Journal of Advanced Zoology
ISSN: 0253-7214
Volume 44 Issue S8 Year 2023 Page421-424

Harvesting Prosperity: A Comparative Analysis Of Karnataka's Agricultural Development Landscape (2021-22)

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***Abstract*:**

In India's southwest, Karnataka is the eighth-largest state. It is the industry leader in floriculture and horticulture. With 23.82 lakh hectares under cultivation, the State holds the top spot and accounts for 9.01 percent of the nation's total horticultural area. Its reputation as a producer of horticulture, cash crops, food crops, and plantations is widely acknowledged. Altitude and distance from the sea influence the interaction of topographic, climatic, and edaphic variables that result in a highly diversified and distinct ecosystem.
The current study aims to analyse the data that the Karnataka government has released regarding 27 indicators, using 31 districts as the study's units. The Composite Index Method is used to construct the agricultural development index, which is used to rank the districts.
The study revealed that whereas Tumakuru and Belgavi are poorly developed, the districts of Udupi, Bangalore (Rural), Kodagu, and Ramanagara are developed districts in terms of agriculture. Every other district is classified as a developing district.

Introduction:

In the fields of floriculture and horticulture, Karnataka leads the way. The entire area and production of horticultural crops in India are documented in the "Agriculture Cooperation & Farmers Welfare database - 2020" as being 264.57 lakh hectares and 3199.69 lakh M.T., respectively. With 23.82 lakh hectares under cultivation, or 9.01 percent of the nation's total horticultural area, Karnataka State has taken first place. The state exports more flowers and gherkins than any other state in the union. India's second-largest producer of maize, safflower, grapes, pomegranates, and onions, Karnataka is also the country's top producer of coffee, raw silk, sandalwood, ragi (finger millet), sunflower, and tomato. In India, the state is in fifth place for the total area dedicated to horticulture.
It ranks third in the production of fruit crops and fifth in the production of vegetable crops. In addition, it produces the most tropical fruits, fragrant and medicinal crops, and spices. After Gujarat, it is the second-largest milk-producing state.
The state mostly cultivates rice-based crops. Ragi, bajra, cotton, groundnut, jowar, and maize are important agricultural substitutes for rice. Wheat, minor millets, and pulses such as tur, Bengal gramme, horse gramme, black gramme, green gramme, and cowpea are additional significant crops. Groundnut, sesame, sunflower,

soybean, and sunflower are examples of oilseeds. In the eastern region, tobacco is a commercial crop; in the northwest, cotton is a commercial crop. Other significant crops include cashew, coconut, areca nut (southern region), cardamom, and chilies.
Other major crops include cashew, coconut, areca nut (southern region), cardamom, and chilies. While maize is mainly farmed in the state's northern part, the Western Ghats are famous for its coffee and tea plantations. The coastal region is ideal for growing fruit orchards because of its climate.
Karnataka has a long history of sericulture, and the state places a high value on silk. The tale of Soil to Silk & Fabric is intriguing. In the field of sericulture, women perform 60% of the labor. The silk and sericulture industries provide significant employment opportunities for around 12 lakh households in Karnataka.
5.76 lakh hectares of inland water resources, 8000 hectares of brackish water, 2.38 lakh hectares of waterlogged and alkaline terrain, 313.02 kilometers of coastline, and 27,000 sq. km of continental shelf make up Karnataka's water resources.
Karnataka produced about 2.0 lakh tonnes of fish in the early 1980s, and by the mid-1990s, it was producing over 3.0 lakh tonnes. Over the past five years, the average annual fish production has been approximately 5.95 lakh tonnes, with the marine sector accounting for 66% of the total and the inland sector for 34%.
Karnataka's forest environment is distinct and exceptionally diverse. It is an essential component of the environment's natural resources. There are several types of vegetation such as semi-evergreen, dry deciduous, moist deciduous, sholas, prickly shrubs, and coastal mangroves. They are a storehouse of abundant biodiversity at the gene, species, and ecosystem levels. The interaction of topographic, climatic, and edaphic variations determined by height and distance from the sea results in distinct forest ecosystems.
Karnataka is home to 25% of the nation's elephant population and 10% of its tigers. About 4500 flowering plant species, 600 bird species, 160 animal species, 160 reptile species (including turtles, snakes, lizards, and crocodiles), 70 frog species, and 800 fish species are found in the state. These numbers provide a decent picture of the state's richness of flora and animals.
Karnataka state is divided into four revenue divisions and 31 districts as follows: -

Table 1: Districts and Revenue Divisions of Karnataka

Belagavi Division	**Bengaluru Division**	**Kalaburagi Division**	**Mysuru Division**
Bagalkote	Bengaluru Rural	Ballari	Chamarajanagara
Belagavi (Headquarters)	Bengaluru Urban (Headquarters)	Bidar	Chikkamagaluru
Dharwada	Chikkaballapura	Kalaburagi (Headquarters)	Dakshina Kannada
Gadaga	Chitradurga	Koppala	Hassan
Haveri	Davanagere	Raichuru	Kodagu
Uttara Kannada	Kolar	Vijayanagara	Mandya
Vijayapura	Ramanagara	Yadagiri	Mysuru (Headquarters)
	Shivamogga Tumakuru		Udupi

List of districts of Karnataka - Wikipedia

Research Methodology: -

Composite Index Method
Consider the set of n units for the group of k indicators. This can be represented by a matrix
$[X_{ij}]$,
i=1,2,3, -------, n and j= 1,2,3, -------, k.
To overcome the difficulty in dimensions and unit of dimensions, the data is standardized as follows.

$$Z_{ij} = \frac{X_{ij} - \bar{X}_j}{6j}$$

Where σ_j = S.D of X_j, j = 1, 2, 3, --------- , k
X_j = Mean of X_{ij} .

$[z_{ij}]$ denotes the matrix of standardized indicators. The best value of each indicator (with max / min standardized value depending upon the direction of indicator) is identified and from this, the deviations of the value for each unit are taken for all indicators in the following manner:

$$C_j = \left\{ \sum (z_{ij} - z_{oj})^2 \right\}^{1/2}$$

Where z_{oj} is the standardized value of the j^{th} indicator of the best unit and Ci denotes the pattern of development of ith unit. The composite index of development is obtained through the following formula:

$$\bar{C} = \frac{\sum C_i}{n}$$

The value of the composite index is non-negative and lies between 0 and 1. The value closer to 0 indicates higher level of development while the value closer to 1 indicates the lower level of development.
The units are ranked by the composite indices scored by the units. The composite indices are arranged in descending order and the units are ranked by the position obtained from their composite index.
The units are further classified into three categories namely developed, developing and low developed. The units scoring the composite indices more than Mean + SD of the indices are treated as low developed, the units scoring the indices ranging between Mean + SD and Mean - SD are treated as developing and the units scoring less than Mean - SD are considered as the developed units.
The correlations are calculated between the composite indices scored by all the units in a particular time stage for all the sectors and the composite indices scored by all the units for a particular sector in all time stages.

Analysis:
-The Directorate of Economics and Statistics, Government of Karnataka published the handbook "Karnataka At A Glance" for the Year 2021-22. The data related to agricultural development for the following 27 indicators and 31 districts as the units, is considered for this study. The data and analysis can be verified at the links provided in the citation 12 to 13 in the references below.

1. Percentage of Forest Area to Geographical Area
2. Percentage of Land not available for Cultivation to Geographical area
3. Percentage of Permanent Pasture to Geographical Area
4. Percentage of Net area Sown to Total Geographical Area
5. Percentage of Net area Irrigated to Net area sown
6. Percentage of area under food grains to Total area sown
7. Percentage of area under oil seeds to Total Area sown
8. Total Area under Fruits (In Hectares)
9. Total Area under Vegetables (In Hectares)
10. Total Area under Cotton (In Hectares)
11. Total area under Sugarcane (In Hectares)
12. Total Area under Condiments and Spices (In Hectares)
13. Total area under Coconuts (In Hectares)
14. Total area under Areca Nuts (In Hectares)
15. Percentage of food grain production to the state total
16. Cold storage Capacity for Horticulture in Tonnes
17. Percentage of Chemical fertilizers distributed to the State Total
18. Kisan Credit Card Distributed
19. Number of Soil Health card Distributed
20. Percentage of seeds distributed to the State total
21. No. of Regulated Markets
22. No. of Regulated submarkets
23. No. of Mandis linked to electronic markets
24. Percentage of Marginal land holders to total land holders (<1 Hectares)
25. Percentage of small landholders to total land holders (1-2 hectares)
26. Percentage of Livestock to state Total
27. Total No. of veterinary Hospitals/Dispensaries

The data is analyzed using the Composite Index method as explained in the Research Methodology and further the units are ranked on the basis of development. The units are further classified as Developed, developing and Low developed.

Table 2: District-wise Composite Indices of Agricultural Development

District	Ci	District	Ci
Udupi	0.3242	Mandya	0.5504
Bengaluru (Rural)	0.3509	Bidar	0.56
Kodagu	0.3972	Davanagere	0.5693
Ramanagara	0.4073	Kalburgi	0.5728
Chamarajanagara	0.4167	Uttar Kannada	0.5764
Chikkaballapura	0.4301	Chitradurga	0.5841
Dharwada	0.4498	Haveri	0.588
Vijayanagara	0.4575	Shivamogga	0.5932
Bengaluru(Urban)	0.4616	Haasan	0.5949
Kolara	0.4733	Bagalkote	0.5975
Chikkamangaluru	0.49	Raichuru	0.624
Gadag	0.4942	Vijayapura	0.6375
Dakshina Kannada	0.5084	Tumakuru	0.7269
Koppal	0.5115	Belgavi	0.9462
Yadgiri	0.5133	Mean	0.5312
Ballari	0.5185	**SD**	**0.1172**
Mysuru	0.543	**Mean - SD**	**0.4141**
		Mean + SD	**0.6484**

Conclusions:

This research offers a comprehensive examination of Karnataka's agricultural development, elucidating disparities among districts. The findings provide valuable insights for policymakers and stakeholders to tailor interventions for the overall advancement of the state's agriculture.
The study found that, the districts of Udupi, Bangalore (Rural), Kodagu and Ramanagara are developed districts in agriculture while Tumakuru, Belgavi these districts are low developed. Remaining all the districts fall under the developing districts category.

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