STRENGTHENING STATE PLANS FOR HUMAN DEVELOPMENT

Report

On

QUALITATIVE DATA COLLECTION

Prepared
By

Department of Economics & Statistics
Government of Kerala

Sponsored by UNDP-Planning Commission

An Analysis of Wage Data

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Introduction

The data used in this report is collected from the schedules of Wage Structure Survey for the year 2008 conducted in Thiruvananthapuram district. Here we made an attempt to study the wage rates in prevailing in shops and commercial establishment sector and construction sector.

COMMERCIAL ESTABLISHMENT SECTOR

Selection of Centres

The survey coverage is both in rural and urban areas. In rural area, 3 Panchayaths were selected and in urban area, one corporation and one Municipality were selected for this survey. The selection of centres is purely based on random method. The Panchayaths selected for the survey are Vembayam, Kudappanakkunnu and Chenkal. From Corporation area, 2 wards were selected which are Karamana and Chala. From Municipal area one ward is selected which is from Nedumangadu Municipality.

Selection of Shops

Simple random sampling method is used for the selection of shops for the purpose of the survey. Shops were categorised into Wholesale shops and Retail shops. Shops were further categorised under different NIC codes based on the activities performed in the shops. For this purpose 4 digit National Industrial Classification (NIC 2004) Code is used.

The major categories according to NIC codes are:

Wholesale Shops			Retail Shops	
Class	NIC codes		Class	NIC codes
I	5121, 5122		VI	5211, 5219, 5920
II	5131, 5139		VII	5231, 5232, 5233
III	5141, 5142, 5143		VIII	5234, 5239
IV	5190, 5149, 5110		IX	5510, 5520
V	5151, 5152, 5159		X	5240, 5251, 5252, 5259, 5260, 5010, 5020, 5030, 5040, 5050

A brief description of NIC codes mentioned above

NIC   **Description**

Wholesale

5121   Wholesale of agricultural raw materials

5122	Wholesale of food, beverages and tobacco
5131	Wholesale of textiles, clothing and footwear
5139	Wholesale of other household goods, toiletry, perfumery, cosmetics, crockery, furniture, watch, radio, consumer electronics etc.
5141	Wholesale of solid, liquid and gaseous fuels and related products
5142	Wholesale of metal and metal ores
5143	Wholesale of construction materials, hardware, plumbing and heating equipments and supplies
5190	Wholesale of other items such as lottery, tickets, trade via e-commerce etc.
5149	Wholesale of intermediate products, waste and scrap (includes basic industrial, chemicals, fertilizers, textile fibre etc.)
5110	Wholesale on a fee or contract basis (commission agents, commodity brokers etc.)
5151	Wholesale of computer, computer peripheral equipments and software
5152	Wholesale of electronic parts and equipment
5159	Wholesale of other machinery, equipments and supplies (agriculture, transport, scientific, medical etc.)

Retail Sales

5211	Retail sale in non-specialised stores with food, beverages or tobacco predominating
5219	Other retail sale in non-specialised stores (apparel, appliances, cosmetics, jewellery, toys, sporting goods etc.)
5220	Retail sale of food, beverages and tobacco in specialised stores
5231	Retail sale of pharmaceuticals and medical goods, cosmetics and toilet articles
5232	Retail sale of textiles, clothing, footwear and leather goods including travel accessories
5233	Retail sale of household appliances, articles and equipments (electronic equipments, furniture, textile materials etc.)
5234	Retail sale of hardware, paints and glass
5239	Other retail sale in specialised stores (watches and clocks, computers, software, jewellery, books, magazines, fertilizers, pesticides, agricultural machinery & equipments, sport goods etc.)
5510	Hotels and accommodation centres
5520	Restaurants, bars and canteens
5240	Retail sale of second hand goods in stores

5251	Retail sale via. Mail order houses (including teleshopping)
5252	Retail sale via stalls and markets
5259	Other non-store retail sale (lottery tickets etc.)
5260	Repair of personal and household goods
5010	Sale of motor vehicles
5020	Maintenance and repair of motor vehicles
5030	Sale of motor vehicle parts and accessories
5040	Sale, maintenance and repair of motor cycles and related parts and accessories
5050	Retail sale of automotive fuel

No. of Shops selected for the study

Centre	Retail Shops	Wholesale Shops	Total
URBAN AREA			
Thiruvananthapuram Corporation			
Chala	7	10	17
Karamana	8	0	8
Nedumangadu Municipality	9	4	13
RURAL AREA			
Vembayam	5	1	6
Kudappanakkunnu	6	3	9
Chenkal	7	10	17
TOTAL	**42**	**28**	**70**

Collection of data

From the selected shops, data on wages given to the employees are collected from all the selected shops in every quarter (quarter ending 31st March, 30th June, 30th September and 31st December). The employees in the shops are classified based on the nature of the job and they are Manager (code 1), Accountant (Code 2), Cashier (Code 3), Clerk (Code 4), Salesman/ Salesgirl (Code 5) etc.

Data Analysis

Since in majority of the shops, the common category of employees seen is Salesman or Salesgirl, here we analyse the wages of employees under Salesman category in Thiruvananthapuram District.

Table 1.1- Wage rate of Salesman/ Salesgirl in Retail shops in Karamana Centre

The following table represents the wages in Rupees of 8 employees under Salesman/ Sales girl category from 8 retail shops in Karamana centre in Thiruvananthapuram Corporation for the quarter ending 31-12-2007, 31-03-2008, 30-06-2008, and 30-09-2008.

	31-12-2007	31-03-2008	30-06-2008	30-09-2008	Bonus	Yearly Estimated Salary
Shop 1	1500	1200	1200	1200	1000	16300
Shop 2	3000	3000	3000	3000	3000	39000
Shop 3	3000	2000	2000	2000	2000	29000
Shop 4	3000	3000	3000	3000	3000	39000
Shop 5	2800	3500	3500	3500	3500	43400
Shop 6	2800	3000	3000	3000	3000	38400
Shop 7	2000	2000	2000	2000	2000	26000
Shop 8	4000	2500	2500	2500	0	34500

The bonus component means the amount given to the employees in certain festival or religious occasions such as Onam, Christmas, Deepavali, Ramsan etc. Usually bonus will be given to those employees who completed more than one year of service in the same shop. In some shops there is no bonus in any occasion.

Another practice which is seen in commercial sector is when the sales in shops are reduced and the profit is also reduced, the shop owner will be forced to reduce the salary or to reduce the number of employees. As and when changes of employees occur in shops the wage rate also may be changed. In some shops, Dearness Allowance is calculated as per the changes in price index and summing up along with Basic Pay.

The yearly salary is estimated based on the assumption that the quarterly collected monthly salary is prevailing for all the three months during the quarter.

Table 1.2- Salary of Salesman in Retail shops in Kudappanakkunnu Panchayat

	31-12-2007	31-03-2008	30-06-2008	30-09-2008	Bonus	Yearly Estimated Salary
Shop 1	1000	1260	1260	1260	0	14340
Shop 2	4500	6600	6600	6600	0	72900
Shop 3	5000	4000	4000	4000	5000	56000
Shop 4	2000	2000	2000	2000	4000	28000
Shop 5	3000	3500	3500	3500	7000	47500

	31-12-2007	31-03-2008	30-06-2008	30-09-2008	Bonus	Yearly Estimated Salary
Shop 6	5100	5400	5400	5400	2000	65900

Table 1.3- Salary of Salesman in Wholesale shops in Kudappanakkunnu Panchayat

	31-12-2007	31-03-2008	30-06-2008	30-09-2008	Bonus	Yearly Estimated Salary
Shop 1	3750	5200	5200	5200	2500	60550
Shop 2	3000	2500	2500	2500	2500	34000
Shop 3	3000	3000	3000	3000	3000	39000

Table 1.4- Salary of Salesman in Retail shops in Nedumangadu Municipality

	31-12-2007	31-03-2008	30-06-2008	30-09-2008	Bonus	Yearly Estimated Salary
Shop 1	4000	3000	3000	3000	2000	41000
Shop 2	3250	3000	3000	3000		36750
Shop 3	1500	1400	1400	1400		17100
Shop 4	4500	4500	4500	4500		54000
Shop 5	4000	4000	4000	4000		48000
Shop 6	3000	3000	3000	3000		36000
Shop 7	3750	4000	4000	4000		47250
Shop 8	1750	1750	1750	1750		21000
Shop 9	1250	1300	1300	1300		15450

Table 1.5- Salary of Salesman in Wholesale shops in Nedumangadu Municipality

	31-12-2007	31-03-2008	30-06-2008	30-09-2008	Bonus	Yearly Estimated Salary
Shop 1	3000	3500	3500	3000		39000
Shop 2	5000	5000	5000	5000		60000
Shop 3	3750	4500	4500	4500		51750
Shop 4	3250	4000	4000	4000		45750

Table 1.6- Salary of Salesman in Retail shops in Chenkal Panchayat

	31-12-2007	31-03-2008	30-06-2008	30-09-2008	Bonus	Yearly Estimated Salary
Shop 1	6250	4000	4000	4000		54750
Shop 2	3000	3000	3000	3000		36000
Shop 3	1900	1900	1900	1900		22800
Shop 4	800	1500	1500	1500		15900
Shop 5	1500	3900	3900	3900		39600
Shop 6	4500	4500	4500	4500	1500	55500
Shop 7	3500	2500	2500	2500	2500	35500
Shop 8	2000	2000	2000	2000	2000	26000
Shop 9	2000	2000	2000	2000	2000	26000

Table 1.7- Salary of Salesman in Wholesale shops in Chenkal Panchayat

	31-12-2007	31-03-2008	30-06-2008	30-09-2008	Bonus	Yearly Estimated Salary
Shop 1	3000	3000	3000	3000		36000
Shop 2	800	650	650	650	500	8750
Shop 3	1000	750	750	750	500	10250
Shop 4	7030	7030	7030	7030	2500	86860
Shop 5	3000	5000	5000	4000		51000

Table 1.7- Salary of Salesman in Retail shops in Vembayam Panchayat

	31-12-2007	31-03-2008	30-06-2008	30-09-2008	Bonus	Yearly Estimated Salary
Shop 1	1500	1500	1500	1500		18000
Shop 2	3000	3000	3000	3000		36000
Shop 3	2500	2500	2500	2500		30000
Shop 4	3000	3000	3000	3000		36000
Shop 5	3000	5250	5250	5250		56250

Table 1.8- Salary of Salesman in Wholesale shops in Vembayam Panchayat

	31-12-2007	31-03-2008	30-06-2008	30-09-2008	Bonus	Yearly Estimated Salary
Shop 1	3000	3000	3000	3000		36000

Table 1.9- Salary of Salesman in Retail shops in Chala centre in Thiruvananthapuram Corporation

	31-12-2007	31-03-2008	30-06-2008	30-09-2008	Bonus	Yearly Estimated Salary
Shop 1	2500	5000	5000	5000	5000	57500
Shop 2	3600	4500	4500	4500		51300
Shop 3	3600	4000	4000	4000		46800
Shop 4	4000	4500	4500	4500		52500
Shop 5	4750	6450	6450	6450		72300
Shop 6	3000	3900	3900	3900		44100
Shop 7	1500	1500	1500	1500		18000

Table 1.10- Salary of Salesman in Wholesale shops in Chala centre in Thiruvananthapuram Corporation

	31-12-2007	31-03-2008	30-06-2008	30-09-2008	Bonus	Yearly Estimated Salary
Shop 1	5000	5000	5000	5000		60000
Shop 2	3750	5500	5500	5500	5500	66250
Shop 3	3500	4500	4500	4500	4500	55500
Shop 4	4750	6000	6000	6000	12000	80250
Shop 5	4500	5250	5250	5250		60750
Shop 6	6750	7500	7500	7500	7500	95250
Shop 7	4750	6000	6000	6000	6000	74250
Shop 8	2500	3000	3000	3000	3000	37500
Shop 9	2000	2000	2000	2000	2000	26000
Shop 10	5250	5460	5460	5460		64890

Descriptive Statistics using SPSS

Salary of salesman/ salesgirl in selected Retail and Wholesale shops in Thiruvananthapuram Dsitrict

Salary	N	Range	Minimum	Maximum	Mean	Std. Deviation	Variance
RURAL							
Kudappanakkunnu Panchayat							
Retail Shops	6	58560.00	14340.00	72900.00	47440.00	22520.14	507156800 0
Wholesale Shops	3	26550.00	34000.00	60550.00	44516.67	14108.54	199050833.3
Chenkal Panchayat							
Retail Shops	9	39600.00	15900.00	55500.00	34672.22	13726.82	188425694.44
Wholesale Shops	5	78110.00	8750.00	86860.00	38572.00	32343.04	1046072170.00

	N						
Vembayam Panchayat							
Retail Shops	5	38250.00	18000.00	56250.00	35250.00	13849.63	191812500.00
Wholesale Shops	1	.00	36000.00	36000.00	36000.000		
URBAN							
Thiruvananthapuram Corporation- Chala							
Retail Shops	7	54300.00	18000.00	72300.00	48928.57	16444.32	270415714.28
Wholesale Shops	10	69250.00	26000.00	95250.00	62064.00	19886.13	395458182.22
Thiruvananthapuram Corporation- Karamana							
Retail Shops	8	27100.00	16300.00	43400.00	33200.00	8905.37	79305714.28
Nedumangadu Municipality							
Retail Shops	9	38550.00	15450.00	54000.00	35172.22	14223.53	202308819.44
Wholesale Shops	4	21000.00	39000.00	60000.00	49125.00	8926.78	79687500.00

Note: N represents the number of shops.

From the above analysis, it is seen that the variability in Retail shops in Karamana centre is the least and hence the data obtained from this centre is the best data among all. Similarly the shops having maximum variation among the data collected is those from the wholesale shops in Chenkal Gramma Panchayath.
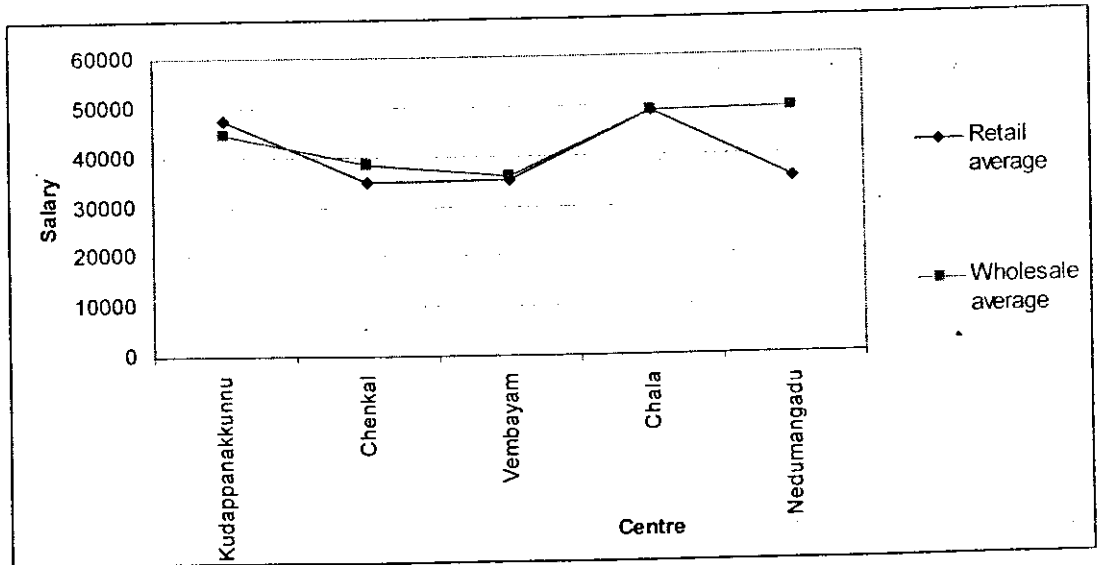
Chart 1.1- Salary of salesman in Retail shops in Karamana Centre in Thiruvananthapuram Corporation
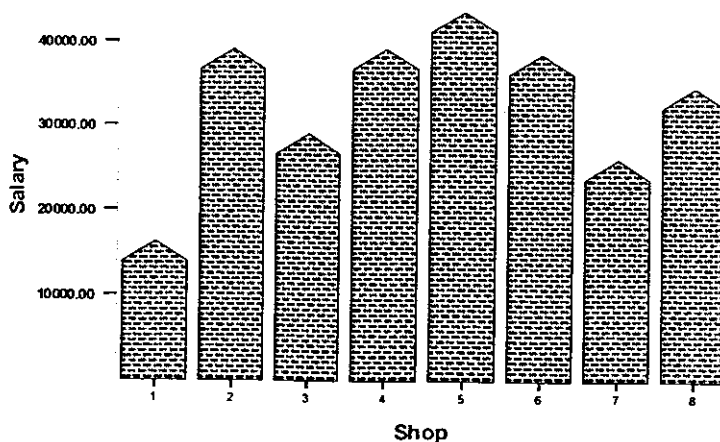
Chart 1.2- Salary of Salesman in Retail shops in NDD Municipality
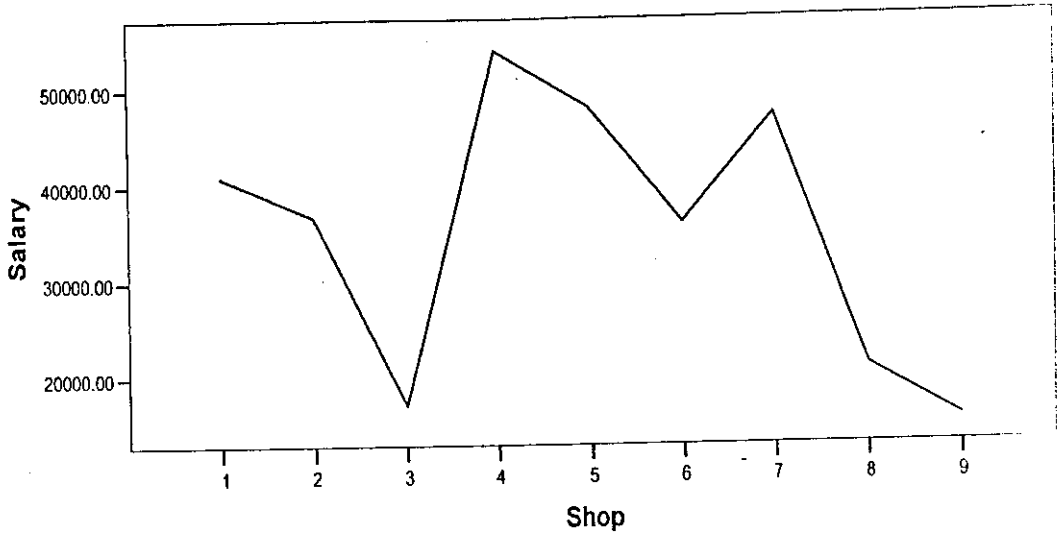
Chart 1.3 – Average salary of salesmen in Retail and Wholesale shops in Rural and Urban Centres

CONSTRUCTION SECTOR

Wage Rates in Construction Sector

The following data represents the wage rates in construction sector in Thiruvananthapuram district for the quarter ending 31st March 2009 collected for the purpose of Wage Structure Survey conducted by the Department of Economics and Statistics in the district.

Selection of the Centres

Three Panchayaths from rural sector and one Municipality and Corporation from urban sector are selected on random basis for the collection of wage rates under Wage Structure Survey. The Panchayaths selected for

the present survey are Chenkal, Kudappanakkunnu and Vembayam and the Municipality selected is Nedumangadu Municipality. Data on wage rates are collected on quarterly basis (quarter ending 31st March, 30th June, 30th September and 31st December) every year by visiting 3 construction sites in rural area and 5 construction sites in urban area by the method of personal enquiry with the workers or with the manager of construction.

Here the data is consolidated at Panchayat level and Municipality/ Corporation level and the average of the wage rates per man day is calculated for each Panchayath, Municipality and Corporation. The number of working hours per day varies from 8 hours to 10 hours depends upon the nature of work and depends upon the site. The average of wage rate per hour in each Panchayath, Municipality and Corporation are also consolidated and the arithmetic mean of the averages are again calculated in this report.

Table 2.1- Wage rate per Man Day in Construction Sector in Thiruvananthapuram District

Category of work	Tvpm	NDD	Chenkal	Vembayam	Kudappa-nakkunnu	Average
CARPENTER I	390	375	350	333	383	366
CARPENTER II	385	375	350	317	383	362
MASON- GRANITE	390	350	342	325	358	353
MASON- FIRE BRICKS	375	350	333	300	350	342
MARBIL	400	400	400	375	392	393
TILES	400	400	400	375	392	393
PAINTER I	350	325	300	300	300	315
PAINTER II	315	320	300	300	292	305
SAWER	400	400	350	350	342	368
PLUMBER	375	350	342	300	392	352
PLUMBER HELPER	320	340	325	300	375	332
ELECTRICIAN	400	325	342	300	342	342
ELECTRICIAN HELPER	365	305	300	292	317	316
UNSKILLED WORKER	300	300	308	275	308	298

Note: Painter I means first class painter, and Painter II means 2nd class painter, similarly Carpenter.

Table 2.2 - Descriptive Statistics using SPSS

Category of Job	N	Range	Mean	Std. Deviation	Variance
CarpenterI	5	57.00	366.2000	23.93115	572.700
CarpenterII	5	68.00	362.0000	28.75761	827.000
Mason_Granite	5	65.00	353.0000	24.02082	577.000
Mason_FireBricks	5	75.00	341.6000	27.66406	765.300
Marble	5	25.00	393.4000	10.85357	117.800
Tiles	5	25.00	393.4000	10.85357	117.800
PainterI	5	50.00	315.0000	22.36068	500.000
PainterII	5	28.00	305.4000	11.65333	135.800
Sawer	5	58.00	368.4000	29.03102	842.800
Plumber	5	92.00	351.8000	35.13118	1234.200
PlumberHelper	5	75.00	332.0000	27.97320	782.500
Electrician	5	100.00	341.8000	36.79946	1354.200
Electrician_Helper	5	73.00	315.8000	28.96032	838.700
UnskilledWorker	5	33.00	298.2000	13.57203	184.200

As the variability decreases the reliability of data increases accordingly. The job having least variation is Marble laying and Tile laying and that having highest variation is for Electrical work.

Municipality Vs Corporation Study

### Chart 2.1 – Variability of wage rates between Municipality and Corporation
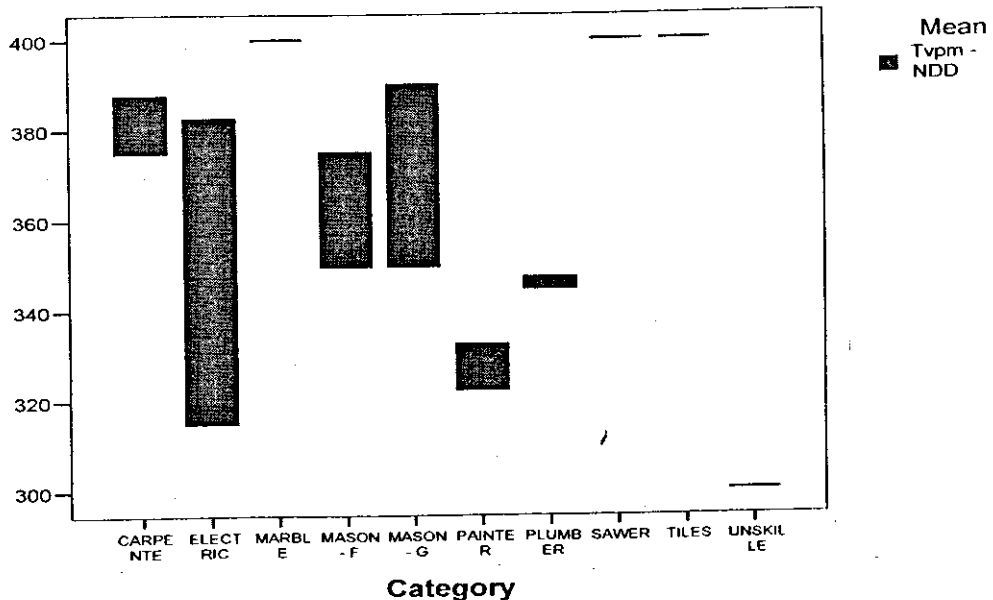
The above chart depicts the variability in wage rate (between Rs.300 and Rs.400) in each category of work between Thiruvananthapuram Corporation and Nedumangadu Municipality. As the wage rates for Marble laying, sawing, tile laying and for unskilled work are same in both Municipality and Corporation, a single line mark only in the graph.

Table 2.3 - Wage rate per hour in Construction Sector in Thiruvananthapuram District

Category of work	Tvpm	NDD	Chenkal	Vembayam	Kudappanakkunnu	Average
CARPENTER I	43	42	39	35	46	41
CARPENTER II	43	42	39	33	46	41
MASON- GRANITE	44	39	37	34	40	39
MASON- FIRE BRICKS	40	39	36	32	37	37
MARBLE	44	44	43	42	43	43
TILES	44	44	43	42	43	43
PAINTER I	37	35	33	32	32	34
PAINTER II	34	34	33	32	31	33
SAWER	45	44	39	40	40	42
PLUMBER	39	37	34	34	44	38
PLUMBER HELPER	34	36	33	34	42	36
ELECTRICIAN	40	36	35	33	36	36
ELECTRICIAN HELPER	37	34	31	32	34	34
UNSKILLED WORKER	32	33	33	29	33	32

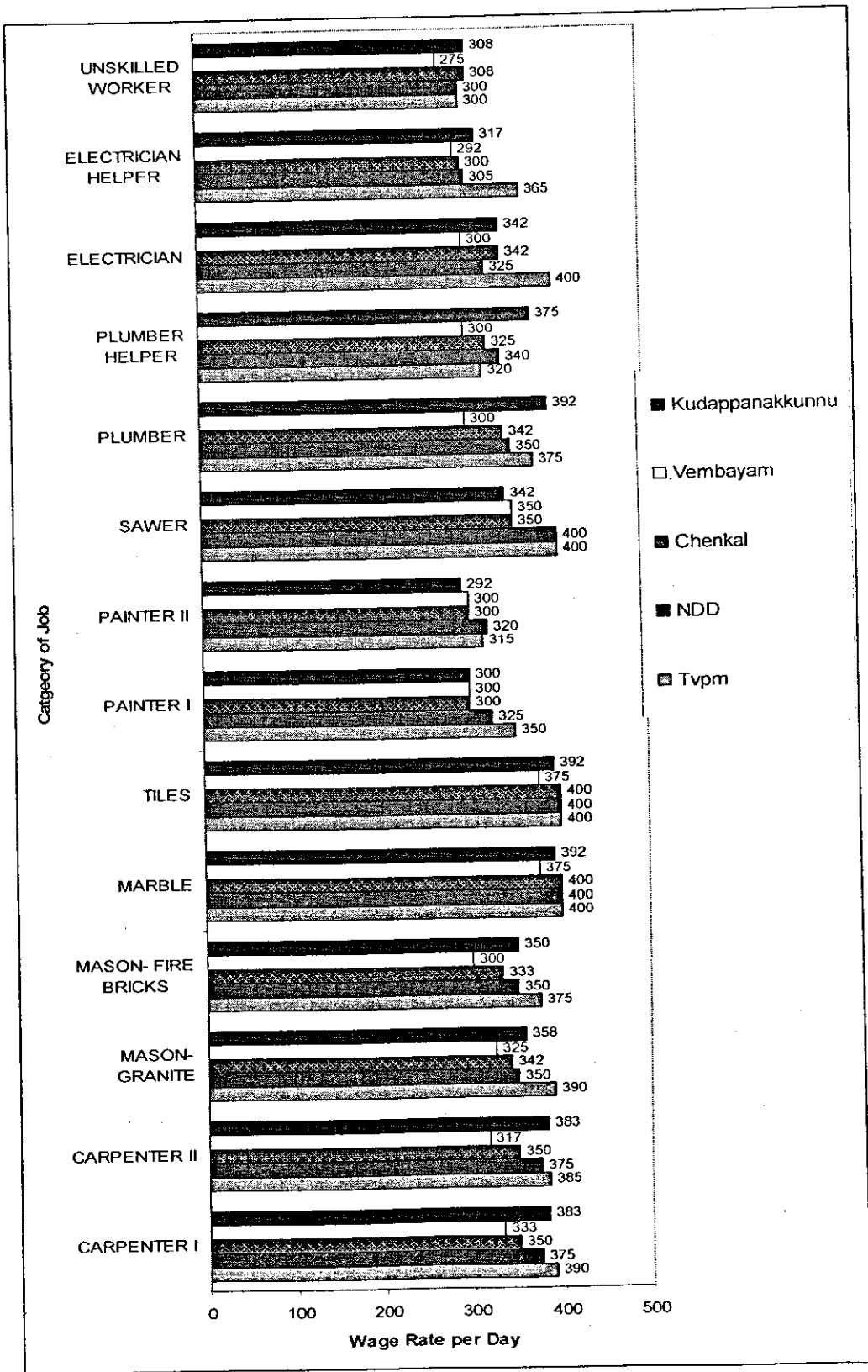## Chart 2.2 - Per hour Wage Rate in all centres – Line graph
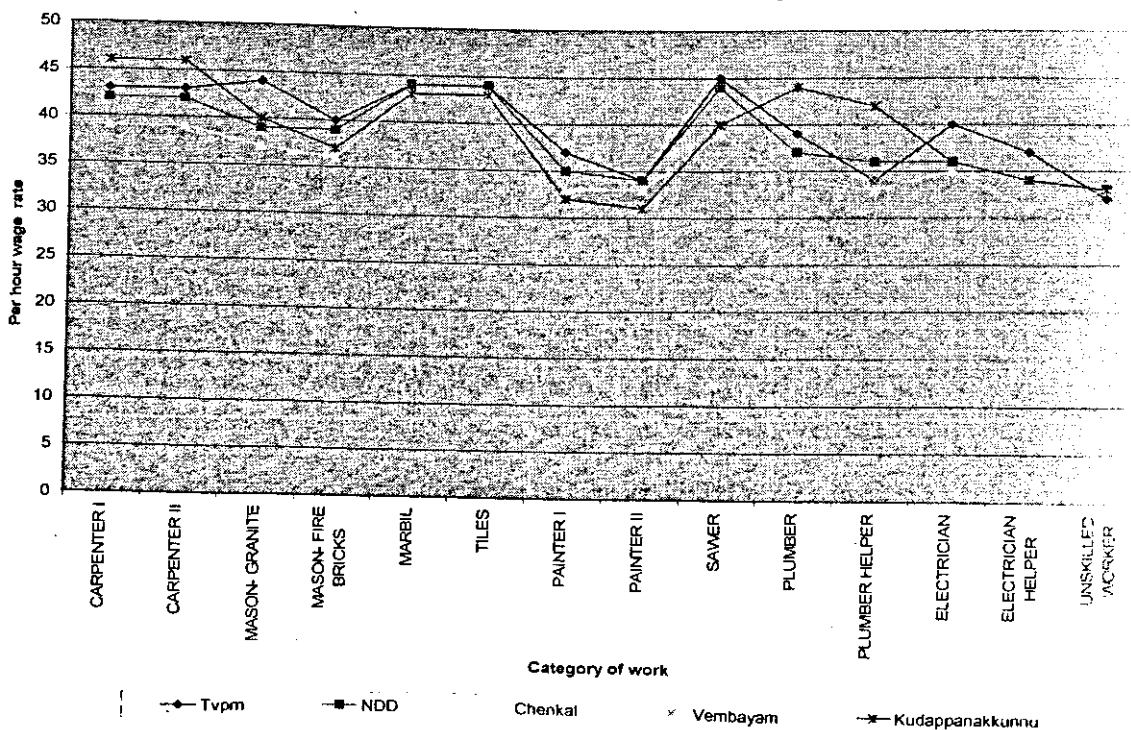
Note: Indication of lines from top (from starting point) to bottom
- Upper line – Kudappanakkunnu Panchayath
- 2nd bottom – Thiruvananthapuram Corporation

- 3rd bottom – Nedumangadu Municipality
- 4th bottom – Chenkal Panchayath
- Bottom – Vembayam Panchayath

Chart 2.3 – Wage rates in Rural and Urban centres

Chart showing Wage Rate per Day (x-axis) by Category of Job (y-axis), with series: Kudappanakkunnu, Vembayam, Chenkal, NDD, Tvpm.

Category of Job	Kudappanakkunnu	Vembayam	Chenkal	NDD	Tvpm
UNSKILLED WORKER	308	275	308	300	300
ELECTRICIAN HELPER	317	292	300	305	365
ELECTRICIAN	342	300	342	325	400
PLUMBER HELPER	375	300	325	340	320
PLUMBER	392	300	342	350	375
SAWER	342	350	350	400	400
PAINTER II	292	300	300	320	315
PAINTER I	300	300	300	325	350
TILES	392	375	400	400	400
MARBLE	392	375	400	400	400
MASON- FIRE BRICKS	350	300	333	350	375
MASON- GRANITE	358	325	342	350	390
CARPENTER II	383	317	350	375	385
CARPENTER I	383	333	350	375	390

Wage Rate per Day

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This Report is Prepared and submitted in continuation of the UNDP Training on QUALITY DATA COLLECTION held during 2nd to 6th June 2009 at Government Gueat House, Thycaud, Thiruvananthapuram, organised by the Directorate of Economics and Statistics, Kerala.

Team No. 1

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REFORMS

&

RENOVATIONS

IN

QUALITY

DATA COLLECTION

A study in Thrissur district

Presented by:

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INTRODUCTION

Thrissur district came into existence on 1ˢᵗ July 1949.It has rich history, cultural heritage and archeological wealth. The word "Trichur" is the analogical version of Thrissur abbreviated from "Thrissivaperur", which means the land of lord Shiva.

Thrissur district is situated in the central Kerala coast (North Latitude: 10° 10' and 10° 46'; East Latitude: 75° 57' and 76° 54') It slopes down from the Western Ghat. It has three distinct natural divisions- the high land, the plain and sea coasts which are Thrissur coasts, Thrissur plain Wadakkanchery upland and Kudassery forest hills. Normal rainfall is more than 3047 mm. Every year average density of rainfall is -2%.Thrissur has 3032 sq km with a population of 29.75 lakhs (males 14.23 lakhs; females 15.52 lakhs), literacy rate 92.27%, density of population 981 per sq km and 6.76 lakh households.

Evergreen forests provide the natural habitat for a vast variety of flora and fauna. It has valuable trees like teak, rosewood, irul etc. Paddy, coconut, Areca nut and banana are the mainly cultivated crops. Coconut is the main crop. Main rivers are Bharatha puzha .Kecheri puzha, Karuvannur puzha and Chalakudy puzha.

We have 5/63* taluks, 138/1452* villages, 1/5* corporations, 6/53* municipalities, 17/152* block panchayats and 92/999 *gramapanchayats. Density of population is 981/819*, literacy 92.27/90.86*, paddy area 36351/289974* hectares, rice produce 87463/667105* tonnes, coconut 85115/399267* hectares. (* Thrissur / Kerala)

OBJECTIVES

Modernization of Statistical system through reforms and renovation of data collection.

COVERAGE

Data collection for EARAS, cost of cultivation, price, soil evaluation, wage structure, NSS and adhoc surveys are the major works in this department.

Line and staff system and work load are the main subject to be reviewed. Management of quality data collection is to be discussed with the primary workers strength. Any fallacy in primary workers strength or quality data collection leads to the damage of this system. Some of the points are to be considered for the reforms and renovation of data collection. A critical view is necessary for the efficient performance. From the beginning of the sample survey, present system has great chances of sampling errors. The investigators personal bias regarding the choice of technique and drawing of sample may lead to opposite result. In the absence of qualified and trained investigators, results obtained from sample survey

will be defective. They are deliberative or purposive. Fundamentally, this is not considered as a scientific approach as it allows for bias or personal prejudice. The investigators may start with preconceived idea and draw sample such that units selected will be subject to specific judgment of the enumeration. In the absence of scientific application of stratified tools, it becomes difficult to establish the significance of statistical error. Forecasting also lies in this realm. The process of making certain estimate of future events is referred to as forecasting, analysis of past and present economic conditions. The rapidity of change of situation, the conversion of land position, fashioning, trend towards automation etc. should be based on scientific analysis of past and present conditions on the view to project into the future. Similarly, the price collection by law of demand, we know that a qualitative and functional relationship between the price of a commodity and quantity demanded. The price and quantities are inversely related. On demand, inverse effect, substitution effect and price effect reflected. Price elasticity for a derived product like rice does not affect its demand for keralites. In case of rice consumption, people shift the quality according to their own tastes. But quantity of purchase of rice stand fixed.

The element of time has a strong influence on elasticity of a product. The time governing elasticity is measured by durability of the goods. But in Thrissur district, in Kerala, less durability of food item is same as more

durability of luxury goods i.e. less elasticity of food and more elasticity of luxury goods are same.

WHY WE SAY SO?
CONTEMPLATE SOME POINTS IN QUALITY DATA TO SUPPORT THE AFORESAID COVERAGE.

EARAS

- Data collected in EARAS is not used for Panchayat level planning. It is not generalized.
- If it is a generalized data, not published such way.
- If the data published, no analysis or suggestion is made
- Not technically supported quality and quantity of crop wise details.
- Primary works, say investigations, have no proper training to identify survey numbers with FMB.
  Also they are not able to identify special crops. (Time waste, this method is not directly used for data collection.)
  - At present, data collected are investigation oriented and not cultivation oriented.
  - Present system of data collection is used for land utilization analysis only.
  - Data collected, in random sample, used for yield estimation. Actually cultivators yield estimation required.
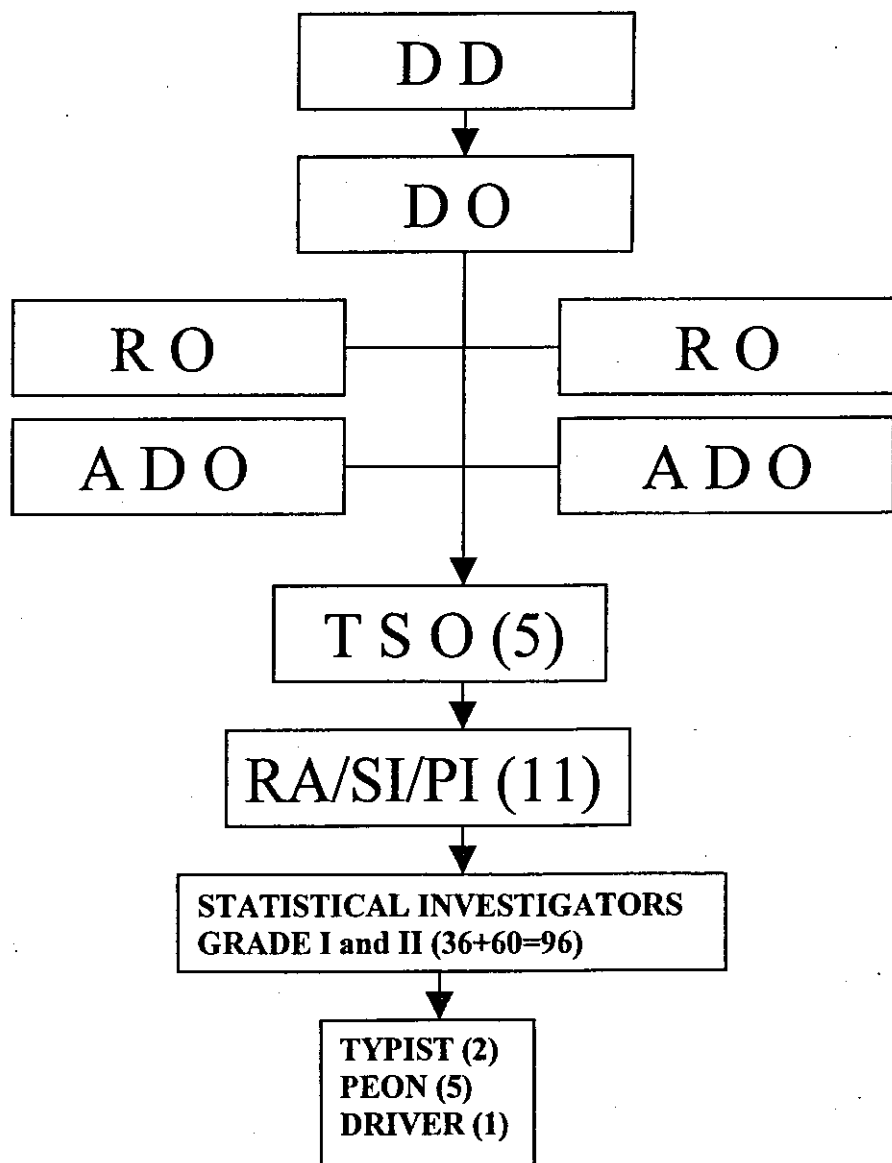
Lands in Kerala can be divided into two:

1) Lands used for agricultural activities. Such owner who has intent, attention, utilization and satisfaction.

2) The remaining is used for 'Real Estate'. Nowadays real estate lobbies are active in Kerala in general and Thrissur district in particular.

- We have a preferred season which is equated with all India nature.
- Our collection data are not used for panchayat planning. A data manager visiting is not explored.
- In diatri price, late approval of price affects for price quoting in quotation.
- In the current situation quantity and quality are changed rapidly, say 500 g disappeared. It becomes 475 g without change in price. The price of quantity and quality are leveled with price schedules do not compromise with present situation. Purchase behavior of the people in Trichur district varies and correlated with consumer marketing advertisement. We are all a test dose customers.
- Data collected for the farm price is the average price of 15 days. Selected cultivator may not sell their farm produce during this period.

- In Thrissur district local agricultural produce uniformly decreases and secondary market play a key role on price.
- Market in globalization, fluctuation in prices, corporate management in purchase of agriculture commodity results a vice versa effect in farm price.
- Land to be converted into small size; 'paattam' cultivation, output reduction etc severely affect the data collection for cost of cultivation.
- About wage structure, no data collected for RCC workers.
- About soil conservation, fund allotted for soil conservation is utilized for other purpose, say construction of roads in the name of soil conservation. Hence data collection for this purpose is futile.

DIAGRAMMTIC REPRESENTATION OF STATISTICAL DEPARTMENT IN THRISSUR
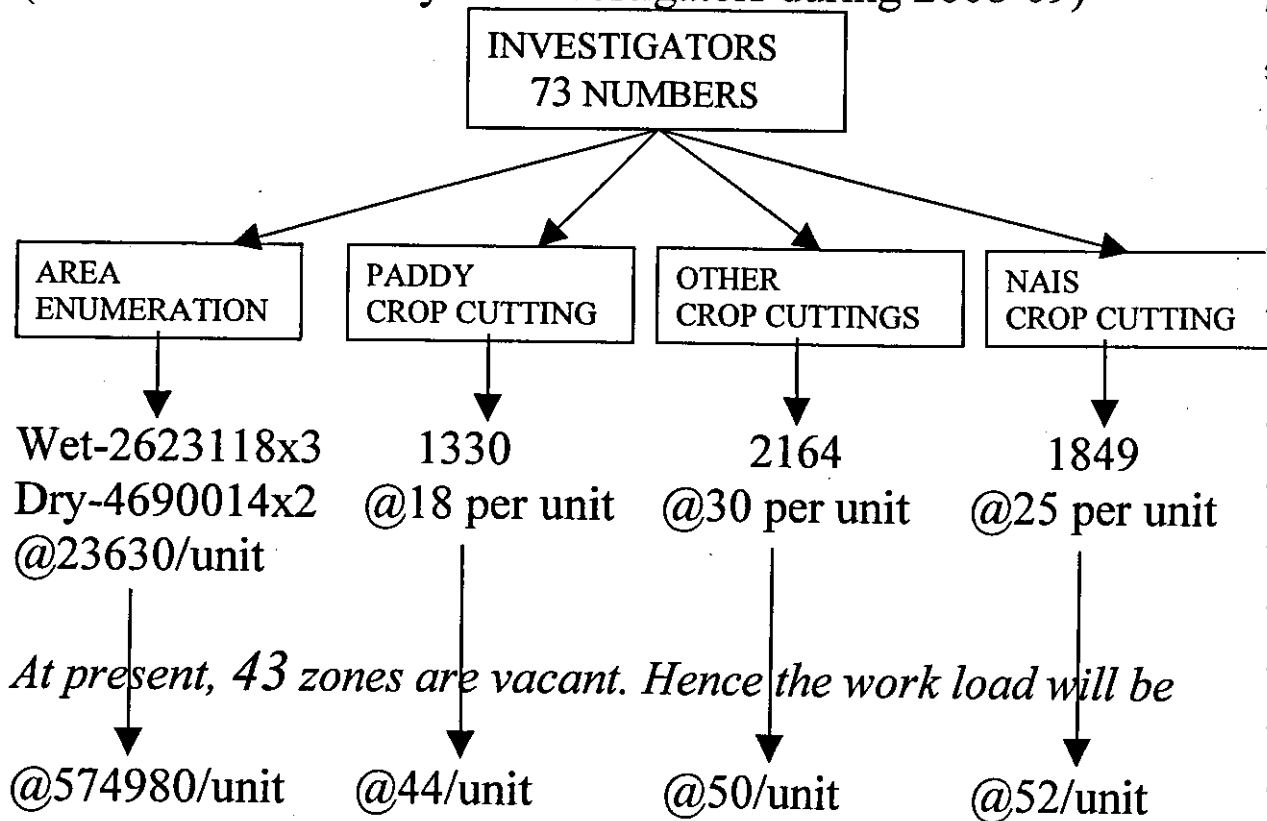
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        ┌──────────────────────────────────┐
        │ STATISTICAL INVESTIGATORS         │
        │ GRADE I and II (36+60=96)         │
        └──────────────┬───────────────────┘
                       ▼
                ┌────────────────┐
                │ TYPIST (2)     │
                │ PEON (5)       │
                │ DRIVER (1)     │
                └────────────────┘
```

Total staff strength in Thrissur: 126

DIAGRAMMATIC REPRESENTATION OF WORK LOAD OF THE PRIMARY WORKERS

(Actual Work done by the investigators during 2008-09)

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                    ┌─────────────────┐
                    │  INVESTIGATORS  │
                    │   73 NUMBERS    │
                    └─────────────────┘
        ┌──────────────┬──────────┴───────┬──────────────┐
        ▼              ▼                   ▼              ▼
┌──────────────┐ ┌──────────────┐ ┌──────────────┐ ┌──────────────┐
│ AREA         │ │ PADDY        │ │ OTHER        │ │ NAIS         │
│ ENUMERATION  │ │ CROP CUTTING │ │ CROP CUTTINGS│ │ CROP CUTTING │
└──────────────┘ └──────────────┘ └──────────────┘ └──────────────┘
        ▼              ▼                   ▼              ▼
Wet-2623118x3       1330              2164             1849
Dry-4690014x2    @18 per unit     @30 per unit     @25 per unit
@23630/unit
```

At present, 43 zones are vacant. Hence the work load will be

@574980/unit   @44/unit   @50/unit   @52/unit

If we have 73 investigators, the work load is 2362.92 acres of area enumeration, 73 numbers of crop cutting experiments (number of crop cutting of coconut, arecanut, nutmeg, cashew etc. are more than two).

At present, there are 43 vacant zones, the actual work load is 5749.79 acres of area enumeration, 146 crop cutting experiments. This shows an uphill task for an investigator to collect a quality data. Beginning of the survey, 100 cluster formation and identification required minimum 400 hours (i.e. 40 days of working hours). In Toto, an investigator has

minimum 686 days in an agricultural year without counting any holiday, leave etc. In simple words, present work load is twice the normal work load. Adhoc surveys amount to another burden of work load of the primary worker. These situations create an unqualified data collection for the survey. By the actual calculation, an investigator has 2.16 times greater than normal work load.

REFORMS AND RENOVATIONS

1) Systematic deficiencies and remedies:-

A three fold panchayath system is introduced in the nation and more power is given to the Gramapanchayath.For planning, panchayath wise data is needed. To cope up with this the method of collection of statistical data may be restructured at panchayath level and each panchayath may be considered as one Investigator zone. The statistical data should be available at panchayath itself and it should be ensured that the investigator is a reliable data bank that common people could trust. The private agencies that collect data at present would lose their importance. For this purpose statutory power shall be given to the department on the basis of collection of statistical data. We can also prepare accurate and good quality data. For achieving this goal one investigator must be posted in

each panchayath so that people and their representatives can approach the investigator as and when they require data. This data has to be consolidated block wise at taluk level and taluk wise data are to be consolidated at district level and then at state level. The administrative control of the Investigator should be with the Taluk Statistical Officer.

2) Technical deficiencies and remedies:-

Our main work is EARAS Survey. Litho map and FMB are essential for the conduct of this survey. At present Litho map, FMB etc. are not fully available and BTR is not properly maintained in village offices. For the smooth conduct and timely starting of the survey it should be ensured that these are available in Taluk Statistical Office by making use of modern Information technology, so that time is saved and work becomes easier and more accurate. Using an alternate method we could depend on panchayath level house hold list (Land holding list) instead of survey no., BTR etc.

The basic qualification for entry in to the service should be raised to graduation. Pre-service training including Survey training for at least 6 months must be made compulsory to the new comers. Besides, training should be given to our primary workers also, at least once in a year. For this, a training institute under the control of department may be set up.

3) Operational deficiencies and remedies:-

The field staff has the view that the present EARAS system must be modified. They suggest decreasing the number of clusters enumerated from 100 to 50 and increase the total area of cluster from 5 acre to 10 acre. They also suggest that the clusters may be formed by surrounding key plot with adjacent survey numbers without gap. The area of one survey no. can be fully enumerated. House hold wise or land hold wise cultivator list can be used for the process of key plot selection. Algebraic sum of cultivators/holders area gives a cluster which will be a uniform formation.

For crop estimation survey for paddy cultivators list can be framed from panchayath itself. In this case, information can be obtained directly from the "Padasekharam committee". In one panchayath if a crop is not available above a certain percentage this panchayath need not be included (for that particular crop) in crop cutting experiment.

Considering geographical and climatic condition of Kerala, Agricultural year may be changed as from 1ˢᵗ June of a certain year to 31ˢᵗ may of the next year. The season may be rescheduled as follows:

Autumn-June to September
Winter-October to January
Summer-February to May

The counting method of trees and plants is inadequate and difficult. During presentation and summarization of data, errors may pop up when the data get adjusted for conclusion. Number of crop per unit area is different from place to place even at the panchayath level. Hence multiple crops of a cultivator holding are distributed in terms of area basis. Thereby good average is obtained. All observations are sensitive to change but they do not affect the extreme values or fluctuations. Crop density varies from plot to plot.

In Mukundapuram Taluk at present 3(a) 3(b) prices are collected from Chalakudy and Koratty centre. Koratty is situated 5k.m. away from Chalakudy. Commodity transaction in Koratty area is very rare and the shop establishments there are reduced day by day. It is a fact that most transactions are being done at Chalakudy. Hence price collection centre may be shifted to Irinjalakuda retaining Chalakudy centre, since Irinjalakuda is a municipal town and belongs to the same taluk as Chalakudy. In the price collection, out-dated and irrelevant items in the schedule should be removed. It is recommended to revise commodities, qualities and quantities with market and purchasing attitude of the consumer.

While planning adhoc Surveys in a district, importance may be given to regional factors. It would be fruitful if surveys are conducted district wise. This may be

compiled in district and published at district level so that easier data availability is ensured.

Wide publicity may be given about the department, adhoc Surveys etc. through Doordarshan, radio, newspapers and other media of mass communication. This will create more awareness about the department. Pamphlets could be published to motivate the common people from whom the data is being collected. Risk allowance and insurance coverage may be provided to the field staff.

4) Man power deficiencies and remedies:-

At present system, an investigator of a zone suffers from enormous work load of 3 visits in wet land area, average 146 number of crop cutting experiments, 24 numbers of paddy crop cutting experiments, one exclusive visit in dry land area, different types of major and minor crop selection, along with additional work entrusted by the department for other surveys with nominal honorarium. Such work load brings down the efficiency of an investigator which may lead to the depreciation of Statistical values and qualities. So the outcome will be that the data available is inaccurate. Under the present system work load of an investigator is 3250 hours per year for field operation and 975 hours per year for record work. In total, 4225 hours per year is required. It is amazing and

impossible for a human being. So the best management required for Human Resource Development. Hence an Investigator must be posted in every panchayath, one in every Municipality, and two investigators in each Corporation. Thus by making a data bank in panchayath level, work load can be minimized. A proper job chart may be framed for work. Training in departmental, Agricultural and chain surveys are essential. Regarding the spot check survey, at present there is only one Compiler in Thrissur Corporation. 15 Divisions have been selected for spot check survey every year. Earlier in Municipality the number of wards to be covered was 15. In a municipal ward the coverage of households was only about 200 to 250 per month. But in corporation even though the number of divisions to be covered in a year were the same as in municipality, the number of households to be covered per month become more than 1000. Providing a single compiler for this will not be sufficient. So it is recommended that in Thrissur Corporation the number of compilers under spot check survey should be raised to three.

5) Infrastructure deficiencies and remedies:-

Computers must be established in taluk level with Internet and Email facility. A computer technician may be appointed on contract basis. He must be well-versed in software and hardware. Computer training may

be given to all the staff. Panchayath, taluk, district, and state may be interconnected by computer networks by which all data can be available to the public more easily, besides providing telephone to all taluks. The monthly diesel quota to the department vehicle attached to district office may be raised to 110litre so that the effective supervisions can be conducted covering remote areas. For effective supervision of field work at taluk level covering the remote areas of the taluk, it is suggested that each taluk is provided with a separate departmental vehicle.

6) Institutional deficiencies and remedies:-

Provide own building with furniture and record room to all taluks. Each primary worker in panchayath must be provided in office itself, so that public will avail the data from there. The office would be under the control of Taluk Statistical Officer. While planning and organizing a survey it may be discussed with the field operation wing so that the practical difficulty can be minimized.

7) Lack in modernization and remedies:-

The computer with internet and browsing facilities in panchayath/taluk/district is essential. Governmental publications must be available to all.

Portable electronic weighing machine must be available for crop cutting estimation. Providing a fax machine and a photocopier at the taluk and district offices may widen up their workspace and reduce work load.

HOW TO COLLECT A QUALITY DATA AT THIS JUNCTURE?

1. Primary level investigators are always in full strength. No vacancy permitted. It is considered as 'Essential service'. Number of investigators zone rose to equivalent number of panchayaths.
2. To avoid lack of knowledge in handling available information, lack of information, lack of correctness in information etc. make a qualified data.
3. Investigators were able to quantify uncertainty and this paved the way for devising methods to reduce and control uncertainty.
4. Data collected for EARAS from 'cultivator' or 'household' basis. Present system of survey number and FMB basis may be avoided (to avoid time waste).
5. Data collected for cost of cultivation from crop wise cultivators. Presently some crops like coconut, areca nut etc. are selected from paddy cultivators list.
6. In Thrissur district, ginger and turmeric cultivators have minimum 10 cents. Minimum area concept should be changed for better data collection.

7. In all surveys, a questionnaire will be framed by a core group consisting of 3 investigators, 3 supervisors and 3 higher officials of the respective fields i.e. in a practical sense, good quality of data can be derived from a good questionnaire.
8. Recognizing statistics on the key technology for planning in local level or the decentralized planning should have statistical quality data backing.
9. Lack of fine tuning over the years make the systems and in particular the governance of low quality data that is reflected through the service delivery.

Data collected will have to be interpreted to get meaningful information. Information on physical implementation, its timely progress, effective utilization of inputs, deviation from project priorities and time frame, field problems etc. have to be processed from the quality data collection.

The information thus processed should be communicated on time to the decision making units. Monitoring information can be communicated to various levels. In the program hierarchy, according to the quality data collection intervention, results would be satisfactorily concluded.

Thus good quality data deliver good results.

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KERALA FORESTS & WILDLIFE DEPARTMENT

1. Forests of Kerala form part of Western Ghats, which is one of the 'biodiversity hot spots' in the world. The State, with a long history of scientific management of forests dating back to1896, maintains 28 percent of its geographical area under forests and 46 percent under tree cover in spite of the ever increasing demographic pressures. It is significant to note that the above figures are much above the national average. Kerala State was first in the country to discontinue clear felling of natural forests in 1981 for raising plantations of economically important species. In 1986, selection felling for extraction of economically valuable timber in the natural forests was also discontinued. Towards the end of 1980s the State had evolved a strategy of managing its natural forests for maximum intangible ecological benefits and of managing its plantations for maximum productivity to meet the increasing demand for timber and firewood

2. From 1934 onwards, protected areas have been constituted in the biodiversity rich areas of forests in the State giving thrust on conservation of wild flora and fauna. Presently, the State has more than 6 percent of its geographical area and more than 22 percent of its forest area under sanctuaries and national parks. The above figures are also much above the national average. Towards the end of last decade, the State has adopted the strategy that livelihood improvement of the forest dependent communities including the tribal population provides best opportunity for ensuring biodiversity conservation. Grass root level institutions of people called Vana Samrakshana Samithies (V S S s) and Eco Development Committees (E D C s) have been constituted to take up the above task. 405 V S S s and 191 E D C s have established meaningful partnership with the Forest Department, Local Self Governments and Non- Governmental Organizations throughout the State, working harmoniously towards the above stated goal.

MANAGEMENT OF NATURAL FORESTS

5. Natural Forests in Kerala are being managed mainly for sustaining the life support systems and biodiversity conservation. During 2007-08 also, no timber was extracted from the natural forests by way of clear felling or selection felling. Only timber from wind fallen trees was extracted wherever it is economically viable. The major activities taken up during 2007-08 were Survey of Forest Boundaries. Forest Protection and Regeneration of Denuded Forests. Boundary demarcation was also carried out by construction of cairns and kayyalas (dwarf walls) along the boundary of the forests. Degraded forest areas were rehabilitated by planting in gaps with the local species. Protection of the forests from fire was carried out mainly by undertaking firelines and engaging fire protection watchers. The achievements under the above activities during the year 2007-08 are given below.

Name of the item	Unit	Achievement
Boundary demarcation		
a. Construction of cairns	No	5367
b. Construction of dwarf walls	Km	37
c. Maintenance of cairns	No	521
Regeneration of Denuded Forests		
a. Planting new areas	Ha	259
b. Maintenance	Ha	9767
Fire Protection		
a. Creation of fire lines	Km ·	3417
b. Fire protection watchers	No	695

MANAGEMENT OF FOREST PLANTATIONS

6. Efforts were made to adopt modern technologies including the use of improved seeds and modern nursery practices in raising the plantations during the year 2007-08. Plantations of Hardwood species of local origin, pulpwood species for supplying raw materials to industries, medicinal plants species and non-wood forest products species like canes and bamboos were raised during 2007-08. The existing

plantations were managed by adopting intensive cultural operations. The details of plantations raised during 2007-08 are given below.

Item	Planting New Areas (Ha)	Maintenance of plantations (Ha)	Remarks
Hardwood species	12	527	
Industrial Raw Materials	799	1101	
Medicinal Plants Cultivation	117	804	
Non-Wood Forest Species	135	822	

EXPENDITURE

3. During the year 2007-08, total budget allotment of both Plan and Non-Plan schemes and the expenditure incurred on various schemes are given below.

SL. No.	Schemes	Budget Allotment (Rs in Lakhs)	Expenditure (Rs. In lakhs)
I	Plan		
a	Central Share	1764.620	1348.459
b	State Share		
i	Revenue Head	2852.870	2577.393
ii	Capital Head	2065.000	1042.192
	State Share Total (b)	4917.870	3619.585
	Total (Plan)	6682.490	4968.044
II	Non Plan	14159.690	11804.390
	Grand Total	20842.180	16772.434

Total amount earmarked on various schemes was Rs. 20842.18 lakhs, the expenditure incurred was in the tune of Rs. 16772.434 lakhs.

FOREST REVENUE

4. In the Revenue aspect,the forests contribute substantially to the non-tax revenue of the State amounting to Rs. 154crores in 2007-08. The forests also supply non-wood forests produce valued at Rs. 5.00 crores annually. Forestry sector provides maximum employment opportunities to the rural masses including the tribals.

WILDLIFE MANAGEMENT

7. The Protected Areas are managed by the Wildlife Wing of the Department. There are 21 Protected Areas in the state which involve 15 Wildlife Sanctuaries including 1 Tiger Reserve, 5 National Parks and a Community Reserve. The total area under the protected area network comes to about 2454 Sq.Km which forms 22.2% of the total forest area of the State, which is higher than national average of 19.5. Statement showing details of Protected Area is given below:

Sl. No	Name of National Park/ Wildlife Sanctuary	Area in Sq.kms
National Parks		
1.	Eravikulam National Park	97.00
2.	Silent Valley National Park *	89.52
3.	Pambadum Shola National Park.	1.318
4.	Mathikettan Shola National Park.	12.817
5.	Anamudi Shola National Park.	7.50
Wildlife Sanctuaries		
6.	Periyar Wildlife Sanctuary ** (Core area (350 sq.km). has been declared as Periyar National Park in 1982	777.00
7.	Wayanad Wildlife Sanctuary	344.44
8.	Parambikulam Wildlife Sanctuary	285.00
9.	Neyyar Wildlife Sanctuary	128.00
10.	Peechi-Vazhani Wildlife Sanctuary	125.00
11.	Shendurney Wildlife Sanctuary	171.00
12.	Chinnar Wildlife Sanctuary	90.44
13.	Idukki Wildlife Sanctuary	70.00
14.	Aralam Wildlife Sanctuary	55.00
15.	Peppara Wildlife Sanctuary	53.00
16.	Chimmony Wildlife Sanctuary	85.00
17.	Kurinjimala Sanctuary	32.00
18.	Thattekkad Bird Sanctuary	25.00

Sl. No	Name of National Park/ Wildlife Sanctuary	Area in Sq.kms
19.	Mangalavanam Bird Sanctuary	0.0274
20	Choolannur Pea Fowl Sanctuary	3.42
Community Reserve		
21.	Kadalundi-Vallikunnu Community Reserve	1.50
	Total	2453.9824

Note: * Another 148 sq.km Reserve Forest area has been added to Silent Valley National Park as its buffer zone in 2007.

** : Another 148 sq.km Reserve Forest from Ranni Forest Division is added to Periyar Tiger Reserve as critical tiger habiat during 2007.

8. Major activities of this Wing include protection of forests and wildlife, conservation of bio- diversity, improvement of wildlife habitat conditions, developing facilities for ecotourism, ecodevelopment and conservation education. The India Ecodevelopment Project implemented in Periyar Tiger Reserve has got wide recognition nationally. The project was successful in weaning out forest offenders and make them part of conservation efforts. Presently, the Department is trying to emulate the Periyar model in the management of all the PAs of the State. In addition, schemes like Project Elephant, management of Biosphere Reserves, management of captive elephants etc. are also being implemented. With the participation of elephant owners, temple trusts, elephant welfare association etc., the Forest Veterinary Unit of the Department has successfully implanted microchips in 625 numbers of captive elephants with the objective of identification, control and monitoring the transport and exchange of ownership of captive elephants. The mandate of conserving biodiversity and ecosystems outside the forest area has been initiated by declaring Kadalundi estuary as a Community Reserve.

9. During the 2007-2008, an amount of Rs.1939 lakhs were earmarked under various schemes and out of which Rs.1597.90 lakhs were utilized Statement showing physical achievements during the period is given below:

Sl.No.	Name of Scheme	Expenditure (lakhs)
I.	100% Centrally Sponsored Scheme	
1.	Project Elephant	124.00
2.	Nilgiri Biosphere Reserve	105.31
3.	Agasthyamala Biosphere Reserve	100.44
II.	50% Centrally Sponsored Scheme	
4.	Development of National Parks and Sanctuaries	1189.31
III.	100% State Sector Scheme	
5.	Conservation of Biodiversity	41.74
6.	Ecodevelopment Programme	9.46
7.	Conservation of Silent Valley forest areas	27.64
8.	**Total**	1597.90

10. It is estimated that out of the total expenditure, about 70 percent has been utilized for employment generation. Accordingly, it is estimated that 5,59,300 man days were generated during 2007-08.

ECO-DEVELOPMENT & TRIBAL WELFARE ACTIVITIES

11. Kerala Forest Department has implemented the following projects/schemes under Eco-development & Tribal Welfare during 2007-08.

(a) National Afforestation Programme (NAP)

12. NAP is a 100% Centrally Sponsored Scheme which started implementation in the State from 2002-03. The scheme is being implemented through Forest Development Agencies (FDAs) at the apex level and Vana Samrakshana Samithies (VSSs)/Eco-development Committees (EDCs) at the grass-root level. 25 FDAs participated in the implementation of NAP during 2007-08 as against 15 FDAs participated during the preceding year. The scheme is aimed at the following:

(1) Employment to the local communities through afforestation & conservation programme, thereby creating valuable forest assets for the dependent communities.

(2) Other durable community assets for overall eco-development of the target communities/villages.

13. The financial assistance received from Government of India during the year was Rs.14.80 crores which accounted for 89% of the total receipts from Government of India during the preceding four year period from 2003-04 to 2006-07. The activities under the scheme include planting of different species. Bamboos and medicinal plants are thrust areas under the scheme. An extent of 6490.84 ha of forest land has been covered under the scheme during 2007-08 at a cost of Rs.9.17 crores. In addition to the planting components, a significant outlay (30%) is earmarked for Entry Point Activities (EPA) intended to benefit the forest dependent communities. The EPA include water supply schemes, construction of roads, culverts, sheds for anganvadies and of community halls, installing of energy saving devices like solar lamps, smokeless choolas and biogas. Providing revolving fund for self help groups is another important component

of EPA. An amount of Rs.82.16 lakhs has been utilized for these activities and a total of 5,00,153 mandays employment has been generated during the year.

(b) Tribal Insurance Scheme

14. Tribal Insurance Scheme 'Hospitalization Benefits and Personal Accidents Benefits for the Scheduled Tribes & Scheduled Castes in the Forest Area' continued this year also. All the tribal populations within the forest area have been covered under the scheme at a total premium of Rs.4.75 lakhs. 15 beneficiaries have received a total amount of Rs. 6.47 lakhs during the year.

(c) Scheme for welfare of tribals living within forest area

15. The Scheduled Tribe Development Department has sanctioned an amount of Rs.1 crore for the above scheme. The scheme is being implemented through 5 Forest Development Agencies (Wayanad Wildlife Sanctuary, South Wayanad, North Wayanad, Peechi & Periyar Tiger Reserve (East)). The activities cover sectors such as agriculture, animal husbandry, education, health, self employment generation programme etc..

ECO-TOURISM

Eco-tourism activities are being given increasing importance. Implementation of 42 eco-tourism projects with the financial assistance from the Tourism Department is continued during the year also. An expenditure of Rs.162.63 lakhs has been incurred during the year for these projects.

SOCIAL FORESTRY

16. The Social Forestry Wing was formed during 1983 –84 for implementing the World Bank Assisted Social Forestry Project. This Project was completed on 31.03.1993. After the closure of this project the State Government had decided to entrust the implementation of Compensatory Afforestation of degraded forests to Social Forestry Wing.

(a) Compensatory Afforestation

17. This Programme commenced in 1994. The objective of the Scheme is to afforest in an area of 57180 Ha. of degraded forest in lieu of 28588 ha. of Forest land diverted for regularization of encroachments prior to 1.1.1977. The programme was a pre- condition laid by Government of India for issuing clearance for distribution of pattas to the encroachers on forest land prior to 1.1.1977. 57050 Ha. of degraded areas were afforested upto 2006-2007 and an area of 130 Ha were planted during 2007-08. An expenditure of Rs. 860.752 lakhs were incurred during 2007-2008 for planting and maintenance.

(b) Afforestation Outside Forest Area

18. The objective is to increase tree cover in non-forest areas to achieve the ideal target of 33.33% of forest cover. The following schemes were implemented during 2007-08.

(i)My Own Tree Programme (എന്റെ മരം പദ്ധതി)

19. This is a joint venture of Forest Department and Education department. Under this scheme one seedling each was planted by students from Standard V to Standard IX. This scheme also aims at creation of awareness towards environment protection among younger generation. 24.35 lakh seedlings were planted under this scheme during 2007-08. An expenditure of Rs. 127.32 lakhs was incurred for raising and distributing the seedlings to schools.

(ii) Shade on Wayside Project (വഴിയോര തണൽ പദ്ധതി)

20. This Scheme aimed at raising avenue plantations for shade, is a joint venture of Forest Department and trade union workers. About 92226 Nos. of seedling were planted along the sides of important roads, especially in urban areas

during 2007-08. The expenditure incurred for this project during 2007-08 is Rs. 11.83 lakhs.

(iii) Green Coastal Line Project (ഹരിത തീരം പദ്ധതി)

21. The Scheme aims at protection of coastal line from natural calamities like Tsunami, Sea erosion, Cyclone etc. by establishing bio-shield of sand binding trees and shrubs. This project is being implemented through Theera Samrakshana Vanavalkarana Samithies (TSVS). An extent of 105 Ha of area in 106 costal wards covering all the 9 costal districts has been afforested through 105 TSVS during 2007-08 by incurring an amount of Rs. 189 lakhs.

(iv) Our Tree Project (നമ്മുടെ മരം പദ്ധതി)

22. This Scheme aims at planting of seedling in the compounds of education institutions and public compounds by student of Higher Secondary School and Colleges, during 2008-09. The Nursery works for raising seedlings required for this scheme commenced in 2007-08.

(v) Conservation & Management of Mangroves in Vembanadu and Kannur.

23. This Project aims at the conservation and protection of Mangrove Forests in Vembanad in Alappuzha District and in Kannur region. The expenditure incurred during 2007-08 for Vembanad is Rs. 9.91 lakhs and for Kannur is Rs. 6.93 lakhs.

(vi) Raising Herbal Garden in Schools

24. The Social Forestry Wing is also implementing a Scheme named raising herbal garden schools in all districts except Kannur and Thrissur with assistance of State Medicinal Plant Board. Rs. 1.26 lakhs each has been allotted to all the district for raising good quality basketted seedlings.

RESEARCH

The Department of Forests & Wildlife has been sponsoring research programmes through selected research institutions like KFRI, TBGRI, Kerala Agricultural University, Rajiv Gandhi Centre for Bio-Technology etc. The research programmes include study on flora and fauna, eco systems analysis and technology development for better productivity in forests. As part of the research finding of Rajiv Gandhi Bio-Technology Centre and Kerala Forest Department have filed an application for patent for a new drug.

During the year 2007-08, an amount of Rs. 10 lakhs was earmarked for Research Programmes. The total expenditure incurred under this scheme comes to Rs. 9.91 lakhs.

TRAINING

Human Resource Development Programmes of the department includes training of staff and interaction with communities through seminars, workshop, training programmes in participatory forest management and eco-development etc.

The Department of Forests & Wildlife has a Training wing under the control of the Chief conservator of Forests (IHRD), with headquarters at Thiruvanamthapuram. During the year 2007-08, a total number of 589 persons was imparted training on various subjects including Forest Rangers, Foresters & Forest Guards. In addition, 193 staff of ministerial wing was also given training on Store Purchase Rules and Procedures at IMG. The total expenditure incurred by the IHRD wing during 2007-08 comes to Rs 482.59 lakhs.

FOREST MANAGEMENT INFORMATION SYSTEM

Computerisation program of the department was started as one of the major initiatives of the World Bank Assisted Kerala Forestry Project (KFP), which was implemented during the period from 1998 to 2003 at a total project outlay of Rs. 182.39 Crores. During the current year the development and implementation of the Forest Management Information System (FMIS) including Geographic Information System (GIS) and other residual activities of the KFP are undertaken with the financial assistance from the State Budget (129.8 lakhs). Kerala is the only State in India, which has been able to successfully develop seventeen customized modules including GIS, designed for capturing all the major activities of the department. Computerisation has been done for the Offices downto Range level and networking of computers has been established downto Division level Offices. The critical modules like Accounts, Sales, Offence, Court Case, and Fire management could be successfully implemented. The department has also developed a Geographic Information System (GIS) first of its kind in a line department under the Government of Kerala. This unit has already developed spatial database of 12 Revenue Districts of Kerala having 23 layers. This comprises of spatial database of 21 Forest Divisions and all Wildlife Divisions. The spatial database so developed is made available to all offices upto division level using the customized GIS module developed by consultants support. With the use of the modern technology of GIS and Remote Sensing, a model-working Plan has also been prepared for Thiruvananthapuram Forest Division. Maps required by the users at various levels of the department are also being generated in the GIS unit and made available to them within a short span of time.

Division-wise area of Forests in Kerala as on 31.03.2008, species-wise area under Forest plantation and production of major Forests products etc. are given in annexure.

Division-wise Area of Forest in Kerala (as on 31-03-2008)

(Area in Sq.Km)

Sl.No.	Division	Reserve Forest	Proposed Reserve	Vested Forest	Total
1	2	3	4	5	6
1	Thiruvananthapuram	359.1240	5.8253	3.6510	368.6003
2	Thenmala	123.4320		7.7350	131.1670
3	Achencoil	284.3298		0.2082	284.5380
4	Ranni	1050.3360	7.1600	1.5680	1,059.0640
5	Punalur	280.0510		0.1690	280.2200
6	Konni	320.6430	11.0210		331.6640
7	Kothamangalam	316.8451		0.1576	317.0027
8	Munnar	371.3950		2.4500	373.8450
9	Marayoor	13.9720	47.2600	0.0760	61.3080
10	Mankulam	90.0600			90.0600
11	Kottayam	627.2870		31.9670	659.2540
12	Vazhachal	413.9440			413.9440
13	Chalakudy	279.7098			279.7098
14	Malayattoor	617.2411	0.5248		617.7659
15	Thrissur	293.7430		4.3137	298.0567
16	Mannarkkad	150.7322		271.7213	422.4535
17	Nilambur North	57.9196	0.0171	340.7032	398.6399
18	Nilambur South	267.3894		57.8888	325.2782
19	Palakkad	73.4100		162.1896	235.5996
20	Nenmara	205.5173		150.2554	355.7727
21	Kozhikode	29.1043	22.9660	243.0856	295.1559
22	Wayanad North	134.0240	15.0640	65.8527	214.9407
23	Wayanad South	73.7947	6.8449	266.8633	347.5029
24	Kannur	207.3923		102.2342	309.6265
25	Thiruvananthapuram WL	181.0000			181.0000
26	Agasthyavanam	31.0000			31.0000
27	Shenthuruni	166.4200		4.5800	171.0000
28	Periyar East	618.0000			618.0000
29	Periyar West	157.0000			157.0000
30	Idukki	130.5240			130.5240
31	Parambikulam	274.1408			274.1408
32	Wayanadu (WL)	344.4400			344.4400
33	Silent Valley	148.7665		88.2329	236.9994
34	Eravikulam	241.0770			241.0770
35	Peechi	122.0370			122.0370
36	Aralam	22.3572		32.6428	55.0000
	GRAND TOTAL	9,078.1591	116.6831	1,838.5453	11,033.3875

* As per the reports from the DFO, Munnar an area of 244.37 sq. km has been excluded from the total area viz KDHP resumed area- 97 sq.km. Chinnakanal unreserve - 47 sq. km, Pallivasal unreserve- 79 sq. km and Revenue land 21.37 sq.km.

Species-wise Area Under Forest Plantation

SI No.	Name of Species	2006-2007	2007-2008
I	**HARD WOOD**		
1	Teak	75581.132	74183.295
2	Rosewood	1015.507	970.507
3	Mahagani	97.45	97.45
4	Sandalwood	100.84	100.84
5	Mangium	1304.267	1221.267
6	Others	802.591	869.481
	Sub Total	**78901.787**	**77442.84**
II	**SOFT WOOD**		
1	Eucalyptus	14525.234	13565.984
2	Green villa Robusta	802.94	802.94
3	Pine	124.576	124.576
4	Albizzia	181.64	148.04
5	Rubber	199.684	199.684
6	Balsa	62.24	62.24
7	Wattle	6389.49	6389.48
8	Murukku	48.48	48.48
9	Matti	444.16	444.16
10	Others	11595.663	11378.373
	Sub Total	**34374.107**	**33163.957**
III	**BAMBOO & REEDS**		
1	Bamboo	2952.18	3888.35
2	Reeds	469.77	479.77
3	Cane	2325.084	2436.684
	.Sub Total	**5747.034**	**6804.804**
IV	**PLANTATION CROPS**		
1	Coffee	30.64	
2	Pepper	319.98	304.98
3	Cinnamon	3.74	3.74
4	Medicinal Plants	1497.583	1573.193
	Sub Total	**1851.943**	**1881.913**

SI No.	Name of Species	2006-2007	2007-2008
V	**MIXED PLANTATIONS**		
1	Cashew	6487.549	6364.006
2	Fuel wood	537.589	682.269
3	Alnus	74.35	74.35
4	Agavu	46.83	46.83
5	Accacia	7079.717	7238.277
6	Sesbania	21.07	21.07
7	Casurina	121.442	121.442
8	Kongograss	140.12	140.12
9	Malbury	2.0	2.0
10	Palm Trees	13.5	13.5
11	Others	44282.418	47106.27
	Sub Total	**58806.585**	**61810.134**
	GRAND TOTAL	**179681.456**	**181103.648**

Production of Major Forest Produce (2006-07 & 2007-08)

SI.No.	Item	Unit	2006-2007	2007-2008
1	Timber (round logs).	Cum.	26774.36	48627.829
2	Timber (round poles).	No.	296013	352896
3	Timber (sawn & squard).	Cum.	17.287	23.354
4	Fire wood.	MT.	12748.397	12676.413
5	Cardamom.	Kg.	2053	38
6	Honey.	Kg.	192835.55	224177.95
7	Reeds.	No.	21403530	14352181
8	Bamboo.	No.	1237030	1551168
9	Jungle Wood Poles.	No.	21221	2044
10	Sandal wood.	Kg.	3159.35	17537.1

CARDAMOM

(The Queen of Spices)

TRENDS IN LAND UTILISATION PATTERN OF PADDY CULTIVATION IN PALAKKAD DISTRICT

INTRODUCTION

Palakkad district is said to be the 'Granary of ~~Palakkad~~ Kerala. It has the highest percentage of irrigated lands where mostly paddy is cultivated. Moreover, Palakkad gives the highest output of paddy compared to other districts of Kerala. The rainfall is not evenly distributed in the district. The district is served with a good net-work of water resources.

Agriculture is the main occupation of the people of the district. Palakkad gets fairly good rainfall. The important irrigation dams in the district are Malampuzha, Walayar, Kanjirapuzha, Meenkara, Chulliar, Pothundy, Mangalam and Chitturpuzha projects.

Palakkad is the largest district with an area of 4480 Sq. Km. in the State. Palakkad district was formed on 01-01-1957. At that time it included Perintalmanna and Ponnani Taluks also. When Malappuram district was formed on 16-07-1969, those two taluks were included in Malappuram district.

Palakkad district has the maximum area and production of Rice in Kerala.

The data relating to land use Area under Paddy, production of paddy and irrigation particulars are based on the reports of Agricultural Statistics published from time to time by the Directorate of Economics and Statistics, Thiruvananthapuram. This Study is based on the reports during the period form 1970-71 to 2007-08.

These data are collected through sample surveys from selected clusters which are consolidated and estimates prepared at Block and district level. Area cultivated under each crop is identified through the enumeration method and mean yield of each crop is prepared from the crop cutting experiments conducted for the respective crops. Based on these two informations, estimates for the Block and District are prepared by using appropriate multiplier at the Directorate of Economics and Statistics, Thiruvananthapuram.
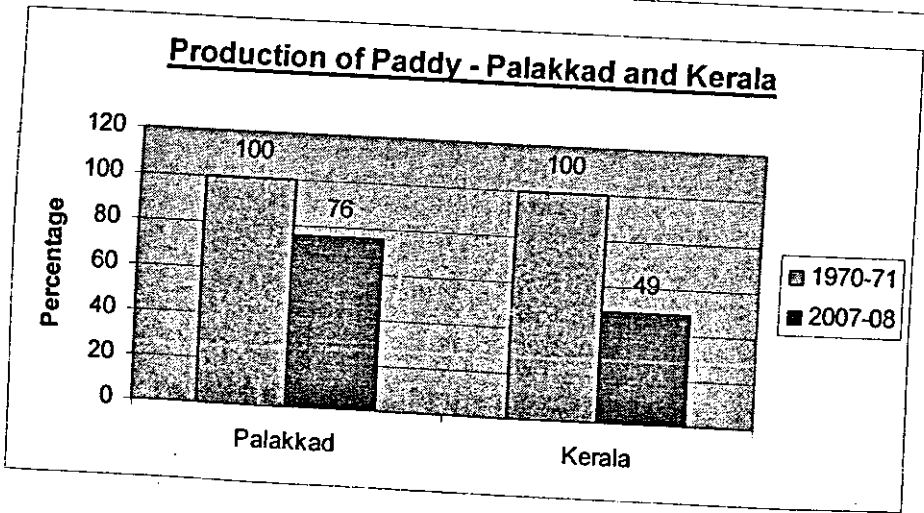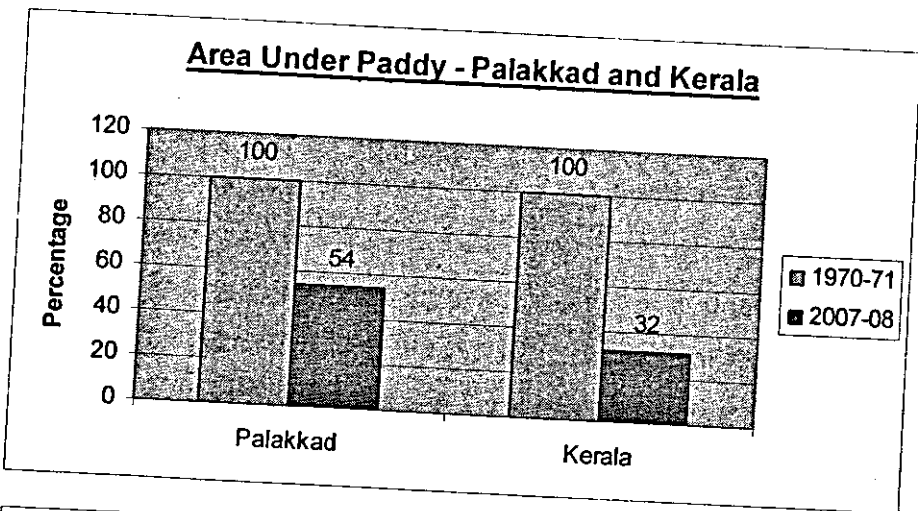
OBJECTIVES

The main objectives of this study are as follows.

1. To observe the Trend in land utilization pattern in the district from 1970-71 to 2007-08.

2. To analyse the Trend of Area under Paddy and Production of Paddy from 1970-71 to 2007-08.

3. To analyse the present irrigation status prevailing in the district.

4. To arrive at the real problems faced by the Paddy Cultivators of this district and to suggest certain remedial measures.

In the year 1970-71 the total area under Paddy was 182621 Hectares and the production was 318925 Metric tones. In 2007-08 the total area under Paddy was 99173 Hectares and the production was 244244 Metric tones. In 38 years the area under Paddy showed a decrease of 46% Whereas the production has decreased by 24%. Eventhough area has decreased considerably (around 50%), production showed only marginal decrease. This is due to the use of High yielding varieties of Paddy, increased use of chemical fertilizers, increase in irrigation and other crop protection measures. If the figures for the State are worked out it shows that when area under Paddy decreased by 68%, production has decreased by 51%.

Area Under Paddy - Palakkad and Kerala

Palakkad: 1970-71 = 100, 2007-08 = 54
Kerala: 1970-71 = 100, 2007-08 = 32

Production of Paddy - Palakkad and Kerala

Palakkad: 1970-71 = 100, 2007-08 = 76
Kerala: 1970-71 = 100, 2007-08 = 49

It seems that either Paddy lands were converted or utilized for cultivation other crops in the district as well as in the State. When the State and District figures are analysed together, it shows that the decrease in area and production of Paddy with respect to the State figures are marginal. This is because Palakkad gives importance to Paddy Crop even

in its adverse surroundings. The farmers of Palakkad are still obsessed with this crop and it can have an increasing trend if government intervenes positively and whole heartedly.

Land use Pattern of Palakkad District 1970-71 to 2000-01 (5 Yearly)

| Sl. No.	Description	1970-71	1975-76	1980-81	1985-86	1990-91	1995-96	2000-01
1	Total Geographical Area	437087	438980	438980	438980	438980	438980	438980
2	Forests	67185	136257	136257	136257	136257	136257	136257
3	Non-Agri use	48060	32147	31351	30223	31908	39520	52567
4	Barren and uncultivable waste	11270	11220	14101	13295	9883	6902	3600
5	Permanent Pastures and grazing land	2810	1709	341	237	103	81	1
6	Miscellaneous Tree Crops	13668	8498	8247	8581	6818	5743	1686
7	Cultivable waste	4140	18374	25271	24698	22759	20660	17698
8	Fallow other than Current Fallow	3387	3924	3117	4204	5481	8683	8587
9	Current Fallow	2284	6342	6547	5436	8739	10087	14415
10	Net Area Sown	284282	219503	213748	216049	217032	207901	204169
11	Area sown more than once	47016	102301	123209	102392	122025	149219	106703
12	Total Cropped Area	331298	321804	336957	318441	339057	357120	310872

Trend of Total Cropped Area Palakkad 1970-71 to 2000-01
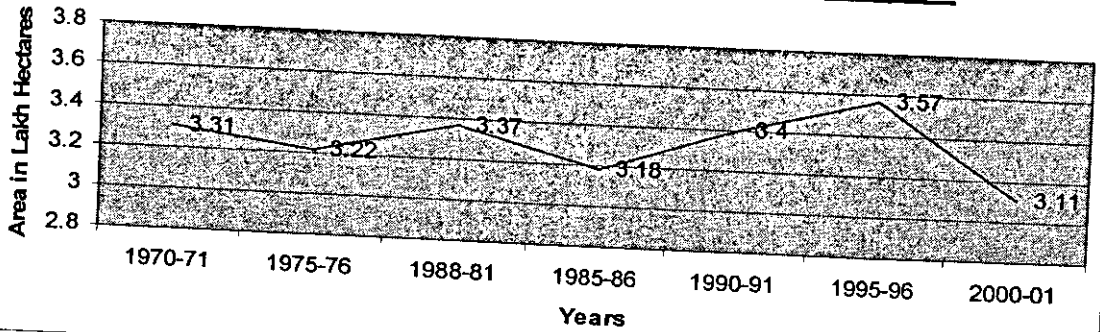
Land use Pattern of Palakkad District (contd.) 2000-01 to 2007-08 (Annually)

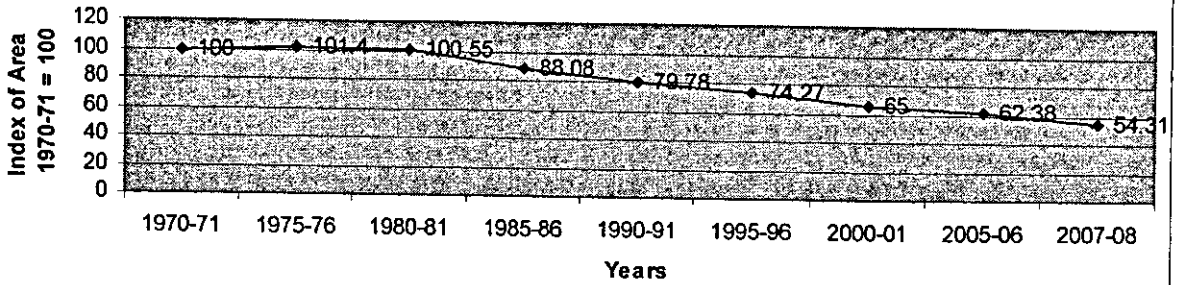| Sl. No.	Description	2000-01	2001-02	2002-03	2003-04	2004-05	2005-06	2006-07	2007-08
1	Total Geographical Area	438980	438980	438980	438980	438980	447584	447584	447584
2	Forests	136257	136257	136257	136257	136257	136257	136257	136257
3	Non-Agri use	52567	52528	53019	53241	53989	38684	47471	47237
4	Barren and uncultivable waste	3600	3436	3393	3297	3912	3541	3121	2902
5	Permanent Pastures and grazing land	1	2	8	10	11	10	4	-
6	Miscellaneous Tree Crops	1686	1578	1451	1446	1360	1247	3151	1822
7	Cultivable waste	17698	18170	20123	19114	22488	18842	23591	26037
8	Fallow other than Current Fallow	8587	8817	10110	10002	9872	9565	9283	9131
9	Current Fallow	14415	14744	13280	11324	12617	11351	12455	17142
10	Net Area Sown	204169	203148	201339	204289	198474	220743	204787	196787
11	Area Sown more than once	106703	117566	120693	112945	126006	108815	132452	127761
12	Total Cropped Area	310872	320714	322032	317234	324480	329558	337239	324548
13	Still Water	-	-	-	-	-	-	7346	10115
14	Water logged Area	-	-	-	-	-	-	37	-
15	Social Forestry	-	-	-	-	-	-	81	154

Trend of Total Cropped Area of Paddy Palakkad District
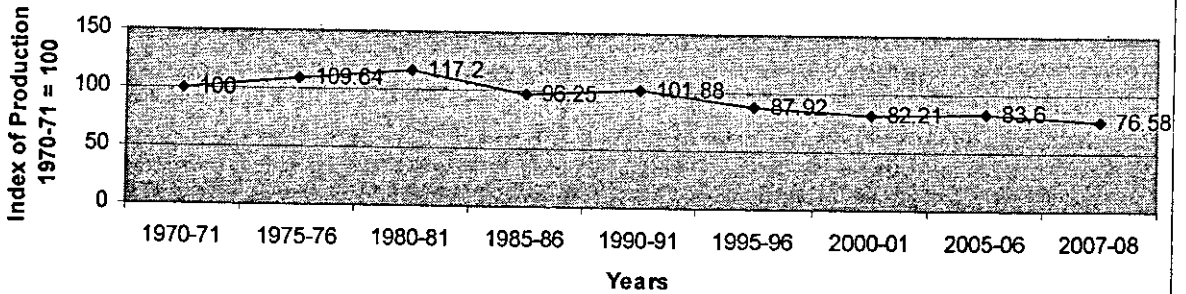## 1970-71 to 2007-08
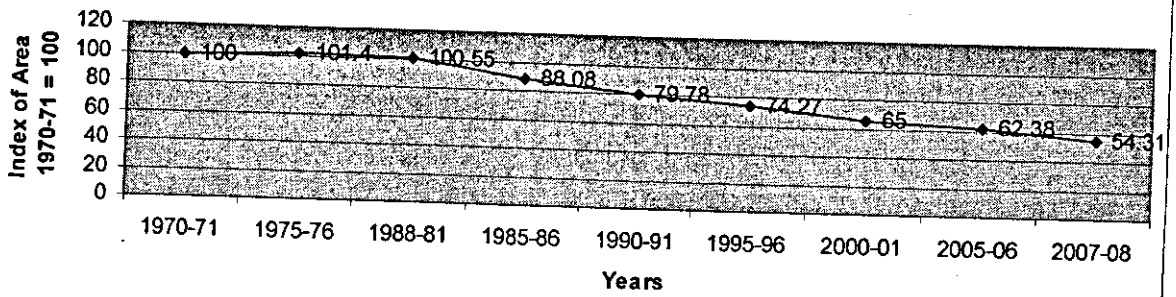
Trend of Area and Production of Paddy from 1970-71 to 2007-08

Year	Area in Hectares	Index 1970-71 = 100	Production in Metric tonnes	Index 1970-71 = 100
1970-71	182621	100.00	318925	100.00
1975-76	185182	101.40	349657	109.64
1980-81	183634	100.55	373782	117.2
1985-86	160855	88.08	306980	96.25
1990-91	145687	79.78	324907	101.88
1995-96	135630	74.27	280405	87.92
2000-01	118701	65.00	262173	82.21
2005-06	113919	62.38	266634	83.60
2007-08	99173	54.31	244244	76.58

Trend of Total Cropped Area of Paddy - Palakkad District
1970-71 to 2007-08

Index of Area 1970-71 = 100

100 101.4 100.55 88.08 79.78 74.27 65 62.38 54.31

Years: 1970-71 1975-76 1980-81 1985-86 1990-91 1995-96 2000-01 2005-06 2007-08

Trend of Total Production of Paddy - Palakkad District
1970-71 to 2007-08

Index of Production 1970-71 = 100

100 109.64 117.2 96.25 101.88 87.92 82.21 83.6 76.58

Years: 1970-71 1975-76 1980-81 1985-86 1990-91 1995-96 2000-01 2005-06 2007-08

When the afore mentioned table and trend were analysed, the following decadal inferences are noticed.

1. 1970-80: There prevailed good price for Paddy; approximately Rs. 1200 to 1500/Quintal.

2. 1980-90: In this decade need for house plots rose and conversion of wetland, especially on road sides, increased drastically.

3. 1990-2000: It became apparent that cultivation of other crops like Ginger, Turmeric, Plantain, Banana, Tapioca were more profitable than Paddy.

4. 2000-2009: Recently when Paddy procured only very low prices, the prices of inputs like fertilizers, pesticides etc. have shot up. The hiring charges of farm machinery have also increased and there was an acute shortage of Agricultural labour. Labourers are unwilling to do agricultural chores as it is more exhausting and fetch low income. Majority of them have shifted to construction field as the remuneration is good and they get work throughout the year. Agricultural activities being seasonal and farmers are either shifting to low labour intensity Crops or just putting the lands as fallow, many of the conventional labours seek other employment. Moreover uncertainty in climate and weather conditions have made Paddy cultivation more risky.

Comparison of Paddy area of neighbouring districts of Palakkad

District	2006-07	2007-08	Decrease %
Palakkad	109208	99173	9.19
Trissur	27311	24422	10.58
Malappuram	15109	9496	3.72
State	263529	228938	13.13

The annual decrease in the area put to Paddy Cultivation in Palakkad and in the two neighbouring districts is far below State average.

Irrigation Scenario of Palakkad

Palakkad district can boast of the maximum number of irrigation projects constituting dams, major and minor irrigation projects etc. The major irrigation projects constitute Malampuzha, Walayar, Kanjirapuzha, Meenkara, Chulliar, Pothundy, Mangalam and Chittur puzha project which has three sub reservoirs viz. Moolathara, vengalakkayam and Kambalathara, Muthalamada Panchayath in Chittur Taluk has 5 irrigation projects which is unique with respect to the irrigation potential of Palakkad. Out of these three dams namely Parambikulam, Thunakkadavu and Peruvarippallam forming part of the Parambikulam-Aliyar Project cater to Tamilnadu's water needs.

The following table depicts the gross area of Paddy irrigated in Hectares from 1986-87 to 2007-08

(Area in Hectares)

Year	Palakkad	Kerala State
1986-87	86,483	2,98,440
1987-88	74,320	2,56,446
1988-89	70,522	2,48,761
1989-90	69,101	2,43,196
1990-91	68,822	2,25,063

Year	Palakkad	Kerala State
1991-92	67,505	2,28,736
1992-93	63,622	2,12,576
1993-94	63,584	2,09,735
1994-95	62,830	2,72,772
1995-96	61,054	2,34,409
1996-97	60,739	2,30,087
1997-98	55,175	2,02,143
1998-99	53,027	1,96,927
1999-00	63,180	2,08,790
2000-01	68,299	2,08,047
2001-02	60,384	1,83,992
2002-03	56,482	1,81,561
2003-04	46,831	1,69,829
2004-05	56,226	1,83,601
2005-06	47,252	1,59,638
2006-07	56,879	1,73,068
2007-08	49,288	1,54,405

Trend of Gross Area of Paddy Irrigated (in Lakh Hectares) from 1986-87 to 2007-08 (3 yearly)
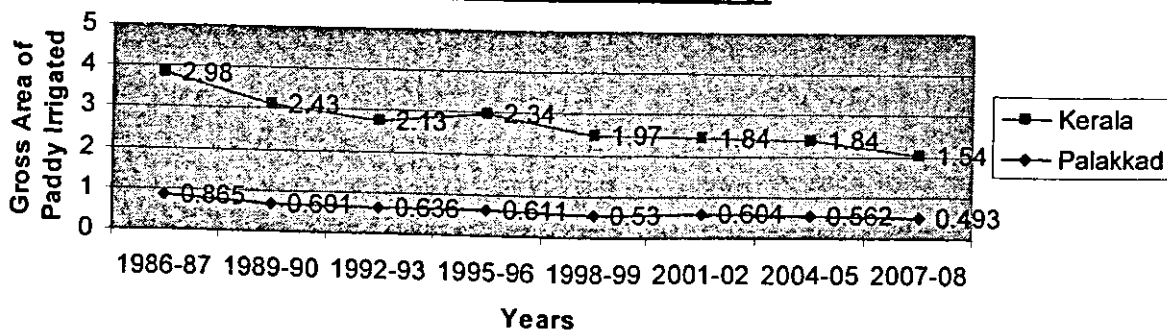
Trend analysis of decadal data of gross irrigated Paddy area of Palakkad District and Kerala.

The decrease of gross area irrigated in Kerala is more than that of Palakkad District. This corresponds with the Area of Paddy cultivation analysed earlier in this report. The variation and decreasing trend in rainfall accounts for the decreasing trend of gross irrigated area.

Suggestions and Recommendations

1. The National Rural Employment guarantee Act of the Central government may be extended to the Agricultural Sector and there by improve the availability of Agricultural labour.

2. A Pilot study in going on in Palakkad, Alappuzha, Upper Kuttanad area of Pathanamthitta, Kottayam on the auspices of Food Security Programme, if the said study is found to be viable. It will help the Paddy Cultivations in a positive way.

3. The National Agricultural Insurance Scheme may be revamped and made more farmer friendly. The claims may be settled promptly so that farmers will get motivated in their future agricultural activities.

4. Necessary Amendments may be initiated in the land tenure act and stringent measures may be taken against those farmers who put their land as fallow without any apparent reasons.

5. The Schemes of the Department of Agriculture may be linked with that of the Department of Economics and Statistics and Planning board so that a coherent improvement can be achieved in the Primary Sector of the economy.

6. Agricultural activities in the State may be given prime importance. The Government interventions in the field of Agriculture in our neighbouring States may be studied and implemented here also.

7. Agruculture, Theory and Practice must be included in the curriculum of Schools and Colleges. Grace marks must be awarded for meritorious activities in this field.

Conclusion:

The paddy cultivation can be strenghthened with the joined efforts of the cultivators and the Government. There is enough potential in Palakkad to increase it's footprint on the map of Kerala's Paddy Cultivation.

Reference:

Agricultural Statistics, weather and crop report published by the Directorate of Economins and Statistics, Thiruvananthapuram.

......and finally, about this report......

This report is prepared by Sri. P. Unnikrishnan, Taluk Statistical Officer, Alathur and Sri. T.P.L. Prasad, Research Assistant, District Office, Economics and Statistics, Palakkad with the help of the books and reports published from time to time by the Directorate of Economics and Statistics, Thiruvananthapuram. This report is prepared in accordance with the directions of the Director, Directorate of Economics and Statistics, Thiruvananthapuram as per Order no. PB.(1) 3900/09/DES, dated 06/06/2009 for submitting to UNDP as decided in the training on *'Qualitative data collection'* conducted jointly by UNDP and Directorate of Economics and Statistics from 2nd to 6th of June 2009 at the Government Guest House, Thycaud, Thiruvananthapuram.

Introduction

Mankind was attracted to Spices from the early days of history. There is a feeling of wellness associated with consumption of spice and this is based on its health giving and anti- disease properties.

Once India was known to the world as the "Land of Spices". Indian spices were highly preferred to Global Market. It has been continuing now also. India held a virtual monopoly in spices production & trade. The small cardamom- Queen of Spices- occupies an important position among the foreign exchange earning commodities. The Cardamom commodity is the dried capsule of *Elettaria Cardamom Maton* belonging to *Zingiberacea family*.

In India, cardamom is cultivated in three states, Kerala, Karnataka, andTamilNadu. Kerala is the leading state in area and production. The crop is cultivated in an area of 13,725 ha, out of Kerala occupies 60% followed by Karnataka 30% and TamilNadu 10%.

The other major cardamom producing countries in the world are Guatemala, Tanzania, Sri Lanka, New Guinea, Honduras, Costa Rica, El Salvador, Thailand and Vietnam.
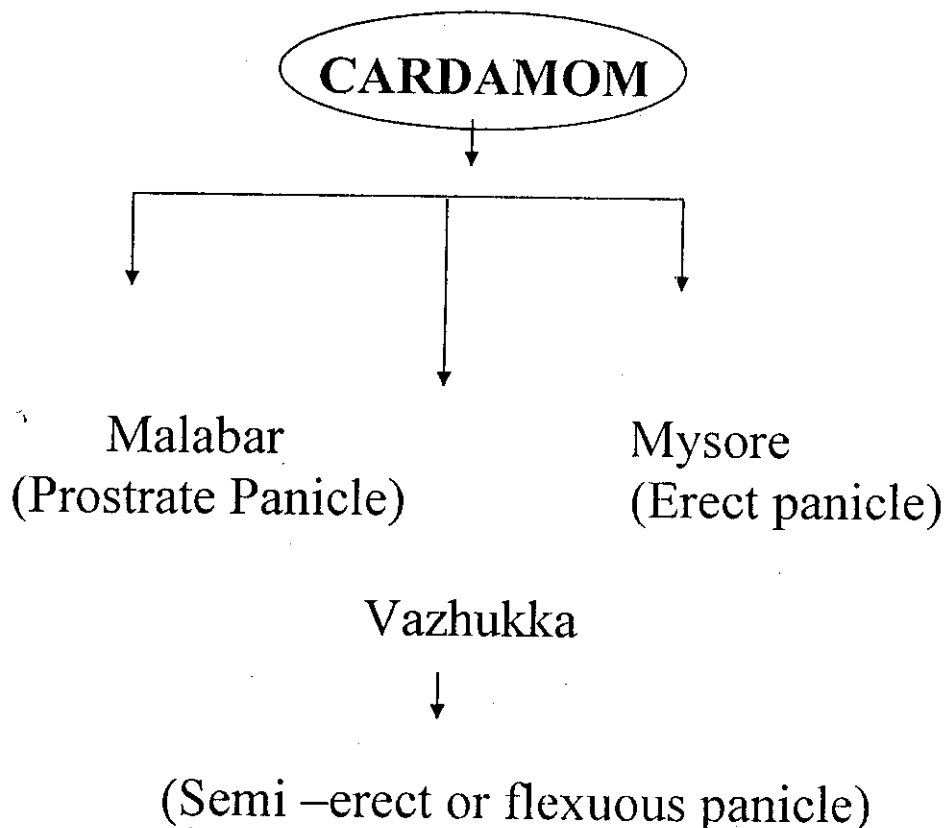
Cardamom – The Queen of Spices

Cardamom is found to grow within an altitude ranging between 600 and 1200 meters along MSL. The suitable rainfall is to be assumed as 1500 to 4000 mm and the atmospheric temperature ranges from 10 to 35^0 C generally if grows in loamy soil which is acidic in nature with PH from 4.2 to 6.8.

Optimum growth and development of cardamom is observed in the warm and humid conditions, at this temperature range. Extremes of temperature and wide variations are not conducive for healthy growth of cardamom plants. Yield is influenced more by the distribution of monthly rainfall than total rainfall and number of rainy days.

Cardamom can be propagated by seeds and vegetative means. Seedling population is variable because cardamom is a cross pollinated crop. Vegetative propagation can be either by suckers or by micro propagation (tissue culture). Plants raised from suckers come to bearing earlier than seedlings.

VARIETIES OF CARDAMOM

Based on the nature of panicles, size of the plants and other morphological characters the cardamom plants are classified into three types namely Malabar, Mysore and Vazhukka.

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                    ┌─────────────┐
                    │  CARDAMOM   │
                    └──────┬──────┘
                           │
        ┌──────────────────┼──────────────────┐
        ▼                  ▼                   ▼

    Malabar                                 Mysore
(Prostrate Panicle)                    (Erect panicle)

                      Vazhukka
                         │
                         ▼

        (Semi –erect or flexuous panicle)
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Malabar: - This variety is mostly suited to areas of 600 to 1200 meters elevation. It is cultivated to a lesser extent in Kerala & TamilNadu. The leaves are 5-6cm broad and about 32cm long. The plant is medium in size which attains a height of 2 to 3 meters on maturity.

My sore: - Plants are robust and attain 3-4 meters in height. Leaves are 8-15cm broad, 60-90cm long, upper surface smooth and lower surface velvety with dark green colour. Panicles are erect and capsules one ovoid, bold and dark green. Suitable to areas of 900-1200 meters high from sea level.

Vazhukka: - This type in a natural hybrid of Malabar and Mysore types and exhibits intermediate characteristics of both. It is well adapted in elevation of 900-1200cm above sea level. Plants are robust and panicles are semi-erect. Capsules are bold, globose or ovoid in shape.

For the crop improvement aspects of cardamom, various research institutions, and farmers have selected a member of high yielding clones. Prominent along them are:

No.	Selection/ Varieties	Cultivar	Distinguishing Characteristics	Area of adaptability	Source	Yield potential (Kg/ha)
1.	ICRI-1	Malabar	An early maturing profusely flowering variety, medium sized panicle with globose extra bold dark green coloured capsules.	South Idukki zone of Kerala, Where the rain-fall is well distributed	ICRI (Spices Board) Myladumpara Idukki	656
2	ICRI-2	Mysore	Performs well under irrigated conditions, suitable for higher altitude. It has medium long panicles bold and parrot green capsules.	Vandanmedu and Nelliampathy of Kerala and Annamalai and Megamalai of Tamil Nadu	-do-	766
3	ICRI-3	Malabar	Early maturing type, non pubescent leaves and oblong bold parrot green capsules.	Cardamom growing tract of Karnataka	Regional station, ICRI (Spices Board), Karnataka	790
4	TDK – 4	Malabar	An early maturing variety adaptable to low rainfall area. Medium size panicles, bold parrot green capsules.	Adapted to Lower Pulney hills of TamilNadu. Suitable for low rainfall area and having similar agro-ecological conditions	Regional Station ICRI (Spices Board), TamilNadu	961
5	TDK - 11	Malabar	An early maturing variety, Long panicle, bold and parrot green capsules.	Adapted to less rainfall conditions of Lower hills of TamilNadu	-do-	890
6	PV- 1	Malabar	An early maturing variety with slightly ribbed light green capsules. Short panicle, narrowly ellipsoid to elongate capsules.	All Cardamom growing tracts in Kerala and parts of TamilNadu	Cardamom Research Station, Kerala Agrl. University, Pampadumpara	500
7	CCS-1	Malabar	An early maturing variety suitable for high density planting, long panicle, bold, parrot green capsules	All cardamom growing tracts of Karnataka and Wynad of Kerala.	Indian Institute of Spices Research, Regional Centre (ICAR), Appangala Karnataka	1156

8	Mudigere-1	Malabar	Compact plant, suitable for high density planting. Tolerant to hairy caterpillars and white grubs. Short panicle, oval bold, pale green capsules.	In the traditional cardamom growing Malanad areas of Karnataka	Regional Res. Station, University of Agrl. Sciences Mudigere, Karnataka	1000
9	NCC-200 (Njallani)	Vazhukka	Non pubescent, semi erect, globose extra bold and dark green capsules.	Suitable to Kerala tracts	Sebastian Njallani & Reji Njallani, farmers in Idukki, Kerala.	1500
10	MCC-12	Vazhukka	Semi-erect panicles and dark deep green capsule suitable under shade conditions.	Oblong capsules suitable under shade condition of Kerala	ICRI, Spices Board, Myladumapara, Kerala	620
11	MCC-16	Vazhukka	Profusely branched compound and semi-erect panicle. Globose green capsules.	Kadamakuzhy & Umdumbanchola zones of Kerala	-do-	650
12	MCC-40	Malabar	An early bearing variety, globose bold and green capsules.	Suitable to all cardamom growing tracts of Kerala	-do-	443
13	RR-1	Malabar	High quality elongated capsules.	Kodagu, North Wayanad, Hassan and Chikmagalur	IISR Cardamom Research Centre, Karnataka	848
14	Mudigere-2	Malabar	Suited for cultivation in valleys in Karnataka	Cardamom growing tract of Karnataka	Regional Res.Station, UAS, Mudigere	476

Practices to be followed for field planting

1. Field Preparation

In sloppy areas soil should be protected from soil loss due to rains for which planting should be taken up in terraces. In low rainfall areas , trenches of size 75 cm width and 30 cm depth may be taken and plants may be planted at a spacing of 1to 1.5m.

2. Planting

High yielding variety suitable from the areas can be selected for planting. They may be planted in the already prepared and filled pits and plants should be protected from wind by staking.

3 .Shade Regulation

It is one of the important practice and which should be attended during summer (March, April). Chopping off branches should be done to provide filtered light. Too much shade or too much openness of area is not advisable for cardamom cultivation as it effects growth and yield.

4 Weed control

Control of weed is also very important in the growth and development of cardamom planting. Weeds are the potential competitor in the consumption of water and nutrients and will depress the growth to plant.

5. Earthing up.

Due to erosion of soil or mismanagement, it is noticed that the top soil covering the plant base is washed away and roots are exposed earthing up of the plant base with top soil is recommended during December-January. Care should be exercised while carrying out this operation, to ensure that only topsoil is used.

6. Mulching & Forking

The entire plantation and particularly the plant base are to be kept under mulch for reducing evaporation loss and to maintain optimum temperature. Forking the plant base to a distance up to 90 cm and to a depth of 9-12cm is found to enhance root proliferation and better growth of plants.

Fertilizer Requirement

Up to the middle fifties, cardamom was cultivated without any manuring or limited to organic manures. As importance of this spice crop was increasingly felt in the national and international market scenario, its cultivation was taken up in a more systematic and scientific manner and many of the planters started applying chemical fertilizers.

Cardamom is an exhaustive crop. The uptake studies revealed that in production of one kg of cardamom capsules, The plant removes 0.122 kg n, 0.414 kg P and 0 .200K organic manures are considered essential for improving physical characteristic of soil apart from their nutritional values and they are indispensable for cardamom irrespective of weather fertilizers are applied or not. Applications of organic manures such as farmyard manure or compost @ 5 Kg/ Plant and neem cake @1-2 kg/ Plant may be done once in a year during May/June. An integrated nutrient management to meet the 25% requirement of nitrogen through farmyard manure and the balance 75% through inorganic nitrogen source for sustained production of cardamom over a period of time.

The fertilizer may be applied in two splits closes, before and after south west monsoon (May/June and September/ October) in a circular band of 20 cm wide and 30-40 cm away from the base of the clumps and mixed with soil. The first application in May will help in the production of suckers and development of capsules and the 2nd application during September will help initiation of panicles and suckers. Under assured irrigated plantations, application of fertilizer in four split does at a quarterly interval found more beneficial. Foliar application can be done in September, November and January.

Fertilizer Schedule of cardamom in Kerala

1st year of planting	NPK 25:25:50
2nd year of planting	NPK 40:40:80
3rd year of planting	NPK 75:75:150
Irrigated areas	
1st year of planting	NPK:25:25:50
2nd year of planting	NPK : 60:60:80
3rd year of planting	NPK 125:125:250 (May/June) & (August/ September)

Irrigation

During summer months irrigation ensures increment in yield by at least 50%. It is required from February to April generally. This is the period in which development of young panicles.

Different methods of irrigation are:

- Pump irrigation
- Hose irrigation
- Sprinkler irrigation
- Drip irrigation
- Mist irrigation

Without irrigation, the growth and development of cardamom plants are not possible and at the same time the number of taking yield will be less. If irrigation is proper and at the specific time the yield of the coming year will increase.

Diseases in Cardamom

Cardamom is affected by a number of diseases cased by various pathogenic Fungi, bacteria and nematodes in main plantation as well as in nurseries. These diseases leads to loss crop and will cause 50% of crop losses if not managed properly.

Nilgiri necrosis disease

It is a viral disease and was first found in Nilgiris, hence the name Nilgiri necrosis Virus. The affected plants are stunted and fail to bear the panicles and capsules. These diseases are not transmitted through seed soil, Mechanical contacts, leaves, roots and farm implements.

How to manage
Eradication of the source of inoculums by destroying infected plants by systematic insecticide application.

Kokke Kandu Disease

This disease affected plants declined rapidly and will cause yield reduction this disease is transmitted through aphid pantalomia nigronervosat. The etiology is not yet established.

Katte or Mosaic

This disease is spread through banana aphid pentalonia nigronesvosa and through infected rhizomes. The first visible symptom appears on the youngest leaf of the affected plant. These flecks develop in to pale green discontinues stripes. The infected clumps will be smaller in size. Plants of all stage are susceptible to virus infection.

Azhukal Disease

This is fungal disease and this disease appears during the rainy season. Malabar varieties are more susceptible to azhukal. It affects the leaves, tender shoots, panicles and capsules. Infection spreads to the panicles and resulting in their decay.

Remedial Measures:

Trashing and destruction of the infected plants and plants part should be done. Excessive Shade Should be avoided. Adequate drainage should be provided in the garden during the rainy season. Application of bio- control agent trichoderma @ 50g per plant with 1kg of neem cake is also effective.

Rhizome rot or Clump rot

This is also a fungal disease occurs during monsoon the symptoms of the disease are deceasing of the tiller starting from the collars region and toppling of the filler.

How to manage
Trashing and destruction of the infected plants and plant part should be done as a phytosanitary measure just prior to the onset of south west monsoon. Shade controls also collective. Adequate drainage should be provided. This disease presupposed by the infestations hence adequate management measures have to be under taken to carvel these inset pets and matador.

The Fungus phaeodactylium alpiniae cause the disease. The appearance of large blotches of irregular lesions with alternating shades of light and dark brown neurotic leaves is the main feature of this disease.

How to control

This disease can be managed by sparking with taugicidas Lake 1.0% Bordeaux mixture, 0.3% mancozed and 0.1% carbendazine.

Leaf rust

Jungas Phakospora elettariae is the cause of this disease. It appears after monsoon rains. The symptoms are white or ash coloured pustules on the undersurtface of the leaves and yellowish orange discolouration on corresponding upper surface of the leaves.

How to control

This leaf rust can be managed by spraying with fungicides like 1.0% Bordeaux mixture or 0. % mancozb.

Centhal disease

The pathogen colletotrichum gloeosporioides is the cause of this disease. It can be seen all most all cardamom growing areas. It became severe during August- September. Initially the symptoms appear as small water soaked rectangular lesions on the leaves. In advanced stages the leaves dry and tear. The incidence of the disease appears to be more severe in areas where do not have proper shade.

Removal and destruction of infected leaves and other parts. Provide adequate shade and foliar spray with 1.0% Bordeaux mixture with mancozeb is recommended for managing the disease.

Production

The National yield of cardamom in India is 218 Kg/Ha

The total area of plantation in 2000-2001 and 2006- 2007 are same and the production is also shows same function comparatively same figure. But same function can be seen.

The functions affecting production are:-

Agro climatic adaptability on conventional climatic conditions
Selection of variety
Use of fertilizer at proper time
Proper use of pesticides
Timely Cultural operations

Production India

Year	Area(na)	Production (mt)
2000-2001	72320	10480
2000-2002	72663	11365
2002-2003	73125	11920
2003-2004	72237	11580
2004-2005	73725	11415
2005-2006	73795	12540
2006-2007	73228	11235

The impact of globalization effected negatively in the case of production of cardamom in India. The trade liberation policy paves the way for large scale inflow of Guatemala Cardamom to our country and other consuming countries.
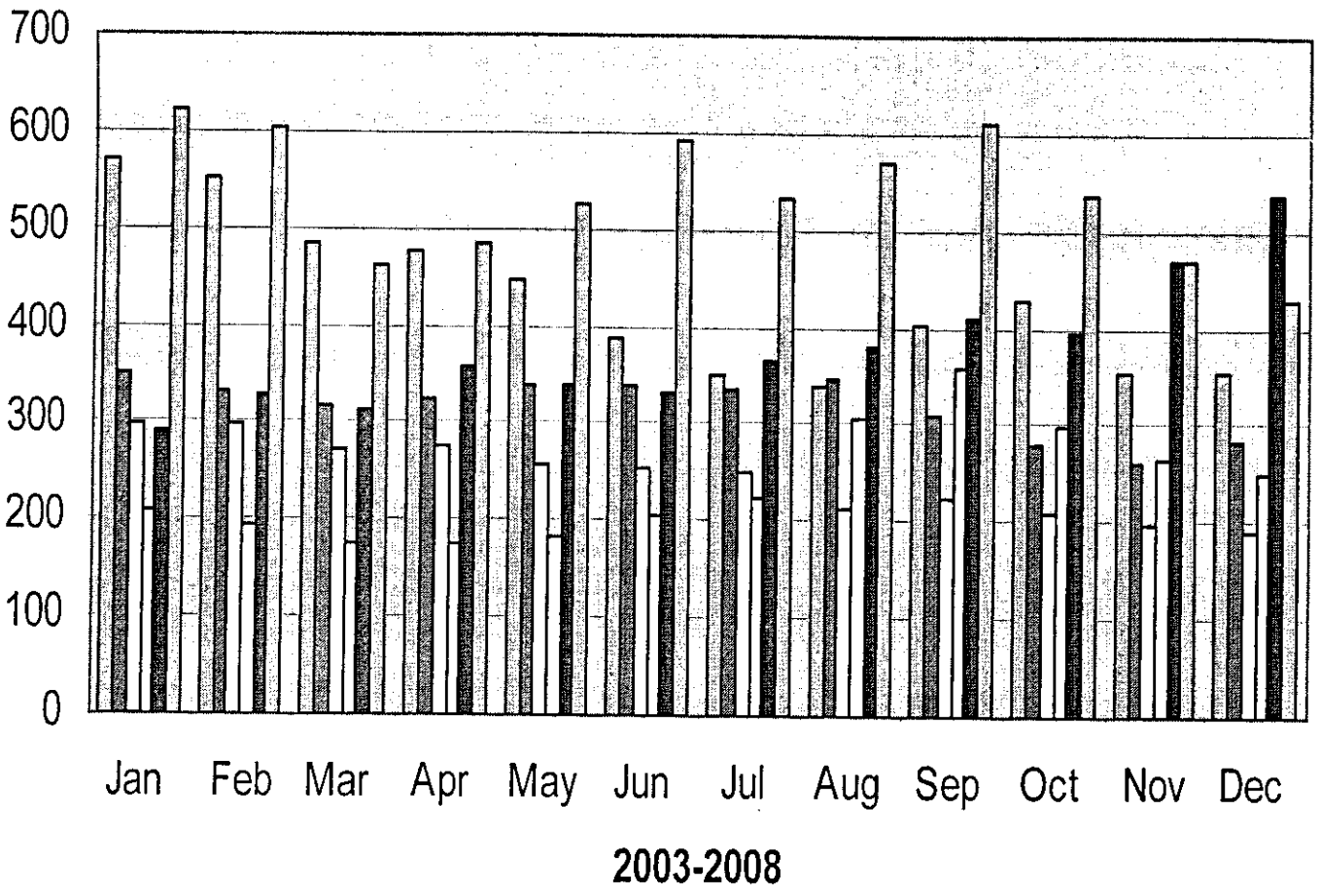
Fluctuation of Prices

The table shows the average monthly prize from January 2003 to December 2008. During these years the price shows ups and downs. It starts Rs.568/- and ends at Rs. 430/. The least figure can be seen in April 2006 as Rs. 175/- per kilogram and the maximum figure has shown here in January 2008 as Rs. 620/- per kilogram. If is not only based on the production of cardamom, but also the impact of cardamom from foreign countries.

These figures in the prescribed tables are prepared based on the records kept in the register showing the daily prise in the Taluk Statistical Office, Udumbanchola. The graph shows the reality of fluctuations of prices during these years. It decreases steadily from 568 to 175 and then start to rise. These Fluctuation indicates the marketing, exporting, importing and production; the impact of these figures can be interpreted on the ground of these situations.

The price of cardamom is showing variations from the beginning of its marketing. It has different markets. The policy of export, import and globalisation affects the price.

Average Monthly Prices From 2003-2008

Month	2003	2004	2005	2006	2007	2008
January	568	350	297	210	291	620
February	550	331	298	193	329	602
March	483	316	273	176	313	460
April	476	325	275	175	356	483
May	445	340	258	184	340	524
June	386	338	255	204	332	592
July	351	334	248	222	365	534
August	340	347	213	304	380	568
September	401	309	223	359	411	610
October	427	279	210	298	395	536
November	355	260	198	264	469	470
December	353	284	190	250	535	430
Average	**428**	**318**	**245**	**237**	**376**	**536**

700

600

500

400

300

200

100

0

Jan   Feb   Mar   Apr   May   Jun   Jul   Aug   Sep   Oct   Nov   Dec

2003-2008

Cardamom Products

1. **Cardamom Oil-** Steam distillation of powdered cardamom. Seeds yields volatile oil or essential oil. Comparatively lower grades of cardamom is suited for destilisation

2. **Cardamom Oleoresin-** is made two components – the volatile oil and resin. Volatile oil represents the aroma while the resin is made up of non volatile matter like colour, tat   waxes   etc. Volatile oil is obtained by steam or hydro- distillation while the resin is   obtained   by   solvent extractions.

3. **Encapsulated Cardamom flavour-** In this method the liquid aroma concentrate is converted to a solid stable powder   form having good shelt life. The basic steps involved in their process are

1. Preparation of the emulsion
2 homogenization of the emulsion with the flavourant
3 atomization of the mass into the drying chamber.

4. **Cardamom Seeds-** Cardamom seeds are obtained by decorticating capsules.   Decortications are done by using a disc mill and only husk is detached without damaging seeds. And   these   two   are passed through a vibratory sieve for separating them. The good   quality seeds will be black to brown in colour.

5. **Cardamom Powder-** Cardamom in its fine powder form gives maximum flavour o   food products. Cryo-   grinding of cardamom is an improved technique to obtain better   quality powder.

6. **Sugar Cardamom Mix-** It is a blend of sugar powder with encapsulated cardamom   flavours along with sunset yellow colour and may contain tri- calcium phosphate as anti-   caking agent.

7. **Cardamom Flavoured Cola Beverage-** This is an amber coloured sparking carbonated beverage containing sugar, caramel, acid and flavours.

8. **Cardamom Flavoured Flan-** This Product is made from milk, sugar and starch with   added colours, flavour and gelling agents.

9. **Cardamom Chocolat-** It is prepared by using cocoa mass with butter, Sugar powder,   milk powder, encapsulated cardamom flavour and emulsifiers.

10. **Cardamom Plus-** It is prepared by mixing freshly grand cardamom with encapsulated cardamom flavours. In place of cardamom powder one can use cardamom residue after oil distillation.

11. **Cardamom Coffee and Tea-** Cardamom Coffee is called Gahwa, and it is a   traditional drink with Arabs. Encapsulated cardamom flavour is very useful while making   Gahwa Coffee. In the same way cardamom tea is prepared by mixing the tea powder with   cardamom powder. These can be useful as a cool drink.

Agencies For assistance

- **Agriculture Department, Kerala**

- **Spices Board**

- **Grama, Block & District Panchayat**

- **Irrigation Department**

- **Non-Governmental Organisation**

These agencies are not appearing at the proper time. The research centres are not helpful to the farmers. Most of the time their presence and predictions especially in the field of control of some disease is not helpful to the farmers. Even now they cannot produce the improved variety through their research more useful then Njallani Green Gold. More than 50% of farmers are depending this variety produced by a farmer in Idukki District.

Problems & Solutions

India is a large cardamom producing country. Many farmers are depending this crop to meet their both ends meet. Government of India allows import of cardamom fromGuatemal, a Latin American country.

The loans from banks, government, non- Government agencies and other organizations cannot be availed for all farmers because of the problem of non- Patta land. Assistance from government and non government agencies are not in proper way. Small, marginal and large farmers are not satisfied with the assistance proclaimed in media time to time.

The import of cardamom is another major problem to get a basic and steady price. The fluctuation of price is not a simple problem. The condition in the agreement W.T.O (World Trade Organisation) among the nations is affecting to the policy of import & export. If the import of cardamom is banned, the basic price can be adopted and it will be a reason to get high price to the farmers. The lack of steadiness in price is one of the major crisis faces by not only the farmers but the marketing agencies & traders.

Labour problem is one of the most urgent problem to be solved in the field of farming cardamom. Labours are not available in these regions for all the works related to this crop... This affects the production harvesting and marketing. If it continues gradually the production of cardamom will be less and small & marginal farmers will be forced to deviate from this field.

Conclusion

The future of cardamom industry in India is depending on the cost effectiveness in production, product diversification and its uses.

We hope that the Central Government and the spices Board would implement their recommendations in this field. Their recommendations and interpretations will be useful to get sustainable increment in production and export.
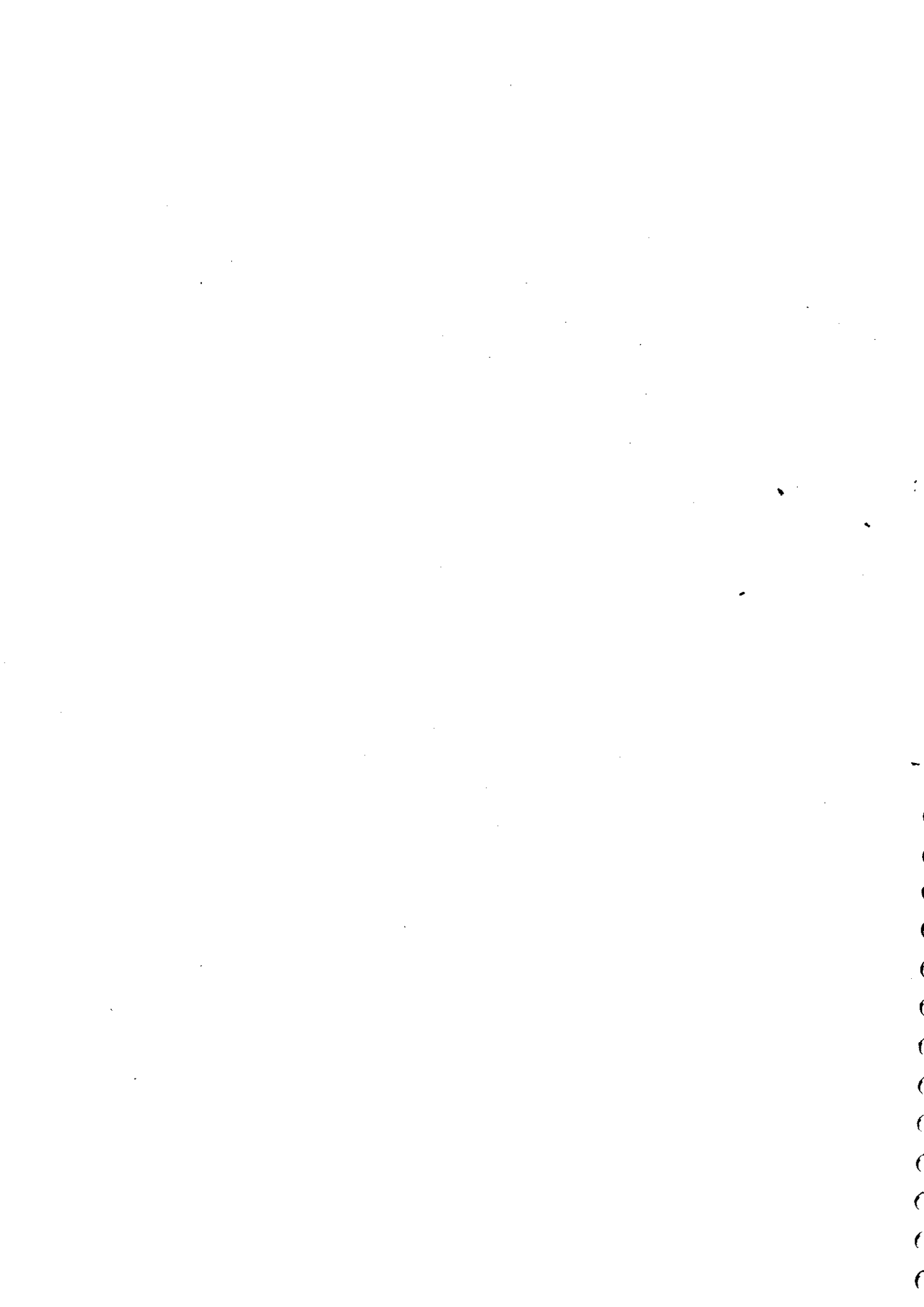
IRRIGATION STATISTICS IN MALAPPURAM DISTRICT

(REPORT SUBMITTED IN CONNECTION WITH THE
TRAINING IN QUALITATIVE DATA COLLECTION HELD FROM
02.06.2009 TO 06.06.2009 AT THIRUVANANTHAPURAM)

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IRRIGATION STATISTICS IN MALAPPURAM DISTRICT

Irrigation is a critical element of modern agriculture. Irrigation means the artificial supply of water to land, to maintain or increase yields of food crops. Irrigation can compensate for the naturally variable rate and volume of rain. Water is pumped from natural ponds, lakes, rivers, streams and wells.

The ancient people, who began agriculture had to learn three tasks, how to concentrate desirable plants into a manageable area; how to prevent weed from there; and how best to encourage the plants to flourish. In short, people learned to plant, to wipe of weeds, and to water or drain crops. In the English climate, there is enough natural rain falls to grow staple crops, but, in dry climate, most crops need water, and must be provided by the farmer. Irrigation has been the technology underlying in all of the world's greatest civilizations.

But irrigation is not easy. Usually, irrigation schemes require a large investment of money and of labour or both. Water supply must be safe, regular and reliable. In each growing seasons, water of the right quality must be delivered at the right time and place in the right quantity at the right place, and irrigation water must later be drained off the crops. Even within one growing season, irrigation systems need continual maintenance.

The long-term hazards of irrigation are even greater. Investment in irrigation projects pays best in dry areas where evaporation is high. Water is never pure, but has mineral salts dissolved in it. Evaporation will therefore make it saltier still. Rivers flowing through dry or desert lose water by evaporation, and become salty. For example, the water in the lower Colorado contains over a ton of salt per acre-foot of water.

Many areas in dry climates have natural brackish or salty lakes, or even dry salts pans. Soils are often laden with lime (calcium carbonate) or salt (sodium chloride), and many sedimentary rocks contains natural salts. Promising irrigation areas thus may have natural salts in rocks or soils that will easily be transferred into fields as soon as irrigation water is applied, and even that there may come from rivers that have become saltier from evaporation along their courses.

As water is used on crops, it spread out as a thin sheet, exposed to the surface. Much of it may evaporate, making it more saline. It may dry up altogether, leaving a thin layer of salts and in the soil. Even under normal circumstances, plants absorb moisture from the soil, leaving behind excess salts. Eventually salts build up in the surface soils until they become infertile. Over time, therefore, soils in dry irrigated areas tend to become salinized.

The only way to deal with this problem is to apply enough water so that salt is flushed off or flushed through the soil. The flushing must remove salt from the land altogether along with natural or artificial drainage. In well-drained areas in a dry season and a wet season, natural flushing takes place each year. But in poorly-drained areas, over-watering simply mobilizes the salt while the water table rises to ground level. Capillary action draws the saline water to the surface, where the salts dries out as a surface deposit, and the problem is made worse rather than better. Once the soil is saturated, with water up to the surface, there is no way to leach salts out of the soil, and the fertility of the region is destroyed unless major drainage channels are built to carry away the salt. Even flushing may not be a net environmental plus: flushing simply delivers salt some where else, perhaps to downstream users, or into ground water supplies. Flushing also leaches away soil nutrients with the salts.

Therefore, irrigation can only be maintained on a long-term basis in the following conditions. Water is applied in such a way that salt is not allowed to build up in the soil. Usually, this means the application of a lot of good-quality water and that drainage is rapid and efficient.

History of Indian Irrigation

Like in all other countries, agriculture began in India during the Neolithic period, which also led to the emergence of irrigation. But man depended largely on rain for watering the fields. Following this in the Chalcolithic period, men began to invent new techniques for betterment of agriculture, which resulted in making of canals and drainage channels.

The next stage in the development of agriculture and hence irrigation occurred during the Bronze age which witnessed the flourishing of Indus or Harappan civilization. Since agriculture was the main basis of this civilization, the Harappan people must have made small dams in the rivers to make artificial flooding to water their agricultural fields. More over they depended largely on river water for agriculture.

The advent of Aryans further brought back the tribalism, which had given importance to pastoralism. But in the later vedic period Aryans took to agriculture which witnessed primitive type of irrigational facilities. The systems of irrigation made a radical shift in the 6th century B.C in Indian history. This period was marked by the emergence of large territorial states with prominent dynasties. Naturally irrigation had became the sole responsibility of the Government, which made artificial canals, ponds, lakes etc. for improving agricultural fields. The notable historical remnant of this is the Sudarsana Lake.

During the time the Mauryas and Guptas, the state provided more or less irrigation facilities by digging ponds, lakes and channelising water for

cultivation. This period also witnessed the use of Persian wheels for watering the fields.

The establishment of Sultanate and the Mughal Empire further improved the systems of irrigation. The popular use of Persian wheels, the new technique of raising water and the large scale construction of canals facilitated irrigation and hence agriculture.

The making of India as a colony by Britain revolutionized the traditional systems of irrigation by introducing public ponds, water pumps along with traditional modes like Persian wheel, and the device to draw from wells or ponds.

More or less this was the system of irrigation prevailed in Kerala during colonial period. Since Malappuram was a part of Malabar district of Madras Presidency, the above systems of irrigation were practiced.

IRRIGATION METHODS IN MALAPPURAM

Like in other parts of Kerala, before practicing water pumps for raising water, the traditional device known as *Etham* was used to water the fields along with the practice of irrigating fields with pots. But the absence of the use of Persian wheels was a feature of agriculture in this area. Thattu nana, thadam nana, thali nana, drip irrigation, micro irrigation, hose irrigation.

kori nana, kudam nana, poovaali, thekku paathram, chakram etc were the traditional techniques used in Kerala before the introduction of Drip and Sprinkle irrigation.

Later, by constructing small bunds across rivulets, rivers and canals, water had been diverted to far off areas to bring these areas to agriculture. The modern system of irrigation projects was introduced only after this, which, of course revolutionized agriculture. Drip irrigation is a water-saving technology which enables slow and regular application of water directly to the roots of the plants through a network of economically designed plastic pipes and low discharge emitters. Nowadays, the new systems like Drip irrigation, Sprinkle irrigation have brought radical shift in irrigational facilities by reducing the quantity of excess water, by pinpointing the area to be watered and by reducing the cost.

Drip Irrigation

Drip irrigation has been used since ancient times when buried clay pots were filled with water, which would gradually seep into the grass. Modern drip irrigation began its development in Afghanistan in 1866 when

researchers began experimenting with irrigation using clay pipe to create combination irrigation and drainage systems.

In 1913, E.B. House at Colorado State University succeeded in applying water to the root zone of plants without raising the water table. Perforated pipe was introduced in Germany in the 1920s and in 1934; O.E. Nobey experimented with irrigating through porous canvas house at Michigan State University.

With the advent of modern plastics during and after World War II, major improvements in drip irrigation became possible. Plastic micro tubing and various types of emitters began to be used in greenhouses of Europe and the United States.

The modern technology of drip irrigation was invented in Israel by Simcha Blass and his son Yeshayadhu. Instead of releasing water through tiny holes, blocked easily by tiny particles, water was released through larger and longer passage ways by using velocity to slow water inside a plastic emitter. The first experimental system of this pipe was established in 1959 when Blass partnered with Kibbutz Hatzerim to create an irrigation company called Netafim. Together they developed and patented the first practical surface drip irrigation emitter. This method was very successful and subsequently spread to Australia, North America, and South America by the late 1960s.

In the United States, in the early 1960s, the first drip tape, called *Dew Hose*, was developed by Richard Chapin Watermatics (first system established during 1964). Beginning in 1989, **Jain irrigation** helped pioneer effective water-management through drip irrigation in India. Jain irrigation also introduced some drip irrigation marketing approaches to Indian agriculture such as 'Integrated System Approach', One-Stop-Shop for farmers, infrastructure status to drip irrigation and farm industry.

Drip irrigation programme in India started in 1977 to address the irrigation problems of small and marginal families living in water surface region of India. Drip irrigation is a water-saving technology which enables slow and regular application of water directly to the roots of the plants through a network of economically designed plastic pipes and low discharge emitters. It maximizes crop productivity through increase in the crop yield and also the area for cultivation, and protects the environment through conserving soil, yield and also the area for cultivation, water and fertilizer resources, and thus increasing the farmer income.

Drip irrigation is suitably adapted this technology to meet the needs of farmers by making the technology simpler and affordable.

Drip irrigation is also known as *trickle irrigation* or *micro irrigation*. It is an irrigation method which minimizes the use of water and fertilizer by allowing water to drip slowly to the roots of plants, either onto the soil

surface or directly onto the root zone, through a network of valves, pipes, tuning and emitters.

Sprinkle Irrigation

Sprinkle irrigation is a method of applying irrigation water which is similar to rainfall. Water is distributed through a system of pumping. It is then sprayed into the air and irrigated entire soil surface through spray heads so that it breaks up into small water drops which fall to the ground.

Sprinklers provide efficient coverage for small to large areas and are suitable for use on all types of properties. It is also adaptable to nearly all irrigable soils since sprinkles are available in a wide range of discharge capacity.

Sprinkler system is a unique irrigation system designed to ensure maximum water saving combining high quality, affordability and ease of installation. All the products are made out of high strength and chemical resistance engineering plastics to achieve functional satisfaction and to maintain cost economics.

Sprinkler system is suitable for almost all field crops like Wheat, Gram, Pulses as well as Vegetables, Cotton, Soya bean, Tea, Coffee and other fodder crops.

Sprinkler system is also suitable for Residential, Industrial, Hotel, Resorts, Public and Government Enterprises, Golf Links, Race courses etc.

SCHEMES IN MALAPPURAM

As per the latest Census report out of the 612413 House holds, 46635 families follows agriculture as there livelihood. The administration has been providing umpteen assistance to the farmers through their various schemes, which consist of Major irrigation department, Minor irrigation department, Ground water department, and Agriculture department.

MAJOR IRRIGATION DEPARTMENT

The Schemes implemented by Major Irrigation Department, though not directly related to irrigation, ensure the availability of water for irrigation. The main aim of all these Schemes is to prevent the mixing of water with saline water.

There are 4 Schemes in the District.
1. Keeranallur New cut. (Work completed)
2. Beyyam regulator cum bridge. (92 % work was completed)

3. Koottayi regulator cum bridge.(Work in progress)
4. Veliyancode Lock. (The work will be starting soon).

MINIOR IRRIGATION DEPARTMENT

This department stands for the promotion of agriculture through improvement in irrigational facilities and infrastructure. For implementing this, a three tier system is introduced which consists of 3 sub divisions followed by 10 sections. The details of the schemes undertaken by the department are presented in appendix I

GROUND WATER DEPARTMENT

It is another agency dedicated to the promotion of agriculture by providing economic assistance to the needy and deserving category of farmers. The Ground Water Department has implemented schemes known as *Agriculture Deposit Scheme* in relation to the improvement of irrigation. The Department provides 50 % subsidy for the construction of Bore well to the Small and Marginal Farmers. In 2008-09, 21 farmers utilized this facility.

AGRICULTURE DEPARTMENT

Like the other departments, the Agriculture department also provides proper assistance and guidance to improve the irrigational facilities to promote agriculture. An agency directly linked with people extended various schemes in the irrigation sector by supporting the farmers with expertise, economic assistance etc. All these are presented in appendix II

ASSESSMENT

Though the facilities for irrigation have increased, it is pity that the total percentage of net irrigated land is decreasing slowly from year to year. But in crop wise, the momentum achieved in 2001-02 has been maintained during the year 2006-07. Owing the many factors, agriculture has been on the decline in almost all countries of the world. This can also be reflected in Malappuram also. The detailed figures of the net land irrigated and the gross (crop wise) irrigated are given in appendix III & IV.

From the beginning of agriculture onwards, rain and rainfall had a crucial influence on the availability of yield, nature of crops and the volume of land cultivated. Even today agriculture in Malappuram, perhaps, largely and directly depends on the availability of rain, and rain water. Though

steps are being taken to collect are preserve rain water through rain water harvesting, irrigation and hence agriculture are yet to benefit from that. The annual rain fall effected during last 7 years-2000 to 2006-has been computed in appendix **V.**

FINDINGS

At the national level though 37% belong to the total irrigated area, Kerala has only 17% of her irrigated area.

The lack of proper utilization of irrigational facilities and the traditional irrigational methods stand in the way of better irrigation and hence improvements in agriculture. It is high time that irrigational facilities have to be provided for cereals, vegetables, pulses and oil seed crops. Further the study identifies that proper irrigation will increase the productivity of coconut, areca nut, cocoa, nutmeg, clove, cinnamon and coffee. The use of proper irrigational methods will of course boost coconut productivity from the existing 30% to 100%. Thus irrigation has to take seminal importance to improve agriculture and to improve the lot of the people.

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IRRIGATION STATISTICS

SCHEMES IMPLEMENTED BY MINOR IRRIGATION DEPARTMENT

Sl.No	Name of Scheme	No.	Settlement Area in Ha.(0.00)
1	2	3	4
1	Class I Scheme (Above 50 Ha.)	27	3745.42
2	Lift Irrigation Scheme	48	6808.06
2	Class II Scheme (Below 50 Ha.)	703	9357.91
3	Integrated Paddy Development Scheme	50	1031.54
4	Jala Dhara Scheme	82	1489.32
5	Special Component Programme for ST	51	483.12
6	Western Ghat Development Programme	22	254.85
7	European Economic Community Programme	52	1322.00
8	Social Irrigation Programme	52	959.39
	Total	1087	25451.61

Source: Minor Irrigarion Division, Malappuram

APPENDIX II

SCHEMES IMPLEMENTED BY THE AGRICULTURAL DEPARTMENT

Year	Name of Implement/Scheme	Area covered (o.oo Ha)	No.
2004-05	Drip Irrigation		
	Sprinkle Irrigation	7.50	
	Pumpset		
2005-06	Drip Irrigation	3.39	
	Sprinkle Irrigation	3.50	
	Pumpset		
2006-07	Drip Irrigation	47.623	
	Sprinkle Irrigation	26.79	
	Pumpset		1131
2007-08	Drip Irrigation	66.15	
	Sprinkle Irrigation	73.13	
	Pumpset		299
2008-09	Drip Irrigation	6.34	
	Sprinkle Irrigation	15.70	
	Pumpset		457

Source: Principal Agriculture Office, Malappuram

APPENDIX III

IRRIGATION STATISTICS

NET ARE IRRIGATED (SOURCE WISE) IN MALAPPURAM DISTRICT

(Area in hectare)

Sl.No	Year	Total Geographical area	Government Canal	Private Canal	Government Tanks	Private tanks	Government Wells	Private Wells	Minor lift Irrigation	Other source	Tube wells	Total	%
1	2	3	4	5	6	7	8	9	10	11	12	13	14
1	2001-02	363230	707	368	205	3849		11283	831	9620		26863	7.40
2	2002-03	363230	1015	784	106	2873	7	310	827	7781	10324	24027	6.61
3	2003-04	363230	904	630	798	1867	44	4878	521	8372	6113	24127	6.64
4	2004-05	363230	989	676	703	1926	30	5317	529	8280	5993	24443	6.73
5	2005-06	363230	824	539	676	1986	27	5481	640	8313	5238	23724	6.53
6	2006-07	363230	972	550	473	2443	36	7125	614	7482	4619	24314	6.69

Source: Agricultural Statistics 2001-2002 to 2006-2007, Directorate of Economics & Statistics,Thiruvananthapuram

IRRIGATION STATISTICS

GROSS ARE IRRIGATED (CROP WISE) IN MALAPPURAM DISTRI

(Area in hectare)

Sl.No	Year	Total Geographical area	Paddy	Tubers	Vegetables	Coconut	Arecanut	Cloves	Nutmeg	Other Spices & condiments	Banan	Betel Leaves	Sugarcane	Other trees	Total	%
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17
1	2001-02	363230	10716	167	1428	12928	5589	8	50	124	4640	582	7	1118	37357	10.28
2	2002-03	363230	9527	159	1471	10564	5524	9	47	128	4327	624	11	1163	33554	9.24
3	2003-04	363230	9437	182	1511	10411	6084	17	54	141	3859	495	14	1411	33616	9.25
4	2004-05	363230	8448	122	981	12544	5762	19	59	165	4812	513	NIL	1460	34885	9.60
5	2005-06	363230	7467	170	942	12910	5789	21	97	163	9746	432	NIL	1520	39257	10.81
6	2006-07	363230	7000	1049	2296	14254	4682	15	270	82	7245	350	NIL	479	37722	10.39

Source: Agricultural Statistics 2001-2002 to 2006-2007, Directorate of Economics & Statistics, Thiruvananthapuram

RAINFALL STATISTICS

ACTUAL AND NORMAL RIANFALL (MM) WITH PERCENTAGE OF DEPARTURE FROM NORMAL RAINFALL IN MALAPPURAM DISTRICT

Sl.No	Year	Actual Rain Fall (mm)	Normal Rainfall (mm)	Deviation	Percentage Departure (%)
1	2000	2191.0	3185.0	994	(-) 31
2	2001	2690.6	2906.1	215.5	(-) 7
3	2002	2281.3	2830.9	549.6	(-) 19
4	2003	2131.3	2719.0	587.7	(-) 22
5	2004	2538.8	2719.0	180.2	(-) 7
6	2005	2401.4	2486.6	85.2	(-) 3
7	2006	2744.4	2486.7	-257.7	(+) 10

Source: Economic Review and Statistics for Planning, 2006

Agricultural Statistics.

Prepared by Jothi J. Winslow, Deputy Director (Statistics), Department of Agriculture

The nodal agency for collecting, compiling and publishing agricultural statistics is declared to be the Department of Economics and Statistics. That department is publishing every year, the estimated area and production of all crops cultivated in the state. Such data on majority of crops are available for last Fifty-five years. Hence the data on estimated area and production of major crops as published by the Department of Economics and Statistics was taken for the study.

Paddy and coconut are the major crops in Kerala. Area and production of paddy and coconut are available from 1953-54 to 2007-08. While verifying the data, a declining trend was observed both in area and production of Paddy in the state. In order to study the actual position of cultivation of paddy and coconut, a trend line was constructed on the area and production of Paddy and coconut in the state.

Straight-line trend

<u>Definition and formula</u>

The straight-line trend is represented by the equation $Y = aX + b$ where

Y = trend value
X = time
'a' and 'b' are constants.

The values of 'a' and 'b' can be determined by method of least square. i.e. the value of a and b can be determined by solving the equations

$$\Sigma y = a \Sigma x + nb$$

$$\Sigma xy = a \Sigma x^2 + b \Sigma x$$

Where n represents the number of years for which data are given. When middle year is taken as origin. i.e. $\Sigma x = 0$ the values of a and b can be determined by

$$a = \Sigma xy / \Sigma x^2 \text{ and } b = \Sigma y / n$$

Therefore the equation of straight-line trend is

$$Y = (\Sigma xy / \Sigma x^2)X + \Sigma y/n,$$

where Y is the trend, X is the time and the middle year takes as the origin.

Area and production of paddy

Trend in the area of paddy cultivation in Kerala since 1953-54

Sl.No	Year Z	Area (Hectares) Y	X=Z-1981	X²	XY	Trend
1	1954	760850	-27	729	-20542950	950360.03
2	1955	763200	-26	676	-19843200	939352.74
3	1956	759350	-25	625	-18983750	928345.46
4	1957	762020	-24	576	-18288480	917338.17
5	1958	766760	-23	529	-17635480	906330.89
6	1959	768420	-22	484	-16905240	895323.6
7	1960	768960	-21	441	-16148160	884316.32
8	1961	778910	-20	400	-15578200	873309.03
9	1962	752690	-19	361	-14301110	862301.75
10	1963	802660	-18	324	-14447880	851294.46
11	1964	805080	-17	289	-13686360	840287.18
12	1965	801120	-16	256	-12817920	829279.89
13	1966	802330	-15	225	-12034950	818272.61
14	1967	799440	-14	196	-11192160	807265.32
15	1968	809540	-13	169	-10524020	796258.04
16	1969	873870	-12	144	-10486440	785250.75
17	1970	874060	-11	121	-9614660	774243.47
18	1971	874930	-10	100	-8749300	763236.18
19	1972	875160	-9	81	-7876440	752228.9
20	1973	873700	-8	64	-6989600	741221.61
21	1974	874680	-7	49	-6122760	730214.33
22	1975	881466	-6	36	-5288796	719207.04
23	1976	876022	-5	25	-4380110	708199.76
24	1977	854374	-4	16	-3417496	697192.47
25	1978	840374	-3	9	-2521122	686185.19
26	1979	799238	-2	4	-1598476	675177.9
27	1980	793266	-1	1	-793266	664170.62
28	1981	801699	0	0	0	653163.33
29	1982	806871	1	1	806871	642156.05
30	1983	778490	2	4	1556980	631148.76
31	1984	740086	3	9	2220258	620141.48
32	1985	730379	4	16	2921516	609134.19
33	1986	678281	5	25	3391405	598126.91
34	1987	663803	6	36	3982818	587119.62
35	1988	604082	7	49	4228574	576112.34
36	1989	577557	8	64	4620456	565105.05
37	1990	583388	9	81	5250492	554097.77
38	1991	559450	10	100	5594500	543090.48
39	1992	541327	11	121	5954597	532083.2

Sl.No	Year Z	Area (Hectares) Y	X=Z-1981	X^2	XY	Trend
40	1993	537608	12	144	6451296	521075.91
41	1994	507832	13	169	6601816	510068.63
42	1995	503290	14	196	7046060	499061.34
43	1996	471150	15	225	7067250	488054.06
44	1997	430826	16	256	6893216	477046.77
45	1998	387122	17	289	6581074	466039.49
46	1999	352631	18	324	6347358	455032.2
47	2000	349774	19	361	6645706	444024.92
48	2001	347455	20	400	6949100	433017.63
49	2002	322368	21	441	6769728	422010.35
50	2003	310521	22	484	6831462	411003.06
51	2004	287340	23	529	6608820	399995.78
52	2005	289974	24	576	6959376	388988.49
53	2006	275742	25	625	6893550	377981.21
54	2007	263529	26	676	6851754	366973.92
55	2008	228938	27	729	6181326	355966.64
		35923983	0	13860	-152560967	

Trend line y= ax+ b

$Y = (\Sigma xy / \Sigma x^2)X + \Sigma y/n$

$\Sigma xy = -152560967$, $\Sigma x^2 = 13860$, $\Sigma y = 35923983$ and n = 55

$a = (\Sigma xy / \Sigma x^2) = -11007.285$, $b = \Sigma y/n = 653163.33$

$Y = -11007.285*x + 653163.33$

TREND OF AREA OF PADDY CULTIVATION
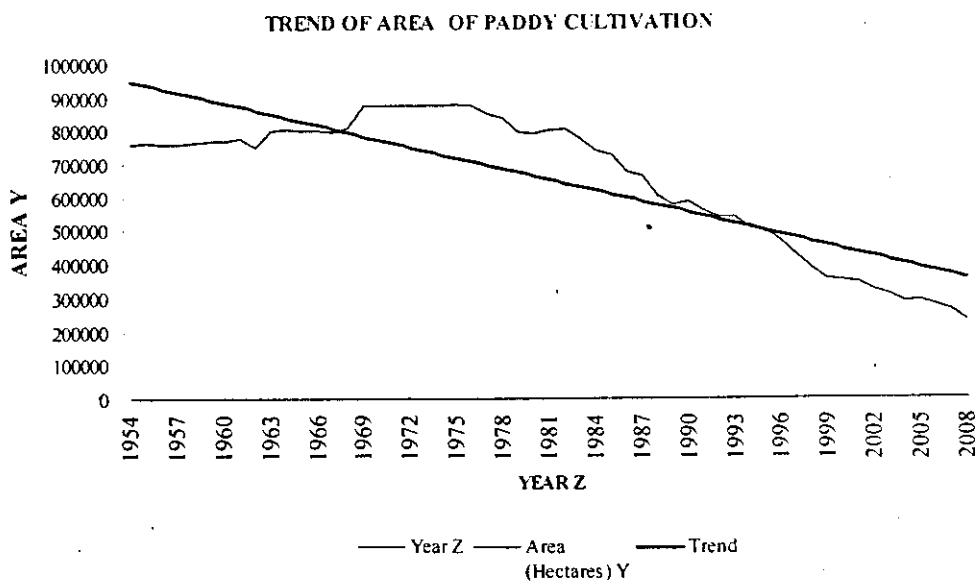
If we stretch this line, further it would meet the X-axis at 2041. That is if this trend is continued, the area will tend to zero in 2041.

Trend in the production of rice in Kerala since 1953-54

Sl.No	Year Z	Production (tones) y	X=Z-1981	X^2	XY	Trend
1	1954	750820	-27	729	-20272140	1205670.3
2	1955	817880	-26	676	-21264880	1199249.5
3	1956	883920	-25	625	-22098000	1192828.7
4	1957	887170	-24	576	-21292080	1186407.9
5	1958	925470	-23	529	-21285810	1179987.1
6	1959	954430	-22	484	-20997460	1173566.3
7	1960	1037940	-21	441	-21796740	1167145.5
8	1961	1067530	-20	400	-21350600	1160724.7
9	1962	1003930	-19	361	-19074670	1154303.9
10	1963	1093210	-18	324	-19677780	1147883.1
11	1964	1128000	-17	289	-19176000	1141462.3
12	1965	1121380	-16	256	-17942080	1135041.5
13	1966	997490	-15	225	-14962350	1128620.7
14	1967	1084060	-14	196	-15176840	1122199.9
15	1968	1123900	-13	169	-14610700	1115779.1
16	1969	1251350	-12	144	-15016200	1109358.3
17	1970	1226410	-11	121	-13490510	1102937.5
18	1971	1298010	-10	100	-12980100	1096516.7
19	1972	1351740	-9	81	-12165660	1090095.9
20	1973	1376370	-8	64	-11010960	1083675.1
21	1974	1257070	-7	49	-8799490	1077254.2
22	1975	1333931	-6	36	-8003586	1070833.4
23	1976	1331191	-5	25	-6655955	1064412.6
24	1977	1254003	-4	16	-5016012	1057991.8
25	1978	1294635	-3	9	-3883905	1051571
26	1979	1272733	-2	4	-2545466	1045150.2
27	1980	1299695	-1	1	-1299695	1038729.4
28	1981	1271962	0	0	0	1032308.6
29	1982	1339393	1	1	1339393	1025887.8
30	1983	1306197	2	4	2612394	1019467
31	1984	1207916	3	9	3623748	1013046.2
32	1985	1255902	4	16	5023608	1006625.4
33	1986	1173051	5	25	5865255	1000204.6
34	1987	1133768	6	36	6802608	993783.83
35	1988	1032605	7	49	7228235	987363.02
36	1989	1012558	8	64	8100464	980942.22
37	1990	1141231	9	81	10271079	974521.42
38	1991	1086578	10	100	10865780	968100.62
39	1992	1060350	11	121	11663850	961679.82
40	1993	1084878	12	144	13018536	955259.01
41	1994	1003938	13	169	13051194	948838.21
42	1995	975065	14	196	13650910	942417.41

Sl.No	Year Z	Production (tones) y	X=Z-1981	X²	XY	Trend
43	1996	953026	15	225	14295390	935996.61
44	1997	871361	16	256	13941776	929575.81
45	1998	764610	17	289	12998370	923155.01
46	1999	726743	18	324	13081374	916734.2
47	2000	770686	19	361	14643034	910313.4
48	2001	751326	20	400	15026520	903892.6
49	2002	703504	21	441	14773584	897471.8
50	2003	688859	22	484	15154898	891051
51	2004	570045	23	529	13111035	884630.19
52	2005	667105	24	576	16010520	878209.39
53	2006	629987	25	625	15749675	871788.59
54	2007	641575	26	676	16680950	865367.79
55	2008	528488	27	729	14269176	858946.99
		56776975	0	13860	-88992313	

Trend line y= ax+ b

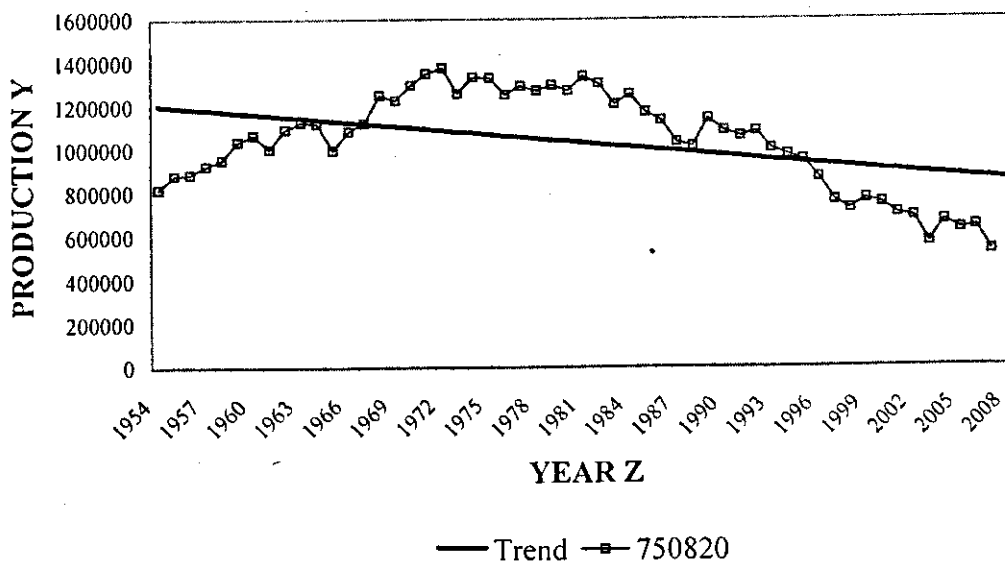$Y= (\Sigma xy / \Sigma x^2) X + \Sigma y/n$

$\Sigma xy = -88992313, \Sigma x^2 =13860, \Sigma y = 56776975$ and n= 55

$a=(\Sigma xy / \Sigma x^2)= -6420.801804, b=\Sigma y/n= 1032308.636$

$Y = -6420.801804 \, x + 1032308.636$

TREND OF PRODUCTION OF RICE

If we stretch this line further it would meet the X-axis at. That is if this trend is continued, the production will tend to zero in 2142.

Area and production of coconut

Trend in the area of coconut cultivation in Kerala since 1953-54

Sl. No	Year z	Area (Hectares) y	X=Z-1981	X²	xy	Trend
1	1954	439620	-27	729	-11869740	473979.01
2	1955	444520	-26	676	-11557520	482957.53
3	1956	447940	-25	625	-11198500	491936.05
4	1957	459840	-24	576	-11036160	500914.57
5	1958	463270	-23	529	-10655210	509893.09
6	1959	475680	-22	484	-10464960	518871.62
7	1960	492540	-21	441	-10343340	527850.14
8	1961	500760	-20	400	-10015200	536828.66
9	1962	504820	-19	361	-9591580	545807.18
10	1963	539260	-18	324	-9706680	554785.7
11	1964	544990	-17	289	-9264830	563764.23
12	1965	558990	-16	256	-8943840	572742.75
13	1966	586310	-15	225	-8794650	581721.27
14	1967	609580	-14	196	-8534120	590699.79
15	1968	638720	-13	169	-8303360	599678.31
16	1969	686060	-12	144	-8232720	608656.84
17	1970	707840	-11	121	-7786240	617635.36
18	1971	719140	-10	100	-7191400	626613.88
19	1972	730260	-9	81	-6572340	635592.4
20	1973	745430	-8	64	-5963440	644570.92
21	1974	744830	-7	49	-5213810	653549.45
22	1975	748174	-6	36	-4489044	662527.97
23	1976	692945	-5	25	-3464725	671506.49
24	1977	694985	-4	16	-2779940	680485.01
25	1978	673479	-3	9	-2020437	689463.53
26	1979	660628	-2	4	-1321256	698442.06
27	1980	664459	-1	1	-664459	707420.58
28	1981	651370	0	0	0	716399.1
29	1982	666618	1	1	666618	725377.62
30	1983	674378	2	4	1348756	734356.14
31	1984	682281	3	9	2046843	743334.67
32	1985	687483	4	16	2749932	752313.19
33	1986	704682	5	25	3523410	761291.71
34	1987	706107	6	36	4236642	770270.23
35	1988	775365	7	49	5427555	779248.75
36	1989	816880	8	64	6535040	788227.28
37	1990	832174	9	81	7489566	797205.8
38	1991	870022	10	100	8700220	806184.32
39	1992	863061	11	121	9493671	815162.84
40	1993	877012	12	144	10524144	824141.36
41	1994	882293	13	169	11469809	833119.89

Sl. No	Year z	Area (Hectares) y	X=Z-1981	X^2	xy	Trend
42	1995	910963	14	196	12753482	842098.41
43	1996	914370	15	225	13715550	851076.93
44	1997	902104	16	256	14433664	860055.45
45	1998	884344	17	289	15033848	869033.97
46	1999	882288	18	324	15881184	878012.5
47	2000	925035	19	361	17575665	886991.02
48	2001	925783	20	400	18515660	895969.54
49	2002	905718	21	441	19020078	904948.06
50	2003	899198	22	484	19782356	913926.58
51	2004	898498	23	529	20665454	922905.11
52	2005	899267	24	576	21582408	931883.63
53	2006	897833	25	625	22445825	940862.15
54	2007	872943	26	676	22696518	949840.67
55	2008	818812	27	729	22107924	958819.19
		39401952	0	13860		

Trend line y= ax+ b
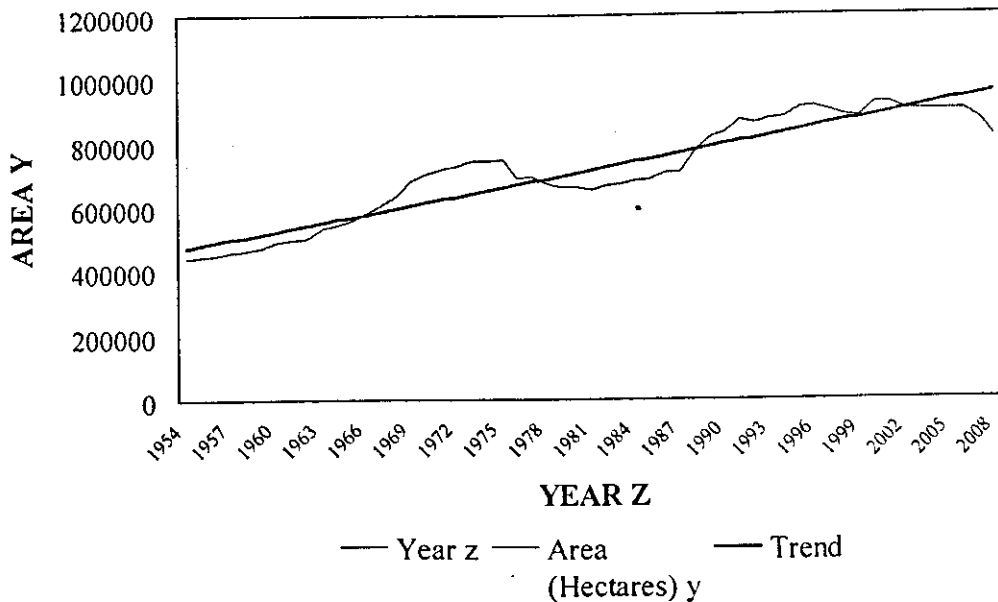
$Y= (\Sigma xy / \Sigma x^2) X + \Sigma y/n$
$\Sigma xy= 124442321, \Sigma x^2 =13860, \Sigma y = 39401952$ and n= 55
$a =(\Sigma xy / \Sigma x^2)= 8978.52244, b= \Sigma y/n =716399.127$

Trend line Y = 8978.522*x +716399.1

TREND OF AREA OF COCONUT

— Year z — Area (Hectares) y   — Trend

An increasing trend is observed in the area of coconut cultivation.

Trend in the Production of coconut in Kerala since 1953-54

Sl.No	Year z	Production (Million Nuts) y	X=Z-1981	X^2	xy	Trend
1	1954	3042	-27	729	-82134	2609.3446
2	1955	3076	-26	676	-79976	2663.1413
3	1956	3099	-25	625	-77475	2716.938
4	1957	3182	-24	576	-76368	2770.7347
5	1958	3199	-23	529	-73577	2824.5314
6	1959	3248	-22	484	-71456	2878.328
7	1960	3365	-21	441	-70665	2932.1247
8	1961	3220	-20	400	-64400	2985.9214
9	1962	3247	-19	361	-61693	3039.7181
10	1963	3305	-18	324	-59490	3093.5148
11	1964	3262	-17	289	-55454	3147.3114
12	1965	3273	-16	256	-52368	3201.1081
13	1966	3293	-15	225	-49395	3254.9048
14	1967	3425	-14	196	-47950	3308.7015
15	1968	3593	-13	169	-46709	3362.4982
16	1969	3834	-12	144	-46008	3416.2948
17	1970	3956	-11	121	-43516	3470.0915
18	1971	3981	-10	100	-39810	3523.8882
19	1972	4054	-9	81	-36486	3577.6849
20	1973	3921	-8	64	-31368	3631.4816
21	1974	3703	-7	49	-25921	3685.2782
22	1975	3719	-6	36	-22314	3739.0749
23	1976	3439	-5	25	-17195	3792.8716
24	1977	3348	-4	16	-13392	3846.6683
25	1978	3053	-3	9	-9159	3900.465
26	1979	3211	-2	4	-6422	3954.2616
27	1980	3032	-1	1	-3032	4008.0583
28	1981	3008	0	0	0	4061.855
29	1982	3006	1	1	3006	4115.6517
30	1983	3184	2	4	6368	4169.4484
31	1984	2602	3	· 9	7806	4223.245
32	1985	3453	4	16	13812	4277.0417
33	1986	3377	5	25	16885	4330.8384
34	1987	3173	6	36	19038	4384.6351
35	1988	3346	7	49	23422	4438.4318
36	1989	4215	8	64	33720	4492.2284
37	1990	4358	9	81	39222	4546.0251
38	1991	4232	10	100	42320	4599.8218
39	1992	4641	11	121	51051	4653.6185
40	1993	5124	12	144	61488	4707.4152
41	1994	5192	13	169	67496	4761.2118
42	1995	5336	14	196	74704	4815.0085

Sl.No	Year z	Production (Million Nuts) y	X=Z-1981	X^2	xy	Trend
43	1996	5155	15	225	77325	4868.8052
44	1997	5276	16	256	84416	4922.6019
45	1998	5210	17	289	88570	4976.3986
46	1999	5132	18	324	92376	5030.1952
47	2000	5680	19	361	107920	5083.9919
48	2001	5536	20	400	110720	5137.7886
49	2002	5479	21	441	115059	5191.5853
50	2003	5709	22	484	125598	5245.382
51	2004	5876	23	529	135148	5299.1786
52	2005	6001	24	576	144024	5352.9753
53	2006	6326	25	625	158150	5406.772
54	2007	6054	26	676	157404	5460.5687
55	2008	5641	27	729	152307	5514.3654
		223402	0	13860	745622	

Trend line y= ax+ b
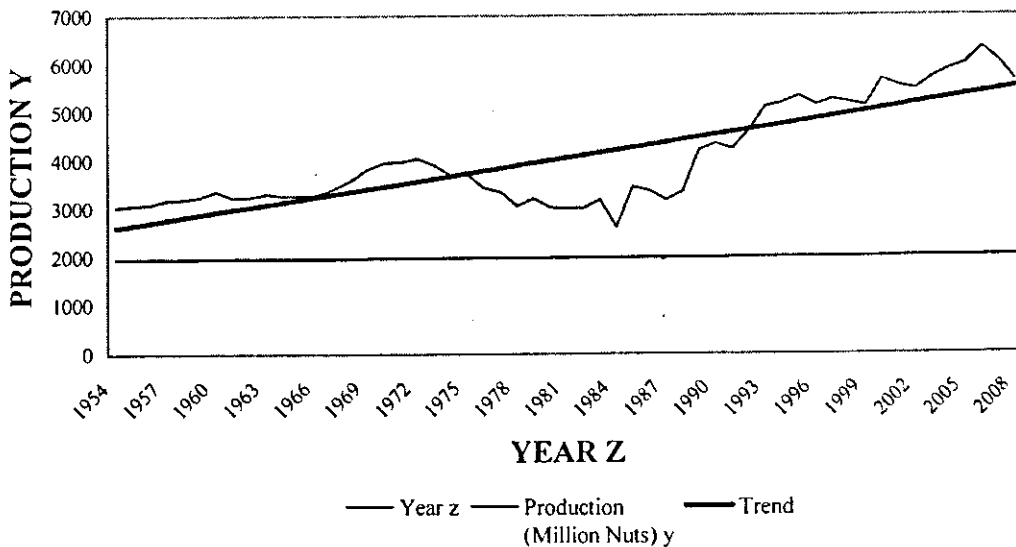
$$Y = (\Sigma xy / \Sigma x^2) X + \Sigma y/n$$
$\Sigma xy= 745622$, $\Sigma x^2 =13860$, $\Sigma y = 223402$ and n= 55
$a =(\Sigma xy / \Sigma x^2)= 53.7966811$, b= $\Sigma y/n =4061.85455$

Trend line Y = 53.7966811*x + 4061.85455

TREND OF PRODUCTION OF COCUNUT

Production of coconut has an increasing trend.

Conclusion

An increasing trend is observed in the area and production of coconut in the state, whereas those of paddy are declining.

In the case of paddy, the trend-line of area cultivated touches the x-axis much earlier than the trend line of production do. This indicates that even though the production of paddy is decreasing, the productivity of paddy is increasing. The declining trend in the case of paddy is solely due to decreasing trend in the area of paddy fields in the state. In order to have a steady production, the paddy fields available for cultivation have to be preserved.
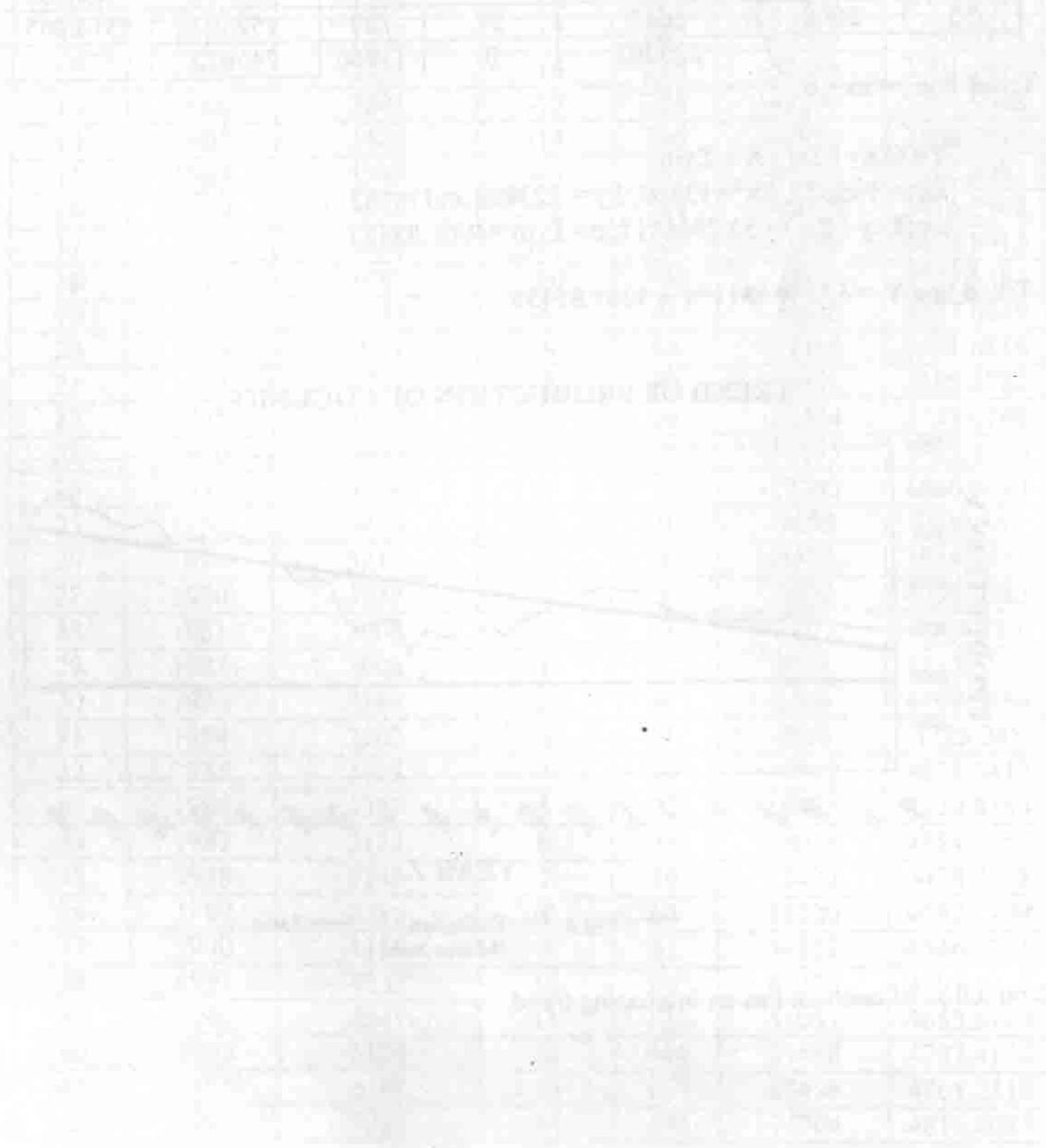
Introduction

The District Hand Book of Kollam was prepared by District Statistical office, and it makes an attempt in providing a reference book of statistics of Kollam district.

This was an attempt to explore various parameters among various constraints. The Brain and Team behind the task has, no doubt, taken utmost care to avoid mistakes

Objectives

This attempt is to analyse the overall progress of the district as on the year of reference compared to Year 2005-06

Demographic details

Population	District	State	Percentage	Geographical area District	Percentage to state total
Male	1249621	15468614	8	2491sq.km.	6.4
Female	1335587	16372760	8		
Total	2585208	31841374	8		

Our district having 6.40 percentage of the state geographical area accommodates 8 percentage of the state population (see table above)

Land put to non agriculture use during 2007-08 has decreased by 1.5% and land under miscellaneous crops has decreased by 45% compared to the year 2005-06. Still it is a fact that the net area cropped as on the year of reference has decreased by 1.5 %, which ought to have increased considering the above factors. (see table below)

do Winter	8537	31380	9712
do Summer	9668	38724	10506
Coconut	55392	372943	66134
Rubber	35545	502240	36869

Though net area cropped has decreased only by 1.5% over the years, total production of important crops has decreased considerably. (See table below; unit in Tonnes)

	Dist 2007-08	State 2007-08	Dist. 2005-06
Rice			
Autumn	3904	191241	5713
Winter	8672	346763	10345
Summer	4	103571	5
Total	12580	641575	16063
Arecanut	1699	109968	1794
Banana	11776	463766	12846
Other plantain	33527	435636	38018
Tapioca	596629	2518999	694984
Coconut (million nuts)	512	6054	504
Rubber	62660	780405	60765
Raw cashew nuts	2424	61680	3003

But productivity of many of the crops has registered an increase. (see table below; Unit Kg / ha)

Crop	District 2007-08	State 2007-08	District 2005-06
Paddy Autumn	2417	2281	2222
Winter	2236	2413	2228
Summer	1333	2881	1667
Coconut in Nos.	7830	6935	7621
Areca nut	709	1077	722
Tapioca	27289	28911	29184
Raw Cashew nuts	655	875	703
Black pepper	290	297	
Rubber	1763	1554	
Banana			7249

Land Utilisation

Particulars	District 2006-07	State 2006-07	District 2005-06
Total Geographical Area	248788	3886287	248788
Forest	81438	1081509	81438
Land put to non Agricultural use	21810	358684	22136
Barren and uncultivable land	190	26125	249
Permanent pastures and other grazing land	nil	301	11
Land under misc. tree crops	87	8959	126
Cultivable waste	697	90288	495
Fallow other than current fallow	1488	47144	630
Current fallow	5264	81651	3707
Marshy Land	85	435	Not known
Still Water	6070	82702	do
Water Logged Area	1557	4330	do
Social Forestry	95	2628	do
Net area sown	130007	2101431	131975
Area sown more than once	53282	816110	57500
Total cropped area	183289	2917541	189475

Over the years from 2005-06 to 2006-07, the area under major crops has decreased considerably, especially during Autumn and Winter Paddy. Though not significant, area under Coconut and Rubber has also decreased over the years. On the other hand, considerable increase has noticed in the area under cultivation of Banana. (See table below)

Area under Various crops

Crop	Dist: 2006-07	State 2006-07	Dist: 2005-06
Paddy Autumn	1615	83859	2571
Winter	3879	143724	4644
Summer	3	35946	3
Total	5497	263529	7218
Arecanut	2398	102073	2485
Banana	1917	59143	1773
Other plantains	4299	54008	4213
Dry Cashew fruits	1701	70463	1674

0411000

GOVERNMENT

Though not area under irrigation the U.P. Govt. canal has increased by15% over the years, total area irrigated under various sources has increased by 14.5 % (see table below) (figure in ha)

	District 2006-07	State 2006-07	District 2005-06
Government canal	351	103070	113
Private canal	100	4300	80
Government tanks	12	1880	9
Private tanks	245	40184	175
Government wells	3	1005	3
Private wells	1715	113472	1531
Minor Lift irrigation	7	9434	4
Other sources	564	106302	403
Tube wells	3	12164	2
Total	3000	391811	2620

The employment status has remained more or less the same. (see table below)

Particulars	31.03.2006	31.03.2007
1. No. of persons employed - Public Sector	45656	45647
2. No. of persons employed on Private Sector	46017	45962
3. Central Govt.	698	651
4. State Govt.	17216	17933
5. Central Govt.(Q)	5317	5267
6. State Govt.(Q)	19197	19603
7. Local Body	3228	3173

Employment
The employment sector remained more or less the same over the years. (See table below)

Particulars	31.03.2005	31.03
1. No. of candidates reg. during the reporting Year		
2. Total reg. seekers	395070	

4. Total No. of registered SC candidates during the year ... 2007 ... 352
5. Total No. of SC work seekers ... 5000 ... 56090
6. Placement given to SC during the year ... 95
7. No. of ST candidates registered ... 3
8. Total No. of ST work seekers ... 572
9. Placement given to ST during the year ... 6
10. No. of Physically Handicapped candidates registered ... 110 ... 186
11. Total No. of PH work seekers ... 4860 ... 334
12. Placement given to PH work seekers during 2007 ... 40 ... 64

Industries

Category-wise details of Regd: SSI Units as on 31.3.2009

1.	Agriculture	3387
2.	Wood based	1452
3.	Animal product based	1143
4.	Textile based	2903
5.	DTP-IT based	560
6.	Engineering	3728
7.	Construction equipment based	930
8.	Clay based	618
9.	Traditional based	1698
10.	Repair & Service	1954
11.	Food Processing Units	4623
12.	Miscellaneous	951
	Total	23747

No. of Cashew Factories as on 31.03.2009

	No.
1. Capex	10
2. KSCDC	30
3. Private	645
4. Packing centers	182
Total	867

PRINCIPAL INDUSTRIES AND NO. OF PERSONS EMPLOYED

Industry	Men	Women	Total
1. Cashew Processing	7083	35982	38065
2. Coir manufacturing	418	1889	2307
3. Brick & Tile Manufacturing	978	288	1266
4. Matches Manufacturing	71	167	228

Fisheries

Though the percentage of common population compared to State average is 11.5%, the percentage of active fisheries in the district is above ... Same is the case in inland fisheries... (see table below)

Marine	District	State
	2007-08	2007-08
Population	97670	832998
Active Fisheries	20408	199983
Inland		
Population	37019	253994
Active Fisheries	9383	41905

EDUCATION
No. of Schools

High schools (Including HSS & VHSS)	District
Govt:	78
Aided	131
Un Aided	17
Total	226
UP Schools	
Govt:	61
Aided	139
Un Aided	18
Total	218
LP Schools	
Govt:	267
Aided	190
Un Aided	26
Total	483
Govt.	406
Aided	460
Un Aided	61
Total	927
Technical Institutions	
Govt:	2
Aided	6
Un Aided	19
Total	27
THSS	1
Special School	1

Schools other than State Syllabus

CBSE	53
ICSE	10
Kendriya vidyalaya	
Jawahar Navodaya	

GOVERNME

Higher Secondary Schools

Govt	13
Aided	19
Unaided	
Total	128

VHS Schools	
Government	20
Aided	32
Total	32

PROFESSIONAL, ARTS AND SCIENCE COLLEGES

Engineering colleges

1	TKM college of Engineering, Karicode.
2	College of Engineering, Perumon.
3	Younus college of Engineering and Technology, Vadakkevila.
4	Travancore Engineering college, Cheriyavelinallur P.O.
5	SHM Engineering college, Pulippara.
6	College of Engineering, Thrikkannamangal, ETC P.O.
7	College of Engineering, Pada North P.O.
8	Baselios Mathews II College of Engg. Muthupilakkadu P.O.
9	TKM Institute of Technology, Ezhukone.

Dental college

1	Azeezia college of Dental Sciences and Research, Meeyannur.

Nursing Colleges

1	Bishop Benziger college of nursing, Sastri Jn. Kollam.
2	Holy Cross college of nursing, Kottiyam.
3	VNSS college of nursing, Kollam.
4	St.Joseph's college of nursing, Anchal.
5	Upasana college of nursing, O.S.Road.
6	Vijaya college of nursing, Kottarakkara.

Ayurveda college

1	Sree Narayana Institute of Ayurvedic studies and research, Karimpinpuzha

MCA

1	TKM college of Engineering, Kollam.
2	Mar Baselios Institute of Technology, Anchal.
3	Marthoma Institute of Information Technology, Chadayamangalam.
4	Sree Narayana Institute of Technology, Vadakkevila, Kollam.

Arts and Science Colleges

1	Government college, Chavara.
2	S.N College, Kollam.
3	S.N college for women, Kollam.
4	T.K.M college, Kollam.
5	F.M.N college, Kollam.
6	Baselius Basel Training college
7	St. Gregorius college, Kottarakkara.
8	St Mathews, Pathanapuram.
9	S.N women college, Kottarakkara.

1. St Paul's College Kalthla
12. S S College Chathannur
14. M.S.M.S.S College Kodiyam
15. D J College Sastamcott?

Arts and Science Colleges

Govt.	12
Aid.d	13
Total	

Industrial Training Institutions

	General	Women	ScDD	Total
Govt.	1	1	3	5
Private	48			48
Total	49		3	53

Institutions under SC Development Department as on 2008

	No	Students
	3	168
Training Institutes	-	-
Model Residential Schools	6	196
Nurseries	8	260
Pre-metric Hostels	2	120
Post Metric Hostels	-	-
Subsidised Hostels	-	-
Sports Hostel	-	-
Production cum training centre	-	-
Pre Examination training centre	-	-
Civil Service Examination training		

Institutions under ST Development Department as on 2008

Ayurveda Dispensary	1
Balavadies (Kindergarden)	2
Pre-matric Hostels	4
Training Centres	
ANM centres	1
Model Residential Schools	1

P.C Renjithkumar, Research Officer.

M. Mundeedharan Pillai,
Taluk Statistical Officer, Kunnachur.

0410997

Micro level Statistics

in

Pathanamthitta District

PATHANAMTHITTA DISTRICT

Not in Scale

Legend

K.B.Hareesh Kumar, Statistical Inspector

O.Samuel, Statistical Investigator

Introduction

In order to cater to the needs of decentralised planning process Economic and Statistics Department has taken various actions to collect and publish primary data from the very micro level. In view of the micro level planning, there is greater need to provide these statistics at Grama Panchayat level.

Very important concern of local level planners and administrators is to identify the local needs and priorities. Lack of reliable local level database the immediate needs and priorities of village people can't be properly identified. Hence Micro level data are very necessary for monitoring the remedial measures organised by basic unit of administration. Micro level data are needed not only for planning but also for measuring the results of planning. It is necessary to know the effects of the investments made for development. The data availability for planning at micro level is a major concern.

The data collected from sample surveys cannot be generated at Micro level as such, since such estimates would be subject to sampling errors due to small sample size. Therefore, the databases now available are mostly at the district and state level. Therefore, great attention is required to prepare local level data

It is necessary to update the local level data in various sectors periodically. Improving statistical database for formulation of appropriate Plans for economic development at the local level and for improvement of quality of life of the people at large, should be a continuous process
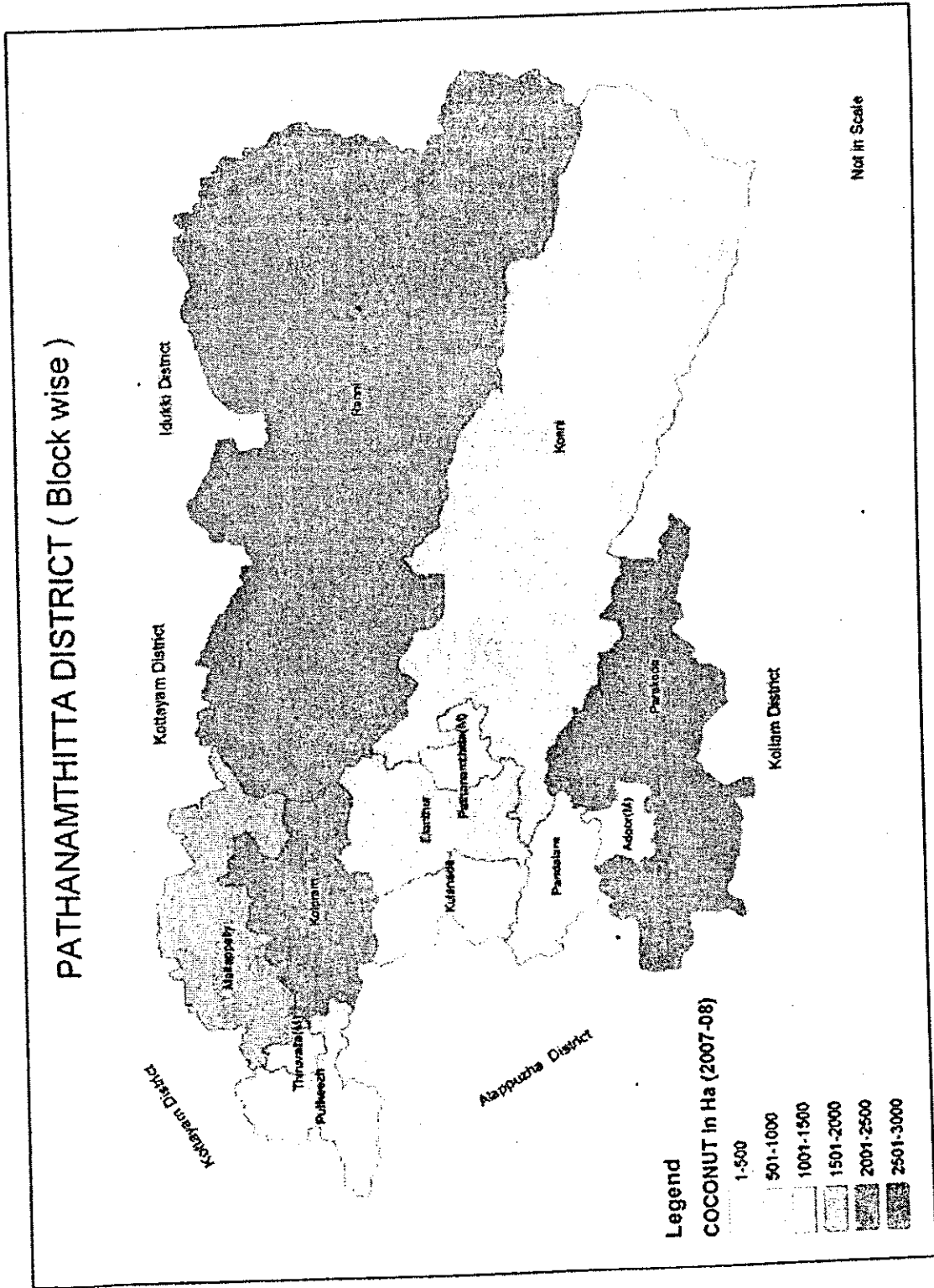
Objective

To help the planners and administrators of local bodies in the formation of policies and plans at the grass root level

Methodology for Collecting Agricultural Statistics

Stratified multistage sampling method is being used for the collection of Agricultural Statistics in our state. The Community Development Block, Municipality and Corporation is treated as stratum. These are divided into Investigator Zones
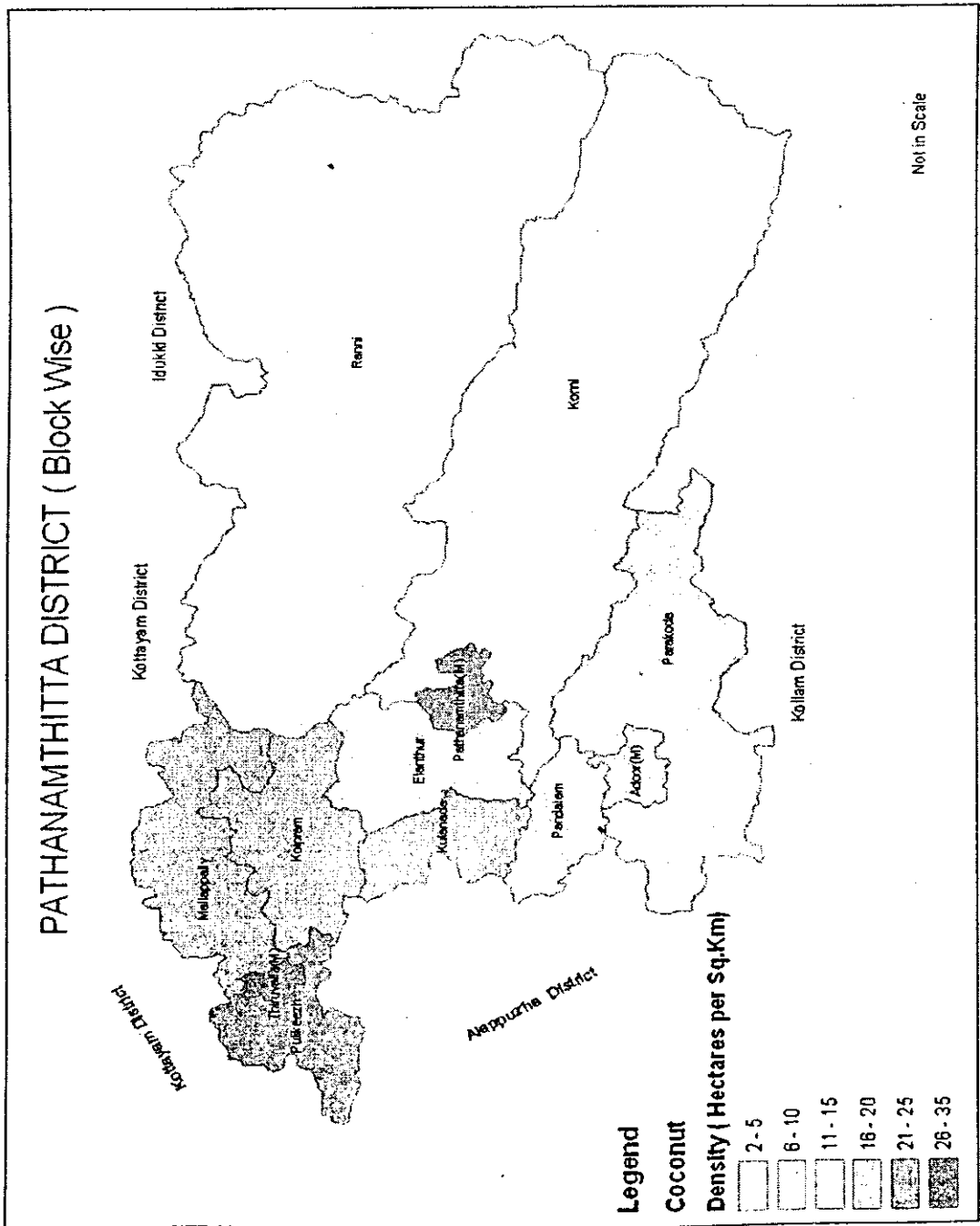
2

Map1   Block wise map of coconut cultivated (2007-08)

PATHANAMTHITTA DISTRICT (Block wise)

Idukki District

Ranni

Konni

Kottayam District

Parakode

Kollam District

Kottayam District

Thiruvalla

Pulhoor

Koipram

Mallappally

Elanthur

Kulanada

Pandalam

Pandanmthitta(A)

Adoor(A)

Alappuzha District

Not in Scale

Legend
COCONUT in Ha (2007-08)
1-500
501-1000
1001-1500
1501-2000
2001-2500
2501-3000

5

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Density of coconut cultivated (2007-08)

Density of Coconut in Parakode Block is 11 hectares per sq.km. Konni Block has the lowest density in coconut cultivation in the district. The Density of Thiruvalla Municipality ranks first with 32 hectares per sq.km.
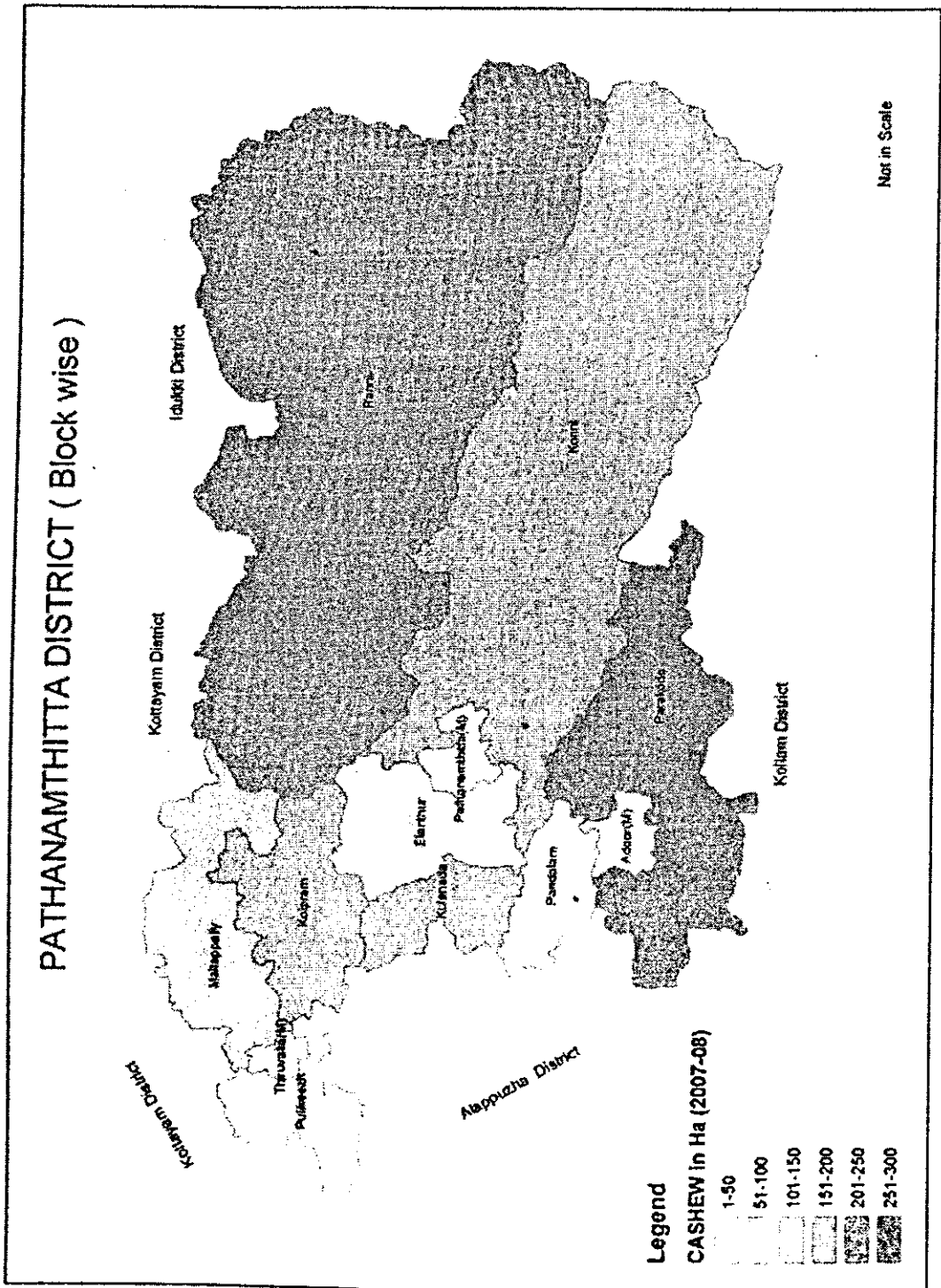
Map2 Density of coconut cultivated (2007-08)

b). Aracanut

Map 3 Block wise map of Arecanut cultivated (2007-08)

PATHANAMTHITTA DISTRICT (Block wise)

Idukki District

Kottayam District

Kollam District

Alappuzha District

Not in Scale

Legend
ARECANUT in Ha (2007-08)

1-50
51-100
101-150
151-200
201-250
251-300
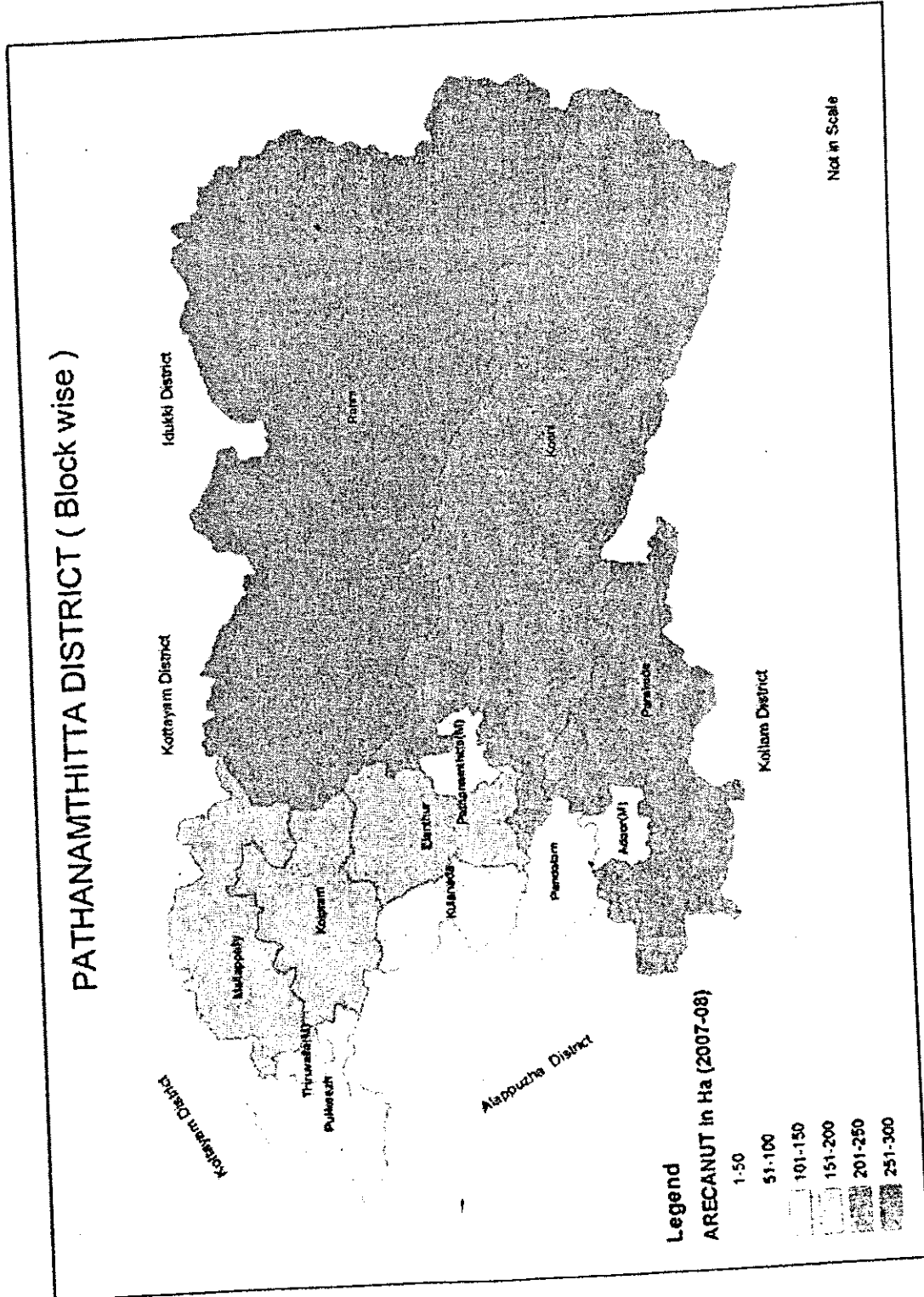
C. Cashew

Map4 Block wise map of Cashew cultivated (2007-08)

2. Population

The population of Pathanamthitta district as per 2001 census is 1234016.The increase of population during 1991-2001 is a growth rate of 3.72% .

Table 2   Area, Population, Density and Sex ratio

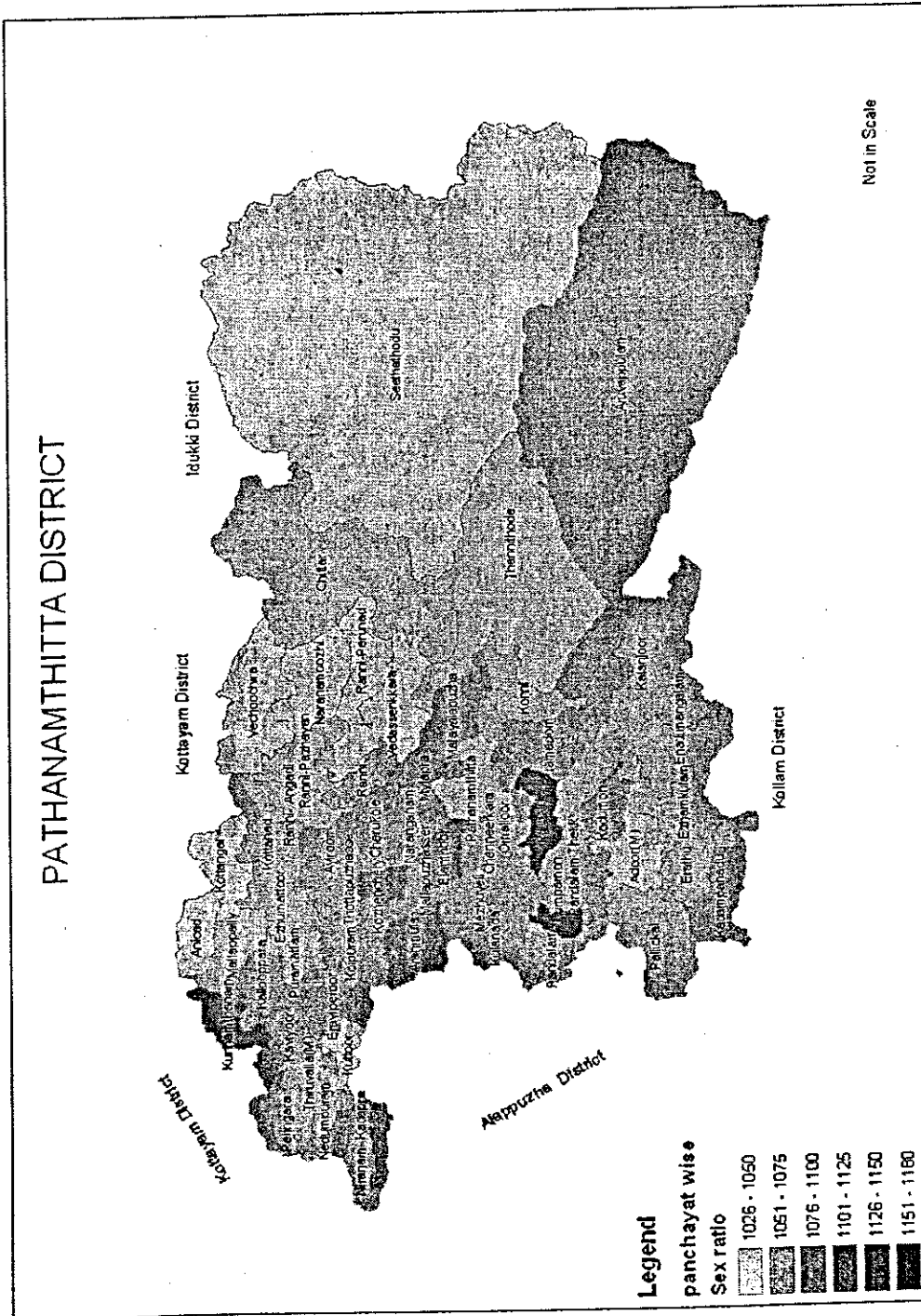|	Name of Panchayat	Area (Sq. km)	Total Population (including institutional and houseless population)			Density of population (sq.km)	Sex ratio females per 1000 males
			Total	Male	Female		
	Mallappally Block	126.24	120201	57599	62602	952	1087
1	Anicad	19.04	14733	7204	7529	774	1045
2	Kallooppara	16.86	17719	8386	9333	1051	1113
3	Kaviyoor	12.67	17502	8325	9177	1381	1102
4	Kottanad	17.01	14581	6978	7603	857	1090
5	Kottangal	23.08	17484	8546	8938	758	1046
6	Kunnamthanam	17.57	20157	9466	10691	1147	1129
7	Mallappally	20.01	18025	8694	9331	901	1073
	Pulikeezhu Block	68.66	91748	43900	47848	1336	1090
1	Kadapra	14.74	22324	10588	11736	1515	1108
2	Kuttoor	12.16	19974	9687	10287	1643	1062
3	Nedumpuram	8.49	12960	6202	6758	1527	1089
4	Niranam	13.17	14381	6862	7519	1092	1096
5	Peringara	20.1	22109	10561	11548	1100	1093
	Koipram Block	123.67	125377	59551	65826	1014	1105
1	Ayiroor	25.76	22596	10696	11900	877	1113
2	Eraviperoor	18.64	26038	12324	13714	1397	1113
3	Ezhumattoor	27.89	19659	9399	10260	705	1092
4	Koipuram	22.26	27089	12823	14266	1217	1113
5	Puramattam	14.66	14706	7031	7675	1003	1092
6	Thottapuzhassery	14.46	15289	7278*	8011	1057	1101
	Elanthur Block	106.22	108255	51041	57214	1019	1121
1	Chenneerkara	19.5	19538	9193	10345	1002	1125
2	Cherukole	15.61	13048	6200	6848	836	1105
3	Elanthoor	15.09	15425	7202	8223	1022	1142
4	Kozhenchery	8.61	12539	5872	6667	1456	1135
5	Mallapuzhassery	12.45	12416	5904	6512	997	1103
6	Naranganam	20.42	17749	8398	9351	869	1113
7	Omalloor	14.54	17540	8272	9268	1206	1120

9

120

	Name of Panchayat	Area (Sq. km)	Total Population (including institutional and houseless population)			Density of population (sq.km)	Sex ratio females per 1000 males
			Total	Male	Female		
	Ranni Block	**1004.61**	**172691**	**84076**	**88615**	172	**1054**
1	Chittar	25.9	**17336**	8279	9057	669	1054
2	Naranamoozhi	33.61	**16272**	7950	8322	484	1047
3	Ranni	15.64	**13990**	6720	7270	895	1082
4	Ranni- Angadi	30.72	**15873**	7696	8177	517	1063
5	Ranni-Pazhavangadi	53.38	**25038**	12161	12877	469	1059
6	Ranni-Perunad	82.05	**22435**	10990	11445	273	1041
7	Seethathodu	651.94	**17192**	8484	8708	26	1026
8	Vadasserikkara	59.57	**22469**	11023	11446	377	1038
9	Vechoochira	51.8	**22086**	10773	11313	426	1050
	Konni Block	**841.27**	**146937**	**69790**	**77147**	175	**1105**
1	Aruvappulam	277.7	**22261**	10588	11673	80	1102
2	Konni	41.45	**29235**	14052	15183	705	1080
3	Malayalapuzha	27.53	**18266**	8684	9582	663	1103
4	Mylapra	10.38	**10200**	4820	5380	983	1116
5	Pramadom	37.1	**31488**	14818	16670	849	1125
6	Thannithode	428.45	**14737**	7183	7554	34	1052
7	Vallicode	18.66	**20750**	9645	11105	1112	1151
	Pandalam Block	**55.65**	**67071**	**31710**	**35361**	1205	**1115**
1	Pandalam	28.42	**40810**	19430	21380	1436	1100
2	Pandalam Thekkekara	19.39	**18101**	8534	9567	934	1121
3	Thumpamon	7.84	**8160**	3746	4414	1041	1178
	Parakkode Block	**251.1**	**208228**	**99346**	**108882**	829	**1096**
1	Enadimangalam	30.77	**20955**	10057	10898	681	1084
2	Erathu	21.74	**25005**	11955	13050	1150	1092
3	Ezhamkulam	30.55	**32860**	15823	17037	1076	1077
4	Kadampanadu	23.95	**26839**	12769	14070	1121	1102
5	Kalanjoor	66.01	**33479**	15940	17539	507	1100
6	Kodumon	36.36	**27714**	13070	14644	762	1120
7	Pallickal	41.72	**41376**	19732	21644	992	1097
	Kulanada Block	**60.05**	**69710**	**32810**	**36900**	1161	**1125**
1	Aranmula	24.04	**29994**	13987	16007	1248	1144
2	Kulanada	21.57	**24493**	11578	12915	1136	1116
3	Mezhuveli	14.44	**15223**	7245	7978	1054	1101
	Block Total	**2637.47**	**1110218**	**529823**	**580395**	421	**1095**
	Municipalities						
1	Adoor (M)	20.42	**28952**	13972	14980	1418	1072
2	Pathanamthitta (M)	23.5	**38009**	18510	19499	1617	1053
3	Thiruvalla(M)	27.94	**56837**	27093	29744	2034	1098

Source. Panchayat level Statistics 2006

10

Map5 Panchayat wise Density of Population of Pathanamthitta District

Amoung Panchayats highest in kutoor Panchayat (1643) and Lowest in Seethathode
Panchayat (26)

PATHANAMTHITTA DISTRICT

Not in Scale

Legend
panchayat wise
Sex ratio
1026 - 1050
1051 - 1075
1076 - 1100
1101 - 1125
1126 - 1150
1151 - 1180

Map6 Panchayat wise Sex Ratio of Pathanamthitta District

Among Panchayats highest in Thumpamon Panchayat(1178). Lowest in Seethathode
Panchayat (1026)
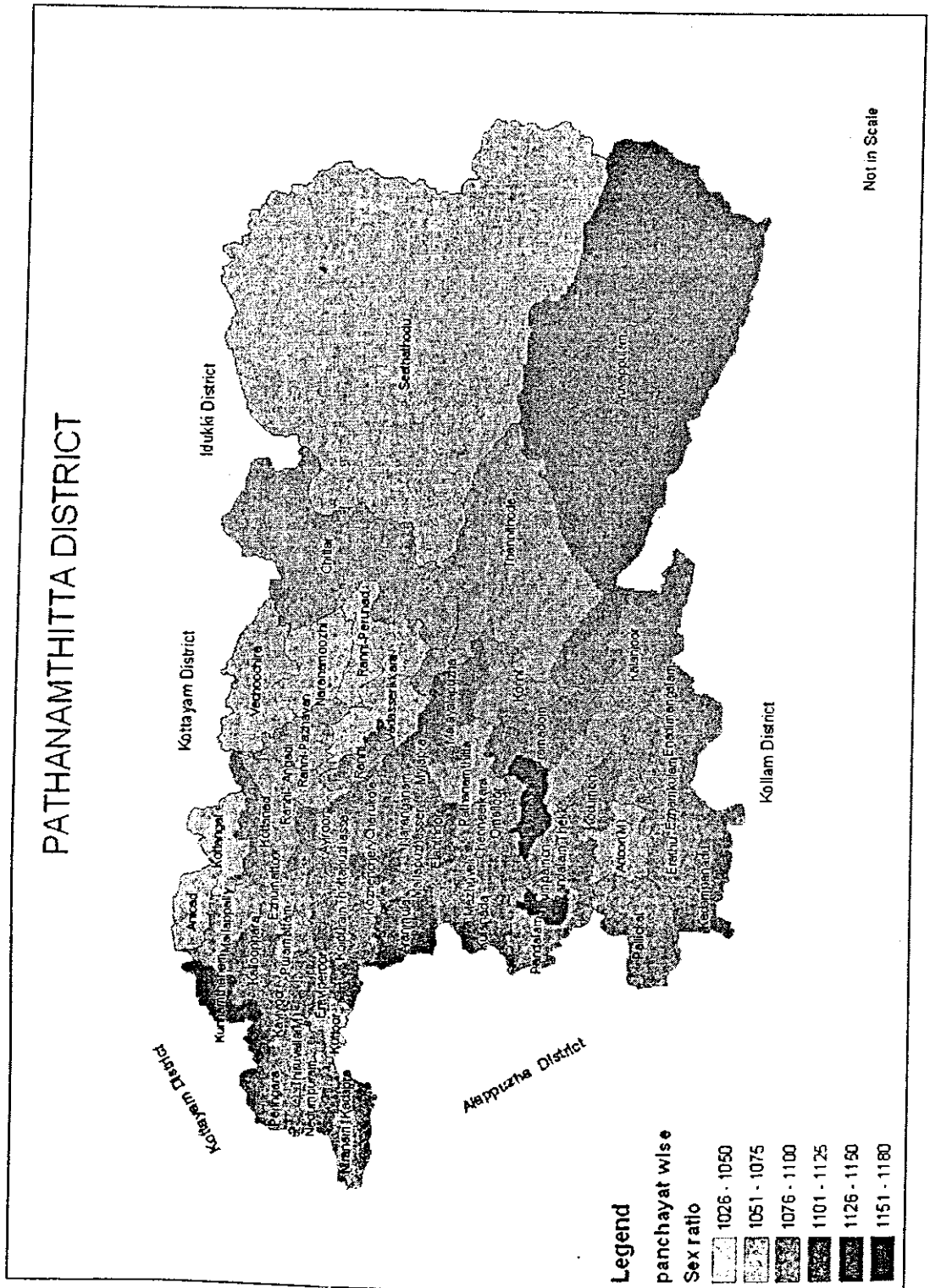
DATA COLLECTION - A PRACTICAL APPROACH

S. RAJENDRAN
Additional Director (Rtd)

The Department of Economics and Statistics is the Nodal Agency of the state responsible for the systematic collection, compilation, analysis, objective interpretation and dissemination of Statistics pertaining to various sectors of Kerala Economy. Kerala is one of the states in India having a well organized Statistical system. The department has been entrusted with the task of providing reliable and accurate data on various subjects to the government, autonomous bodies and other agencies in a time bound manner. Realistic data at macro and micro level is needed to formulate development plans to various sectors of the economy. The decentralized planning which is under implementation in the state requires micro level and macro level data for effective plan preparation. Hence the department is duty bound to collect and provide authentic data to the government, local bodies and other users. The department has been carrying out the task assigned to it for the past several years with some limitations.

The department has been collecting the data by resorting to census and sample surveys. (Sample surveys are mostly conducted

The men, materials, time etc needed for sample surveys are comparatively less. Our aim is to collect reliable and accurate data irrespective of whether sample or census survey is resorted to for data collection. Here comes the importance of the enumerator/ investigator who is entrusted with the data collection works.

The quality of data mostly relates to the person who collects it. The duty bound and far sighted enumerator can collect authentic data which will help one to arrive on right conclusion on the subject.

One who has only little or half hazard knowledge on the data collection technique may not be able to collect realistic and quality data and the data he provides will only lead to wrong conclusion. This will ultimately badly affect the planning which is required for development process. Thus the data collection and allied works are intelligent and clever works. Understanding of the works and interest in the assignment are very much

important in data collection. The following points may be borne in mind while doing data collection works.

(1) Full awareness of the aims and objectives of the survey.

The enumerator has to study the subject of the survey in detail and the importance of the data to be collected and the use to which the collected data is put in. The enumerator who fails to equip with the importance of the data being collected, cannot do justice to his work and may collect only rubbish or half hazard data.

(2) Ensure whole hearted co-operation of the informant

The enumerator has a big role to play in winning the co-operation of the informant. Unless the informant is pleased, he may not divulge the required information. The enumerator has to salute the informant with a pleasant smile in an appropriate manner whenever he meets the informant and to reveal his identity to him.

(3) Explanation of the purpose of the survey

The enumerator has to explain the purpose of his visit in a manner understandable to the informant. This has to be done in a friendly and simple way so as to create a feeling of oneness among the enumerator and informant.

(4) Detailing of the use of the survey result

The enumerator has to explain the likely benefit or good effect to the people or to the society that is aimed as a follow-up of the survey result to the informant.

(5) Eliciting of information in an informal manner

Never ask direct questions to the informant for data collection. The required information has to be elicited through friendly conversation. i.e., in an indirect way.

(6) Filling up of information in the prescribed schedule or format

Information has to be collected as per schedule. The enumerator has to fill up the details in schedules only. Don't try to collect details in loose sheets of paper or books.

The collection of data in papers or books other than the prescribed schedule /format may result in omission of few items of information.

(7) Cleverly canvassing of information on sensitive items

There may be sensitive items of information in the schedule. People may be reluctant to divulge such information out of fear or some other reasons. Special care has to be taken in canvassing such information.

e.g.: The details of asset, income, use of contraceptives etc.

(8) Data collection from business establishments etc

Special care has to be taken when data is collected from business establishments and similar other establishments. Enumerator should not visit such establishments in the peak hour of their activities as far as possible. Eg: Price collection. If we contact the shop keeper at a time, when brisk transactions are going on, there may be chances of getting incorrect figures from the shop keeper.

(9) Keeping pamphlet or other documents narrating the aims and objectives of the survey

If the enumerator concerned is not in a position to explain in a convincing manner the purpose of his visit to the informant, it is better to keep a pamphlet or such other documents with him depicting the aims, objectives and benefits likely to be received to the individuals or society as a whole through the survey and authenticated by a competent authority. This can be shown to those who are enthusiastic to know about the survey.

(10) Convenience of the informant

Try to visit the informant according to the convenience of the informant. If the informant is preoccupied with some other urgent matters when you meet him, visit him a time convenient to the informant. Don't collect information whenever the informant is

busy with his personal problems. If we resort to data collection on such occasions, only incorrect or half hazard data could be collected.

(11) Non co-operative informant

If the informant is reluctant to divulge information in spite of the best efforts by the enumerator, do not try to fill up the schedule by making some assessment about the house hold/firm/establishment etc by yourself. In such a situation, try to substitute the unit by another one in the same category. If there is no scope for substitution, treat the case as casualty.

(12) Checking and finalization of schedules.

After the data collection from the field, the investigator has to check the schedule page after page to ensure that complete information is collected before leaving the field. The filled up schedule has to be finalized in the very same day so that the schedule is pucca for submission in the collection day itself.

(13) Need for writing remarks

Remarks to be written wherever necessary. It is needed so as to clear the ambiguity or doubt about some entries at scrutiny level. For example: special expenditure made due to ceremonies in a house hold during the period of survey is to be specially mentioned by way of remarks.

PLANNING OF STATISTICAL ENQUIRY OR INVESTIGATION

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Statistical information

Statistical investigation or statistical enquiry means investigation carried out by any agency wherein relevant information is collected in numbers rather than in words. All phenomena cannot be the subject matter of statistical enquiry. Only those phenomena which can be expressed in quantitative numbers can be the subject matter of statistical investigation. The conduct of statistical investigation may be in two phases, namely

(1)   Planning an enquiry and   (2)   Executing the plan

Different stages in Statistical investigation.

(1) Planning the statistical investigation

(2) Collection of data

(3) Organization (editing, classification and tabulation)

(4) Presentation of the organized data

(5) Analyzing the presented data

(6) Interpretation of the findings from the analysis.

(7) For casting of data

Preliminaries for the collection of data

Collection of data is one of the most important functions of statistics. Before the actual collection is started. Statistician must prepare a plan for the

collection of data. The main steps to be taken in planning a statistical investigation are

(1)   Whether the problem under study is capable of quantitative expression. If so

(2)   Object and scope of enquiry

(3)   Source of information

(4)   Type of enquiry

(5)   Statistical units

(6)   Degree of accuracy desired

(7)   Cost of the plan

Object and scope of enquiry

Object is to be clearly determined. It helps the investigator to decide on the data to be collected and the data not to be collected. It will enable to have a uniform approach to different problems. Scope also should be determined before hand. If a very large quantity of statistical data is collected they are likely to become unmanageable. It may not be easy to draw correct conclusion from them. Similarly inadequate quantum of data will also lead to wrong conclusions. Therefore necessary quantum of data should be collected.

Source of information

There are two sources- primary and secondary. Primary data is collected by the first time for the investigator While secondary data are those that have already been collected by others and which are usually available in journals and magazines. The nature, scope and objects of the enquiry have to be taken in to account for deciding whether primary or secondary data to be collected. Collection of primary data involves much time and expenses but it yields better information.

Type of enquiry:

Type of enquiry depends on factors like object and scope of enquiry, availability of time money and facilities. Enquiry may be

(a) Census or sample

(b) Original or repetitive

(c) Direct enquiry

(d) Indirect enquiry

(e) Open enquiry

(f) Confidential enquiry.

Census or sample : In Census study, all the units connected with the problem are taken into account. Only some selected representative units are studied in sample survey.

Original or repetitive : Original is one which is conducted for the first time. Repetitive is one which is carried out in continuation of previous enquiry.

Direct enquiry : Those in which the data are capable of quantitative expression.

Indirect enquiry : Those in which the problem is not capable of quantitative measurement.

Open enquiry : Here the details are not kept secret.

Confidential : The details are confined only to their members.

Statistical Units

The unit of measurement applied to the data in any particular problem is the statistical unit. Units like ton, gram, meter, hour etc are examples of such units. Before commencing the work of collection, statistician has to define units of measurement. Statistical units must be simple, clear and well defined so that it is not misunderstood or misinterpreted.

Degree of accuracy

The investigator must have some idea about the degree of accuracy which he desires in his estimates. An absolute accuracy is impossible in all cases. So decision about the degree of accuracy should be made with regard to the purpose

of investigation and nature of enquiry. The degree of accuracy needed by a grain merchant is much less than that needed by gold smith in weighing gold.

Cost of the plan

In conducting statistical inqui ry money has to be spent on different stages. An estimate of the cost of the survey must be prepared before the commencement of the enquiry. Preparation of cost estimates will avoid wastage of resources.

Local Level Data Collection -
Need for an integrated approach

Introduction

The 73rd and 74th constitutional amendments are two landmark legislations in the country. These acts empower the local bodies to ensure peoples participation in the planning and development process and remove the restrictions and control upon the local bodies by the state govt. It provides powers, authorities and responsibilities wider in some respects. Decentralized planning has enhanced local capacity in understanding matters related to development and in identify strategies and programmes to meet them.

In decentralized planning process the integrated rural / urban projects are inevitable. For the preparation of projects local self Govt institution (LSGI) needs local level data relating to all most all socio- economic and non- social economical aspects. Their projects should be based on realistic data. Then only grass root planning will be a success in its objectives. For strengthening local level planning quality of data is important. Unfortunately, LSGIs or Govt Depts have own no quality data on local level, even after lapses of 12 years of decentralised planning in the country.

Any how local bodies have collected various types of data by people's participation and they were published it in their *Vikasanarekhas'*(Developmental doctrines). Now a day's people's participation shows a set back in public involvements. But in the new political environments all LSGIs still need quality data on all aspects, viz; social, economical, demographic, employment, Agricultural etc.

Availability of local level data

Dept of Census Operations, Govt of India have published District wise Hand book on 2001 Census comprising of ward wise demographic details. The Dept of Economics & Statistics has generating various statistics to cater the needs of the LSGIs. Dept published district wise books on "Panchayath Level Statistics" in 3 series. Moreover the Dept have published books in "Agricultural Statistics" in every year. This essay is an effort to examine the quality of local level statistics in view of above publications.

A) Demography

For Decentralised planning process ward wise demographic details and socio-economic details are essential. 2001 census details in respect of two each ward in two panchayats are given below.

Table – 1
(Demographic particulars and basic details)

Panchayat	Ward No	No of House holds	Total populat ion	Male	Female	SC populat ion	ST populat ion	Gen. literacy rate(%)
Thirunelly	05	374	1593	800	793	28	1005	57.31
Thirunelly	10	417	1905	965	940	28	523	38.06
Pulpally	06	492	2087	1071	1016	14	124	23.93
Pulpally	16	456	1987	985	1002	38	1232	42.04

Table 2
(Details of employment)

Panchayat	Ward No	Total workers	Main workers	Cultiva tors	Agri. laboure rs	Domestic industrial labourers	Other employ ees	Non- employ ees
Thirunelly	05	814	523	38	176	0	309	779
Thirunelly	10	798	517	52	3	23	439	1107
Pulpally	06	794	655	262	202	4	187	444
Pulpally	16	915	703	134	420	9	140	365
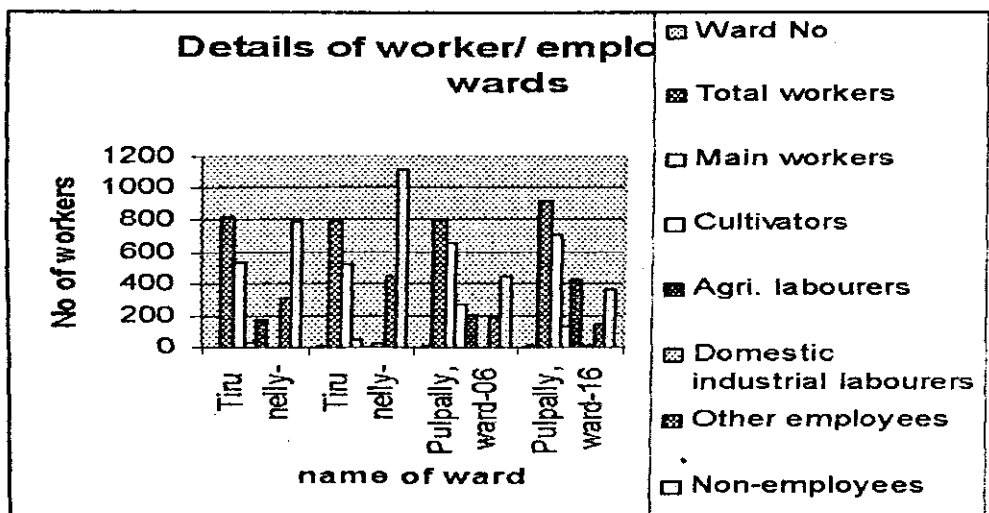
By examine the above table it is clear that socio-economic status like employment structure, literacy rate etc can varies from ward to ward and panchayat to panchayat. For fixing beneficiary groups in decentralized planning these types of accurate database had its own importance. Sex wise

and sector wise employment details are available. For employment generation projects these type of data are much helpful. Population data are being widely used by the LSGIs. The population details are collecting through Census process by the Centre Govt in every 10 years. Generally geographical areas of panchayat and Muncipality wards are changing in every 5 years on revision of wards. In above situations the use of census population data are limited scope. Hence a new system is to be started to update these information in appropriate intervals.

B) Assets and facilities of LSGIs

Almost all Local bodies were already prepared data on their assets and facilities. It includes details of schools, Hospital (Ayurvedic, homoeo, Modern medicine), No of beds, No of doctors, No of paramedical staff, facilities available , details of SC/ ST colonies , details of Ayalkoottams, NHGs , Adult Education Centres , Aganvadies, Clubs, Cultural institutions , Libraries. Residential houses (concrete , tiles, thatched). But the details are not updating or tabulating in ward wise by the local bodies or by other agencies .

Details of residential houses according to the type of roof and electrification in respect of panchayats in Sultan Battery are given below in the table.

Table - 3

Name of panchayat	Concrete	Tiles	Thatched	Others	Electrified	Drinking Water	Smoke less chullas
Amalavayal	1653	4013	76	2277	4863	5243	330
Meenagadi	1708	3513	56	1929	4730	4219	711
Mullankolli	1418	2830	167	1972	4021	3833	197
Nenmeni	1850	7029	93	1236	6838	7170	1546
Noolpuzha	973	3925	70	700	3538	4324	403
Poothadi	1599	4594	253	1837	4479	5167	538
Pulpally	1691	4151	390	1578	5629	5561	459
S.Battery	3427	4004	151	1706	6984	7326	302

ICDS office is collecting these details for their annual survey report by deputing Aganwadi workers. The details collected by area wise and not in ward wise. Almost all the departments are conducting surveys and collecting details frequently for their own departmental use.

C) Details of Livestock population

The details on livestock population of panchayat in Mananthavady (2003)
Table-4

Panchayat	Cattle				Buffalos		Goat		pigs	Dogs
	Cross breed		Indigenous							
	Male	Female	Male	Female	Male	Female	Male	Female		
Mananthavady	359	4262	119	938	88	32	376	1019	267	3153
Edavaka	437	3045	67	430	172	49	280	715	349	1610
Vellamunda	312	2650	124	728	109	45	241	576	210	913
Thavinhal	394	3049	99	1952	180	35	660	1059	194	2080
Thondernadu	191	2382	65	754	66	82	121	405	129	651
Thirunelly	377	1965	407	1026	45	58	517	1562	117	1358
Panamaram	706	5608	97	473	117	105	551	1307	191	2226

The details on livestock population of panchayat in Mananthavady 2007)

(

Table -5

Panchayat	Cattle	Buffalos	Goat	pigs	Dogs	Rabbits	Cat	Poultry
Mananthavady	5182	45	3892	150	2011	215	1838	7027
Edavaka	3593	38	3355	50	1257	62	801	5026
Vellamunda	2787	120	2324	84	1005	110	1324	6079
Thavinhal	4752	117	4303	116	2080	144	2214	9108
Thondernadu	2426	85	1792	25	1084	150	792	5976
Thirunelly	3192	53	3498	184	1375	149	1002	9751
Panamaram	5825	143	2730	110	1527	80	1279	5630

By comparing above two tables we can get a clear picture of growth / decline of livestock population of the panchayats. These types of data are much useful for panchayat level formulation groups. But ward wise details are not available.

D) Agricultural Statistics

The data of the Agricultural Census/Statistics were collected through field enquiries and sampling techniques from the selected operational holders. Basic unit for collection of data in Agri.Statistics was operational holding and in Agricultural Statistics was cluster of plots. As there are no comprehensive land records, the required data were collected through sample survey by adopting enquiry method in Agri. Census.

The main problem encountered during the analysis of data was underreporting. This was visible in the area reported under the operational holdings as well as under estimation of crops. This is mainly due to the enquiry method adopted for the Agri. Census. The cultivators are furnishing information from their memory in many questions.

Data on land use, area of crops and crop productivity were published in Panchayat level by Directorate of Economics & Statistics. The panchayat wise geographical area of panchayats in Mananthavady taluk is given below.

Geographical area of Panchayats of Mananthavady taluk
Table- 6

Panchayat	Area (s/ km)	Agri. Area		Forest area	Plantation area
		Dry land	Wet Land		
Mananthavady	96.11	54.5	13.54	14.14	13.93
Vellamunda	64.46	44.3	14.16	6	0
Thirunelly	216.75	35.83	12.53	152.3	16.09
Thondernadu	137.02	44.5	8.77	77.34	6.41
Edavaka	47.77	37.05	10.72	0	0
Thavinhal	93.34	42.56	6.01	31.71	13.06
Panamaram	80.94	52.59	22.47	5.88	0

By examine the yearly Agricultural statistics report the Dry land, Wet land Forest area and Plantation area are same. It may be changed. And the conversion of land from wet land to dry land is not taking into account for estimating total area of dry land. Almost in all panchayats/ municipalities a large amount of wet land had already been converted. But details of the extent of conversion of land are not including in agricultural survey reports.

Land utilization pattern in Wayanad District
(for the period 2001-01 to 2006-07)

Table – 7

| SL No	particulars	Area in Hectres						
		2000-01	2001-02	2002-03	2003-04	2004-05	2005-06	2006-07
1	Geographical area	212560	212560	212560	212560	212560	212560	212560
2	Forest Area	78787	78787	78787	78787	78787	78787	78787
3	Barren and uncultivable land	268	280	294	273	248	228	274
4	Permanent pastures and other grazing land	22	30	38	52	45	43	13
5	Land under Miscellaneous tree Crops	950	864	720	489	489	396	212
6	Cultivable waste	1561	1680	1512	1032	1051	1031	1706
7	Follow land other than current fallow	824	782	613	391	400	402	536
8	Current fallow	2168	2053	2279	1598	1438	1431	1363
9	Net Area sown	116065	115753	115827	117384	115892	117984	115059
10	Total Cropped area	208941	201394	202071	205027	207930	212736	213994

Details in respect of Sl No 3 to 10 were by estimated data by conducting cluster sample surveys. Here percentages of sample units taken were low. Since the agricultural practices of cultivators varies from place to place and person to person, It can't presume that land utilization pattern and cultivators behaviour are in same way. Hence use of sampling technique for collection of data in agricultural sector has its own defects.

The crop area estimation of paddy , Jack, mango for the period 2002-03 to 2006-07 in Wayanad District are given below

Table - 8

	2002-03	2003-04	2004-05	2005-06	2006-07
Crop	(Area in hectres)				
Paddy	12988	12343	11331	11503	11832
Jack	10241	10021	10521	10284	12421
Mango tree	4830	4604	4929	4734	5560

In the above table the paddy growing area shows a increasing trend and the areas of mango and jack were decreasing. The expansion of paddy area is due to the special programs implemented by the local bodies and Govt. Paddy growing area estimation was done by local enquiry and field visits. Hence data on paddy growing area is more or less correct. Area of jack and mango were estimated by using statistical method of cluster sampling. Here the area of both mango and jack shows a zigzag movement. Any how such a movement (annual Fluctuation) has not been expected to occur in normal course, since the crops are perennial.

Paddy growing area for the period 2002-03 to 2006-07

Area of Jack and Mango during 2002-2007
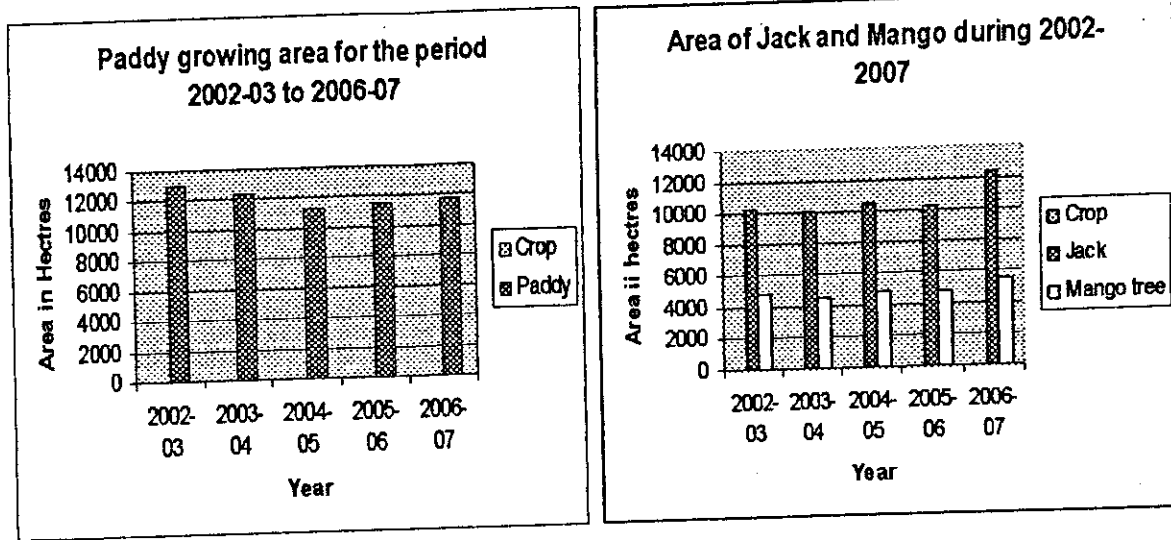
Data not available on ward wise

Most of the depts. /agencies are collecting details on various aspects, both by census method and sample method. Details of educated unemployed persons, details of morbidity, and details of anti- social activities prevailing are not available now in ward level.

No of agricultural holdings by size, details of self employed persons working in service sector, details of vehicles, details of migration in micro level (ward level) are not available. Even though birth and death registration are compulsory and complete in practice, the ward level secondary data are not available. For local developmental planning, details in respect of child workers, drug addicters, and juvenile delinquents is to be collected. But official efforts to collect these details by official level failed. These details can collect only by participating local people in data collection. The published data on Demography, educational institutions, students, SC/ ST colonies, socio- economic conditions, agricultural cropped area and agricultural productivity etc were the most accepted and widely used data, by the local planners

Problems in collection of secondary data on local level

Micro level data collection is much expensive. For quality data complete enumeration is needed. Most of available data were collected by sampling method. Hence it lacks accuracy and reliability. Though various Govt. Departments are collecting various details on micro level; it lacks a common data collection frame or data collection unit. Eg; Health Dept. collecting details on morbidity, death and birth, disease in sub centre wise. ICDS office collecting demographic and socio-economic details in area wise. Education Dept collecting details of schools, students, dropouts in school wise or in panchayat wise. Panchayat office is recording all details in revenue ward wise, which is different from election ward. For local level planning, getting details in election ward level is important and crucial.

Scope of integration of Modern technologies in data Collection

In 2007, in Malapattam Panchayat in Kannur District, a Micro level survey was conducted by Economics & Statistics Dept with people's participation. In the survey socio-economic details of entire families of the panchayat and land use pattern with crop details by survey sub division were collected. Political-social workers, NGO activists, Kudumbasree members, retired persons; students, cultural activists etc were trained by Economics & Statistics Dept:al personnel. The survey results were consolidated by the Department and published in a book. By participating the public in data collection the field work became easier & smooth and the final data became a reliable one.

In 2008 Integrated Rural Technology Centre (IRTC) an NGO in Palakad district developed a system of Geo-reference local level information about *Akethethara* Grama panchayat. For this, IRTC conducted a socio- economic survey in the panchayat with public participation. They also collected details of land sub- division, crop, type of land, Type of ownership, name of land owner, length of rural roads, canals, wells, water resources, land marks, institutions, etc and all the details were incorporated to the Geo-reference Cadastral map. For developing the geo-reference local level statistics IRTC used modern techniques like GIS, Remote sensing and conventional data collection methods.

Modern technologies like IT, GIS, Digital Imaging, and remote censing can contribute much in quality data collection, maintenance of data, and updating of data.   Recently centre for earth science studies (CESS) and Kerala State Remote Sensing & Environmental Centre (KSRSEC), under the co-ordination of Kerala State Planning Board and ISRO have generated natural resources database of Wayanad District. The geo-spatial tools such as Digital Image processing and GIS were used for generating village database of revenue division, land use, forest, transport network, watersheds, rivers, drainage, major and micro landforms, geology, soil texture etc. Socio- economic data collected were also incorporated in the digital GIS database.

The Digital pictorial land use data of Wayanad District generated by CESS and ISRO by using GIS and Remote Sensing Technique is given below.

WAYANAD DISTRICT - LANDUSE

N

0   5   10   20
                            Kms

KANNUR

KARNATAKA

KOZHIKKODE

TAMILNADU

MALAPPURAM

All except data included in book.

State Boundary

District Boundary

Taluk Boundary

Barren rocky/Stony waste/Sheet rock

Crop land (Paddy)

Deciduous (dry/moist)

Degraded land under plantation crops

Evergreen/semi evergreen

Fallow

Forest plantation

Grass land

Lakes/Ponds

Land with or without scrub

Mining/industrial wastelands

Plantation

Reservoir

River/stream

Towns/cities (Urban)

Under utilized/degraded notified forest

Villages (Rural)

Water bodies

WAYANAD

Suggestions for improving quality of local level data.

Details of demographic particulars, health, education, industry, infrastructure, transport, environment, watersheds, forest, water reserves, communication, housing, tourism, IT etc are inevitable for micro level planning. But all the details cannot be generated by a single method.

1)   Data collection by Social intervention

At present no micro level data collection system is prevailing in state. Since micro level data are frequently changing in nature, it should be updated in due course. For collection of data, an integrated approach should adopted by including all the personnel like Anganwadi workers, JHIs, JPHNs, Kudumbasree ADCs, Saksharatha Prerakshs, SC/ST promoters, Ayalkoottam conveners of the ward in to the data collection team. Political and social worker, NGO activist, knowledgable persons of the ward can contribute much in collection of data. For this purpose a **Ward Statistical Samithy (WSS)** including above persons can be constituted under the leadership of ward member. Technical advice and guidance should be given to the group by statistical staff. Close supervision and evaluation of the data is must. In Kerala, Akshaya IT centres working in almost all panchayats areas. Akshaya centres can be incorporated to this system as data manipulating centres or as Data banks of local bodies.

Whenever new data is needed new effort can be initiated easily by WSS for collecting it by choosing appropriate personnel and by appropriate method. Regular collection of local level data and its updating is must. WSS can decide the areas and nature of data to be collected during the year. WSS can directly collect secondary data from available sources.

Honorarium to the Kudumbasree workers, Anganvadi workers, JPHNs, etc for data collection at ward level should be given. They should be entrusted in data collection in their places of regular work. The expenses should be met from plan fund / own fund of local bodies. Regular collection of data should be entrusted with WSS.

2)   Introduction of unique data collection unit

Basic unit of collection of official surveys and reports should be converted into election wards of local bodies instead of existing units like panchayat, village, local area, sub centre area etc.

3)   Updating data in frequent interval

In every 5 year, a full-fledged field survey should be conducted with peoples involvement for collecting details on housing and sanitation, land utilization , cropped area , agricultural production , demographic aspects, socio-economic conditions, live stock population, environment and water resources etc .

4)   <u>Use of modern technologies</u>

For quality data collection use of modern technologies like IT, GIS , remote sensing should be incorporated to the existing statistical methods in relevant areas ; especially in water & natural resources , Agricultural area enumeration and resource mapping etc .

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