and area under improved varieties of paddy to the production of paddy crop only were applied. The generalized form of the Multiple Regression Analysis was given below:

\[ Y = f (X_1, X_2 and X_3 + U) \]

Where,

- \( Y \) = Production of paddy in thousand tons.
- \( X_1 \) = Fertilizer consumption for paddy in thousand tons.
- \( X_2 \) = Area irrigated under paddy in thousand hectares.
- \( X_3 \) = Area under improved variety of paddy in thousand hectares.
- \( U \) = Used as uncertain Variables.

To observe the changes in agriculture performance in Chhattisgarh State, compound growth rate (CGR) was computed in area, production, productivity of major crops, land use pattern, use of fertilizer, area coverage under improved varieties of major crops, agricultural growth rate during the study period etc. The formulae was used for compound growth rate is given as under;

\[ Y = a B^t \]
\[ \log Y = \log a + t \log B \]

Where,

- \( Y \) = Area / Production / Productivity etc.
- \( a \) = Constant
- \( B \) = Regression Coefficient
- \( t \) = Time in Year
- \( \text{CGR (\%)} = (\text{Antilog } B-1)^*100 \)