



Livestock Combinations in Tamil Nadu River Basins: A Geographical Analysis

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Abstract

Doi's (1959) method of livestock combination has been applied in the Tamil Nadu River Basins to explore the various combinations of livestock that optimize the livestock growth. Therefore, it may be useful as a tool for planning of livestock in a given region. Livestock is generally grown in combinations that show the relative positions of different livestock on regional scale living of particular livestock is normally region-specific and season-specific as livestock ecology depends upon the nature of physical geography in addition to various socio-economic factors. The study area is of livestock's most resourceful and the major livestock live are Cattle, Goat, Sheep, Buffalo and Pig. Altogether, five livestock combinations have been found in this area. This may be used to explore a particular livestock's combination to maximize the revenue generation. The importance of livestock breeding for poor farmers provides fixed income for poor livestock growers due to a large number of restrictions in the study area. The present study falls between 13° 56' N- 8° 07' N and the 78° 23' - 80° 33' E longitude. The River basins of Tamil Nadu were divided into 17 major rivers. The present research work is an attempt to generate inputs by processing the data using recent technologies like GIS along with in situ observations and field verification

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Introduction

The production of both crops and livestock on the same farm undoubtedly is more common than the raising of either livestock alone. Livestock keeping in the River Basin contributes greatly to human security, income, culture and agricultural gross domestic product (GDP) (Ali, 1978). Inappropriate livestock management uses excessive water and causes water and land degradation. The farmers depend upon the livestock activities from non-cultivated time. Livestock-water interactions are complex, not well understood, and often ignored in agricultural water development. This results in the loss of opportunities to achieve sustainable and higher investment returns. Typically, livestock management also ignores important livestock-water issues. This lack of integration creates knowledge gaps resulting in inefficient and inequitable use of water resources. The importance of livestock breeding for poor farmers does not provide sustainable income for poor livestock growers due to enormous controls in the study area (Husain, 1996). The crop combination regions have been studied time and again by geographers and agricultural land-use planners. But such pieces of evidence for livestock combination

regions are almost non-existent except studied the livestock combination different approaches are generally applied for Haryana on a theoretical basis (Singh and Dhillon, 1984). Two regions for delineation of crop combination regions based on the arbitrary choice of crops etc. the first crop only, first two crops only, first three crops etc. and development of crop combination regions in terms of variables based on some theoretical techniques which are considered to be more accurate, scientific and widely acceptable. In this paper, an attempt has been made to delineate the livestock combination regions in Tamil Nadu Cauvery basin based on the statistical and GIS approach identifying the group of significant functions.

Study Area

The Tamil Nadu is one of the progressive & largest states in India, which falls between 13° 56' N- 8° 07' N latitudes and 78° 23' E to 80° 33' E longitudes, was selected in the study area. The river basins in Tamil Nadu are grouped into 17 major river basins as furnished Chennai Basin, Palar, Varahanadhi, Ponnaiyaar, Vellar, Paravanar, Cauvery, Agniyar, Pambar and Kottakaraiyar, Vaigai, Gundar, Vaippar, Kallar,



Thamirabarani, Nambiyar, Kodaiyar, and Parambikulam Aliyar. The temperature of the region range between 18.32°C in the month of January and 36.42°C in the month of April. The upland gradient slope gradually decreases west to east. Thus, agriculture directly or indirectly remains as an important component of the livelihood Livestock production which contributes the highest share to the Tamil Nadu agricultural GDP, mainly through meat, milk, eggs, wool, hides, and skins. Livestock plays a vital role adding to the stability of farm incomes, food security, and farming systems. In Tamil Nadu, Large chunk of the population is engaged in agriculture activities. Agriculture continues to be the prime mover of the State economy supporting 56 percent of the population.

Objectives

The main objective of the current study is to identify livestock ranking and examine the livestock combination in the study area.

Materials and Methods

The present study is based on the secondary sources of current research data. It will be collected to the entire state and access to the Tamil Nadu river basin region wise based on the latest administrative setup. The Statistical Handbook of Tamil Nadu is considered as the main source of the data. Livestock-related statistics has been also obtained from diverse sources. The secondary type of most of the data used this study. Using the ARC GIS 10.1 GIS software is analyzed for the digitization and boundary generation of the selected area and using livestock data prepared thematic maps. Successfully used to MS-Excel and SPSS for tabulating and processing such a large amount of statistics. The objective of the study is to analyze livestock grow in all 17 River Basins in Tamil Nadu. Read livestock inequality in all the river basin of Tamil Nadu. Policy options for improving the productivity of livestock in the herd.

Livestock Ranking

The percentage livestock of Tamil Nadu River Basin area is given in area fig. 2.

First Rank Livestock

The first rank of 2 livestock growing in the study area like Cattle and Goats livestock. This livestock occupying the highest percentage of total livestock area in each of the component areal units could be chosen, no matter what percentage it occupies in the gross First Rank Livestock: The first rank of 2 livestock growing in the study area like Cattle and Goats livestock. With the help of this method, the distribution rank of first rank livestock's was determined. It may be noticed from figure No.: 3 that cattle and goats rank first in 09 and 08 regions are the leading livestock in the study area. In the present study area, where monoculture is prevalent with no general diversify in their livestock patterns, there is no merit in the livestock combinations as it helps in ascertaining the areas of the dominance of the first rank livestock (Fig. 2).

Second Rank Livestock

On the basis of Second ranking Livestock, three types of livestock is dominated by research areas like Goats, Sheep,

and cattle. Goats are living in Chennai Basin, Palar, Varahanadhi, Ponnaiyaar, Vellar, Paravanar, Cauver, Agniyar, Pambar and Kottakaraiyar. The Vaigai, Gundar, Vaippar, Kallar, Thambaraparan, Nambiyar and ParambikulamAliyarriver basin are Growing in the Sheep Population. Cattle is occupied in Kodaiyar river basin (Fig. 2).

Third Rank Livestock

Third livestock dominated in three livestock from the study area. The sheep's occupied in Chennai Basin, Palar, Varahanadhi, Ponnaiyaar, Vellar, Paravanar, Cauver, Agniyar, Pambar and Kottakaraiyar Northern part of Study area. Cattle are found in Vaigai, Gundar, Vaippar, Kallar, Thamirabarani, Nambiyar river basin. Pigs occupied in Kodaiyar river basin (Fig. 2).

Fourth Rank Livestock

In the fourth rank estimate, there was two livestock from the study area. It is Buffaloes and Pigs (Fig. 2).

Fifth Rank Livestock

The fifth arrays of three livestock's dominated the study area. It is pigs, Buffaloes, and Sheep (Fig. 2).

Livestock Combination (after Doi, 1959)

The weaver techniques were subsequently modified by Doi's 1959. Doi's techniques used to be considered to be the easiest for combination analysis prior to the application of computer programming facilities. Doi's "An Abridged of Deviation Analysis Table" has been consulted using actual percentages under different livestock in the Tamil Nadu River basins. The ranking of livestock percent and cumulative percentage are shown in Annexe - I. Doi's Livestock Combination formula is:

$$SD = \frac{\sum d^2}{n}$$

It shows that higher-ranking crops have a high percentage (above 10%), the lower ranking element with less than 5% which is usually excluded from the combination. This technique is most profitably applied to such a situation as is found in the livestock combination in which interrelationship exists between the component combinations. Using this technique, industries which has cumulative percentage is less than 50 are included in combination; or the critical value for all the livestock's at different ranks against 50 in Zero.

It was found that individual livestock having 70% and above of the total area in a region constitutes monoculture and other livestock do not find any position in the livestock combination because of their insignificant livestock occupancy status. Thereafter, it is comfortable to decide about the Predominant: 70 to 50%, Dominant: 30 to under 50%, Major: 15 to under 30%, Secondary: 5 to under 15%, Minor: under 5%.

In this method, the first ranking livestock occupied the highest percentage of the total livestock in district wise. It may be noticed from the figure :3 that are Cattle, Goat, Sheep, Buffaloes, and Pigs are the leading livestock in Tamil Nadu river basin.

Predominant / Single Livestock Combination

It was found that individual livestock having the 70 to 50



percentages, and above of the total area in a region. Predominant are occupied by the largest percentage of total livestock's in Palar, Varahanadhi, Kodaiyar and Ponnaiyaar river basins. It comes out of the four regions of the study area in the 17th regions (fig.3). The Palar, Varahanadhi, and Ponnaiyaar region widely occupied in Cattle's and Kodaiyar river basin occupied in Goats it spreads widely in the study area of good irrigation and widespread climate. The livestock diversification is low in this region. Therefore, this method helps the livestock's to determine the dominant areas of the region in the area of the study area.

Dominant and First Two Livestock Combination

It was found that individual livestock will have 30- 50 % and above that, total area percentage in a region is known as Dominant livestock combination. Dominant livestock combination is occupied by the largest percentage of total livestock's in Chennai Basin, Vellar, Paravanar, Cauvery, Agniyar, Pambar and Kottakaraiyar, Vaigai, Gundar, Vaippar, Kallar, Thamirabarani, Nambiar and Palar at 17 regions in the area emerges in 14th regions at the study area. This Dominant livestock combines the two livestock's combination. Based on the Dominant livestock groups occupied in the first two livestock combination, seven livestock categories can be identified in the Tamil Nadu river basin. The resulting livestock combinations present have been shown in the figure: 3. The relative strength of the first two livestock Combination is Cattle- Goat at six regions and Sheep- Goat in seven regions. The Cattle, Goat, and Sheep are important livestock combination. Hence, river basin areas are with livestock combination region at suitable climate, good irrigation, low livestock diversification, and Farmers. So, livestock growth and production is the result of an increase in the study area.

Conclusion

The Tamil Nadu state located are grouped into 17 major river basins as furnished Chennai Basin, Palar, Varahanadhi, Ponnaiyaar, Vellar, Paravanar, Cauvery, Agniyar, Sambar, and Kottakaraiyar, Vaigai, Gundar, Vaippar, Kallar, Thamirabarani, Nambiyar, Kodaiyar, and Parambikulam Aliyar. In the study area, one or two livestock combinations were studied. The ranking livestock percent and cumulative percentage are as shown in Annexure -I. The predominant and Monoculture livestock's are present in the four regions out of 17 regions and its diversification was low. The Palar, Varahanadhi, and Ponnaiyaar river basins were widely distributed with cattle, which is part of the Dryland and Non-perennial River flowing regions. The first two livestock combinations are Cattle- Goat at six regions (Chennai Basin, Vellar, Paravanar, Cauvery, Parambikulam Aliyar, and Agniyar) and Sheep- Goat is seven regions (Vaigai, Gundar, Vaippar, Kallar, Thamirabarani, Nambiyar, and Kodaiyar) in 13 territories. The adequate terrain, climate, water, and vegetation type increases the livestock population and balances its growth. The livestock combination method of regional planning of future livestock can be used to propose and to understand the revenue of the study area

References

Books

1. Ali, Mohammad (1978): Dynamics of Agricultural Development in India. Concept Publication, Private

- Company-New Delhi.
2. Jasbir, S., & Dhillon, S. S. (1984). Methods of Agriculture Regionalization, Agricultural Geography (3rd ed., pp. 213-297). New Delhi, India: Tata McGraw-Hill.
 3. Majid Husain (1996) Systematic Agricultural Geography (1996 ed.). Jaipur, India: Rawat Publications.
 4. Mohammad A (1978): Dynamics of Agricultural Development in India, Concept Publication, Private Company - New Delhi, 1978.
 5. Najma Khan (2003): Quantitative Methods in Geographical Research, Concept Publishing Company, Delhi, 2003. pp. 5.

Conference Proceedings

6. Doi K (1959): The Industrial Structure of Japanese Prefecture Proceeding", I. G. U. Regional conference in Japan, 1959, 310-316.

Journals

9. Athawale, A.G. (1966): "Some New Methods of Crop-combination", Geographical Review of India, Kolkata, December issue, Pp. 28-34.
10. Bhat, M. M. (2013). Agricultural Land-Use Pattern in Pulwama District of Kashmir Valley. International Journal of Economics, Business, and Finance, Vol.1 No.5, pp80-93.
11. Bhatia, S. S. (1965). Pattern of Crop Concentration and Diversification in India, *Economic Geography*, Vol.4, No.1, pp39-56.
12. Coppock, J. T. (1964): "Crop-Livestock and Enterprise Combinations in England and Wales," *Economic Geography*, Vol.40, PP. 65-77.
13. Dayalan N., Analysis of The Industrial Combination Structure based on Doi's Method: Case Study of Tamil Nadu Cauvery Basin (India). Cloud Publications, International Journal of Advanced Earth Science and Engineering 2017, Volume 6, Issue 1, pp. 557566.
14. Dayalan N, Agriculture Regionalization using Doi's Crop Combination Method: A Case Study of Tamil Nadu Cauvery Basin, 2014- 2015, Indian Journal of Spatial Science Vol - 9.0 No. 2 Autumn Issue 2018 pp. 78 - 82, ISSN: 2249 - 3921 homepage: www.indianssss.org.
15. Dayalan, N, "GIS Application in Deficiency Disease Analysis from Doi's Combinations Method", Research Guru, (ISSN: 2349266X), Volume: 12 Issue: 2, September 2018, UGC approved 63726, Impact Factor: 3.021. Online Journal.
16. Gopal Das (2013). The Study of Crop Combination Regions in Jalpaiguri District, West Bengal. *Acme International Journal of Multidisciplinary Research*, Vol.1 No.9, pp27-33.
17. Noor Mohammad (1970) "Crop-Combination in Trans-Ganga Plain". *Geographical Review of India*, Calcutta.
18. Motebennur S S, "Crop Combination Regions in Karnataka with Special Reference to Major Edible Oilseeds", *Indian Journal of applied research*, Nov 2014.
19. Ogale SB, "A study of crop combination region ", *International Journal. of Innovation and Scientific*



- Research, Jun 2014, pp 329-334.
20. Patil, B. D. (2013). A Geographical Analysis of Spatio-Temporal Variation In Cropping Intensity & Concentration Of Irrigated Crops In Dhule&Nandurbar Districts (ms). Nandurbar Districts (ms). Indian Streams Research Journal, Vol.3, No.11, pp1-6.
 21. Sharma, S.C. (1971): "Cropping Pattern and Crop-Combination Regions in Etweal Middle Ganga Yamuna Doab". The Deccan Geographer, Secunderabad.
 22. Singh, H. (1963) "Crop Diversification in Malwa Tract of Punjab." The Indian Geographical Journal, Madras, Vol.38, 3and 4.
 23. Todkari, G. U. (2012). A Study of Crop Combination In Solapur District Of Maharashtra. Journal of Crop Science, Vol.3, No.1, pp51-53.
 24. Weaver, J. C. (1954). Geographical Review, American Geographical Society. Crop Combination Region in the Middle West, Vol.44, No.2, pp175-200.
 25. Panigrahy S &Manjunath K R, "Deriving cropping system performance indices using remote sensing and GIS", International Journal of RS, 2005, 26 (12), pp. 2595-1606.
 26. Najmul Islam Hashmi, &Gomatee (2013). International Journal of Innovative Research and Development,.Pattern of Crop Concentration and Diversification in Upper Ganga Yamuna Doab, Vol.1, No.5, pp481-496.
 27. Rathod.H.B&Naik.V.T.(2009). Agricultural Land Use Cropping Pattern In Yavatmal District.Shodh, SamikshaaurMulyankan (International Research Journal), Vol.2, No.6, pp780-782.
 28. Shahidullah, S. M., Talukder, M. S.A, Kabir, M. S., Khan, A. H., &Nur-E-Elahi (2006).Cropping Patterns in the South East Coastal Region of Bangladesh. Journal of Agriculture & Rural Development, Vol.4, No.2, pp53-60.
 29. SushmaPanigrahy, Ray, S.S., Anil Sood, Patel, L. B., Sharma, P. K., &Parihar, J. S. (2004). Journal of Indian Society of Remote Sensing.Analysis of Cropping Pattern Changes in Bhatinda District, Punjab, Vol.32, No.2, pp209-216.

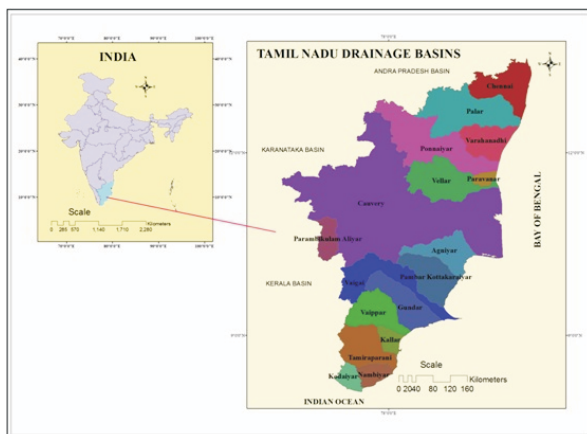
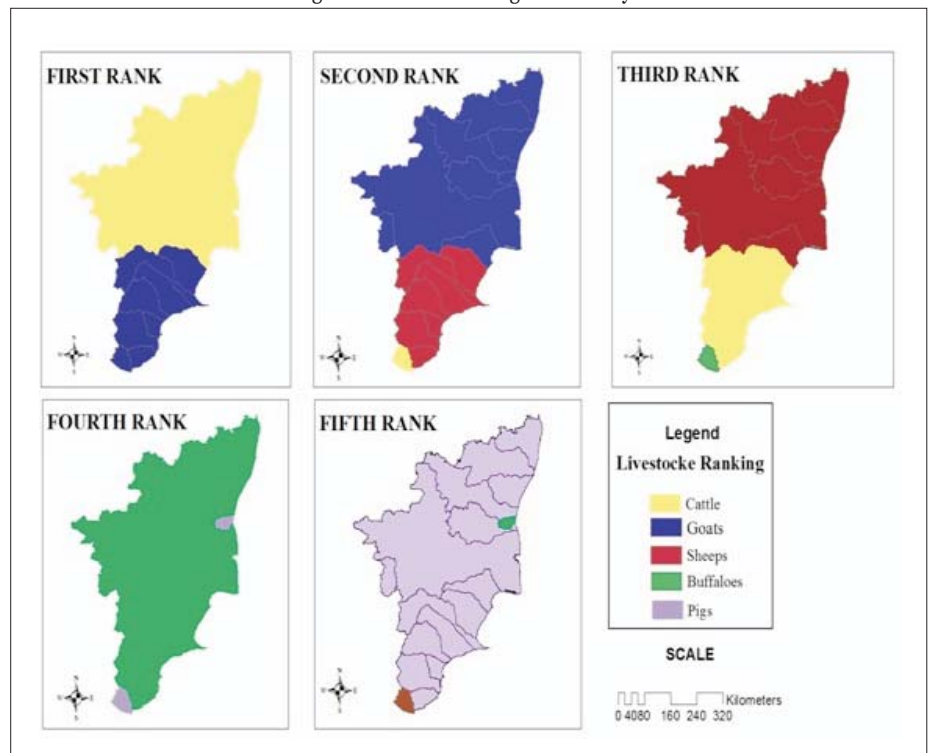


Fig. 1: Location of the Study Area

Fig. 2: Livestock Ranking in the Study Area



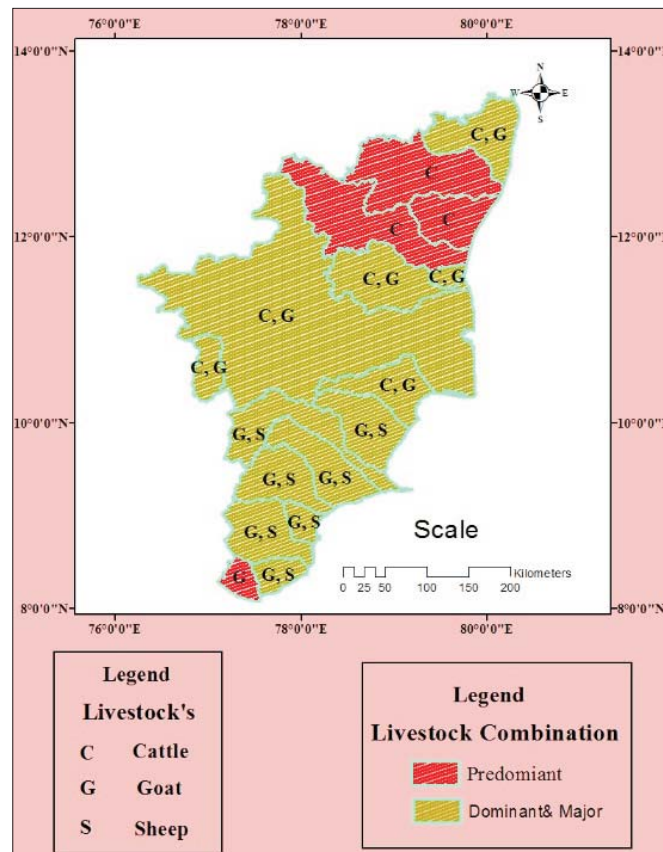


Fig. 3: Livestock Combination Regions after Doi in the Study Area

Annexure - I

An Abridged Part of Deviation Analysis Table (One-Sheet Table)

	Rank of Element												
	1	2	3	4	5	6	7	8	9	10	11	12	13
	Critical Value												
95											6.98	6.27	5.68
90								8.84	7.60	6.67	5.94	5.35	4.49
85				12.93	10.00	8.17	6.91	5.99	5.29	4.73	4.29	3.91	
80			13.83	10.00	7.85	6.46	5.49	4.78	4.23	3.79	3.33	3.14	
75		16.67	10.57	7.75	6.13	5.06	4.32	3.76	3.33	2.99	2.71	2.49	
70	27.64	12.25	7.93	5.96	4.65	3.85	3.29	2.87	2.55	2.29	2.08	1.90	
65	18.38	8.66	5.63	4.19	3.14	2.77	2.37	2.07	1.84	1.65	1.50	1.37	
60	11.27	5.46	3.59	2.68	2.14	1.78	1.52	1.33	1.18	1.06	0.97	0.88	
55	5.38	2.68	1.73	1.29	1.04	0.86	0.74	0.64	0.57	0.52	0.47	0.43	
50	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

Source: Doi, Kikukazu, "The Industrial Sturcture of Japan Prefectures", Tokyo, *Proceedings of the International Geographical Union, Regional Conference in Japan, 1957*, pp. 310-316.



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