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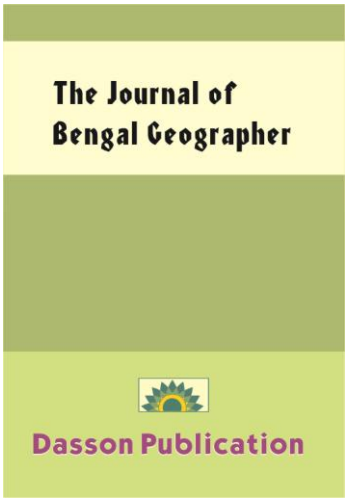

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Paddy land conversion and its impact on food security status: a study in Chittur taluk, Palakkad, Kerala

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Abstract

People generally eat what they grow or the food they find in their surroundings. The physiographical variations and pedological conditions that influence the crop type, production distribution and food habits. As the food production varies from place to place, consequently, there are surplus and deficit areas of food. Even in the food surplus regions, there are chances of crop failures due to physical and socio-economic factors. These crop failures and deficit food production may threatened food security and paved the way for hunger. The main causes of hunger, deprivation and starvation are climate change, environmental degradation, less profit in food production, costly input and land use land cover changes. Last few decades have seen sharp decline in the area under food crops and the substantial expansion in the area under non food crops especially in developing countries. This has lead to a crisis in food security among these producing regions. In Kerala, rice is the staple food. Earlier different variety of rice were cultivated in Kerala especially Wayanad, Palakkad, Kuttanad region and Thiruvananthapuram. But the present situation is totally different, the existing paddy fields are replaced by coconut, other plantation crops and fruits. Due to these conditions, questioning the food security of Kerala and make Kerala as a consumer state instead of producer. With this background, this paper tries to understand the food security and also to analyse the situation of declining paddy land in different periods of Chitturtaluk, a predominant and traditional paddy cultivating area typically known as granary of Kerala. The region is chief provider of Kerala's stock of staple food as it alone account 54.58 percent of total district production. In order to calculate food security, Chakravarthy (1970) and Singh's (1975) proposed methodology has been adopted. To understand the spatio-temporal variations of paddy decline, Survey of India topographical maps (1:50,000) and Landsat programmes Operational Land Imagery (OLI) imagery has adopted. From the data, it reveals that, in 1971 only one panchayat shows insecure in food security where as in 2011 about five panchayath coming under insecure place. The main reason is because of paddy land conversion to other purposes.

Key Words: *Food Security, Land Conversion, Plantation Crops and Chittur*

1. Introduction

Land is the most basic of all natural resources and it provides the space for living and livelihood (Aneesh M.R, 2019). From the whole land of the world, it seen to be some 30% only having potentially cultivated area. There has always been competition for land, sometimes reaching the

level of conflict (Young A, 1998). The massive increase in population which has led to land shortage started with the industrial revolution and has been accelerated by improvements in health and the introduction of international action for famine. In fact knowledge of land use and land cover is important for many planning and management activities and is essential for modeling and understanding the earth as a system (Lillesand T M et.al, 2008). But the land conversion occurs in many forms including changes in area and changes in the intensity of use (Houghton RA, 1994). Cultivated land may increase in the initial stage of economic development but invariably decrease as increased population, urbanization, industrialization, road construction and non staple food production demand more space. In other words change of cultivated land is closely related to the overall pattern of economic development. The factors controlling how rapidly humans can modify their land use in response to changing environmental conditions vary according to social, political and economic characteristics (Ojima D S et.al., 1994). Neither population nor poverty alone constitutes the sole and major underlying causes of land use change. Rather people's responses to economic opportunities as mediated by institutional factors, drive land use changes (Lambin E F et.al. 2001). Population growth also the factor accelerated the encroachment of agricultural land by settlement posing great threat to fertile top soil and to food security (Dhirde S et.al. 2011).

1.1 Concept of food security

Food security exists when all people, at all time, have physical and economic access to sufficient, safe and nutritious food to meet their dietary needs and food preferences for an active and healthy life (FAO, 1984). Food security has three components viz., availability, access and absorption (nutrition). The three are interconnected. Many studies have shown that improvement in nutrition is important even for increase in productivity of workers. Thus food security has intrinsic (for its own sake) as well as instrumental (for increasing productivity) value. Concerns about insufficient food access have resulted in a greater policy focus on income, expenditure, markets and prices in achieving food security objectives. Next is the food utilization is commonly understood as the way the body makes the most of various nutrients in the food. Ensuring food security ought to be an issue of great importance for a country like India where more than one third of the population is estimated to be absolutely poor and one half of all children malnourished in one way or another. National food security is important what the more important food security is for each and every household and to every member of the family within household. Assuring food security then must be the fundamental objective of the development strategy of countries and the extent of the attainment of this goal should be a major indicator of the success or failure of the developmental process (Anjali Gaidhane 2015). The promulgation of the National Food Security Act (NFSA) is in the offing to ensure economic and social access to adequate food and a living with dignity, for all persons in the country, at all times.

The agricultural land use pattern in Kerala has been experiencing drastic change in the area under different crops. The agriculture continues to be the core sector in the rural economy of Kerala, providing livelihood security for vast majority of the population. The accelerating rate of paddy declination into non agricultural purposes leads to many challenging concerns including that of food security, water scarcity and rural unemployment etc. On this regard the food security concern is of utmost importance to food production deficit state of Kerala. As the majority of the farmers are marginal and poor, they cultivate paddy for their own consumption and only a little surplus to the market. A deviation from this will result directly to the food security.

Paddy is the most significant cereal of Kerala and it is the staple food crop produced and consumed in the state. Majority of the population of the state is someway or other depends on paddy for their livelihood. It is the crop that primarily decides the food security of the state by way of directly feeding the people and by supporting the cultivation of other crops through water recharging from paddy fields. It is the largest source of employment in the state as the crop is highly labour intensive (JeemolUnni 1983). But now the Kerala state has been experiencing a severe crisis in agricultural sector in recent years due to fall in production, prices and income and rise in cost of production making cultivation unprofitable. Palakkad is one among the district of Kerala which face agricultural crisis of paddy cultivation. As majority of the farmers are marginal and poor, the crisis has severely affected the well being of a large section of farming population in the district (Prakash. B.A 2008, Karunakaran 2014, Rejula&Rashmi Singh 2015).

Food security on the supply side means total availability of food in the economy. When the internal production does not meet the domestic demand there arises a need to import food to meet the deficit. Food production in the state has been decreasing against the increasing requirement and it has never been sufficient to meet the domestic demand. There exists a wide gap between consumption and production of food grains in the state, especially in the case of Paddy, which is the major staple food of the people in the state. The food grain deficit in the state is increasing annually and now it has reached a position where it produced only 14% of the required Paddy in 2010 (MuhammedKasim.C 2012). The deficit in Paddy production assumes greater importance because cereals accounts for more than half of the intake of calories (64% for rural and 57% for urban), around half of the intake of protein (52% for rural and 48% percent for urban) in Kerala (Kannan.K.P, 2000).

2. Study Location

The present study conducted in humid tropical region of Chitturtaluk, Kerala. It is a second largest taluk in Palakkad district of Kerala. The grid extension lying between $10^0$35’ N to $10^0$45’ N latitudes and $76^0$40’ E to 76^0 52’ E longitudes covering an area of about 1136 Km^2 (Fig.1). Almost the entire area falls under rural category and only 1.3 percent area is urban. The

agriculture is the main economic activity about 45 percentage of the people engaged in agricultural activities. The net cultivated area of the Chitturtaluk is 56027.34 hectares (Palakkad District Census Handbook, 2011) which is 49.31 percent of the geographical area of the taluk. In which, the net irrigated area is about 47.09 percent. Paddy is the most important crop of Chitturtaluk and it has helped the district to earn the name "Granary of Kerala". The Economics and Statistics data of Chittur for the year 2014-15 shows paddy was the most important crop covering an area of 28180.86 hectare and it represent 44.12 percent of the gross cropped area of the taluk. Cropping seasons in the district are mainly paddy based; the three seasons are defined by the paddy- paddy- fallow system. In this area, drought is a major factor limiting paddy production in the summer season. Especially drought is also experienced during the end of the winter season. Here, cultivation mainly depending on tank and canal irrigation and water shortage experienced in both the season.

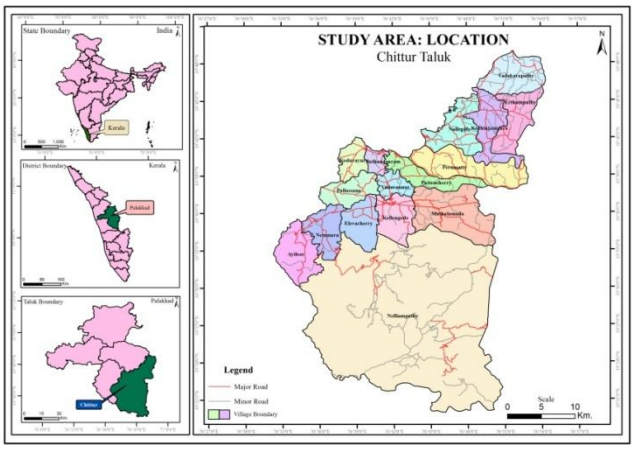


Fig: 1 Location Map

3. Objectives

1. To examine the spatio-temporal changes of paddy cultivation in the study area
2. To analyse the relationship between paddy cultivated area and the status of food security in the study area

4. Methodology

The administrative units of Chitturtaluk has been delineated by using the Survey of India topographic map series number, 58B/9, 58B/10, 58B/11, 58B/13, 58B/13, and 58B/15 with the scale of 1:50000. The Paddy cultivated area for the year 1971 has been traced out from these topographical map series through geo-coding and on screen vectorisation. To generate area under paddy field for the year 2015, landsat-8 OLI (15 meter resolution after PAN sharpening) data is used which is downloaded from www.earthexplorer.com at free of cost. Then Maximum likelihood algorithm has been employed to demarcate the paddy cultivated area. The secondary

data were collected from Economics and Statistical handbook published by Directorate of Economics and Statistics, Kerala. For the calculation of food security status of Chitturtaluk Singh (1975) and food availability Chakravarthy (1970) have been employed. To know the required energy intake of a person in Kcal,the Standard Nutrition Units (Chakravarty A.K 1970)has also been adopted.

5.Spatio-Temporal Changes in Paddy Land Use in ChitturTaluk

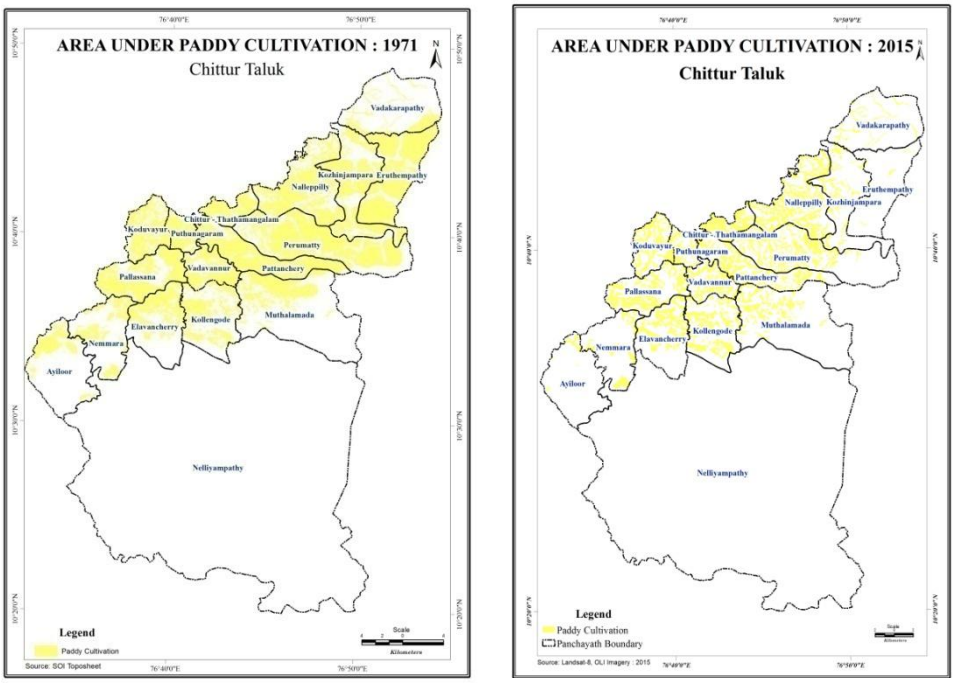
Chitturtaluk's lush green paddy fields pre 1970 was the most fascinating features of the taluk. Paddy was the dominant land use category of Chitturtaluk in 1971. In 1971, out of the total area of 113623 hectares (24.14%) about 27734.34 hectare land was under paddy cultivation. During this period most of the panchayaths have more than 60 percentage of their land under paddy. Pattencherry had the largest share of nearly 86.67 percentage followed by Eruthempathy with 82.19 percentage and Vadavannur with 81.87 percentage. Out of 17 panchayath's 10 panchayath shows the area under paddy cultivation was more than 60%. The area under paddy (table.1) in Chitturtaluk for the period of 1971 to 2015 (Fig.2) has clearly indicated that a sharp decline in area under paddy.

Table 1

Paddy Land Use Change in ChitturTaluk 1971- 2015

Sl.No.	Panchayath	Paddy Land use 1971-2015					
		1971			2015		1971-2015
		Total Area (in Hectare)	Area under Paddy(in Hectare)	Percent	Area under Paddy (in Hectare)	Percent	Change
1	Eruthempathy	5000	4109.5	82.19	68.32	1.37	-80.82
2	Kozhinjampara	3085	1929.05	62.53	511.23	16.57	-45.96
3	Nallepilly	3982	2644.45	66.41	1931.68	48.51	-17.90
4	Pattencherry	3050	2643.44	86.67	1354.43	44.41	-42.26
5	Perumatty	5954	3999.3	67.17	1657.33	27.84	-39.33
6	Vadakarapathy	4919	865.25	17.59	374.74	7.62	-9.97
7	Elevancherry	3228	1285.71	39.83	992.94	30.76	-9.07
8	Ayiloor	4094	732.42	17.89	491.94	12.02	-5.87
9	Nemmara	3763	1089.01	28.94	534.9	14.21	-14.73
10	Pallassena	2937	2038.28	69.4	1323.77	45.07	-24.33
11	Nelliyampathy	57653	17.3	0.06	15.45	0.11	0.05
12	Koduvayur	2173	1595.2	73.41	1105.28	50.86	-22.55
13	Kollengode	3181	1264.13	39.74	1064.76	33.47	-6.27
14	Muthalamada	6609	1505.53	22.78	849.68	12.86	-9.92

15	Puthunagaram	810	612.52	75.62	300.4	37.09	-38.53
16	Vadavannur	1714	1403.25	81.87	817.4	47.69	-34.18
17	Chittur - Thatamangalam	1471	1199.40	81.56	707.10	48.07	-33.49
	Total	**113623**	**28933.74**		**14101.35**		



Source: SOI Toposheets and Landsat OLI imagery

Fig: 2 Area under Paddy Cultivation in 1971 and 2015

The area under paddy in 2015 shows different picture all the panchayath have recorded sharp decline in their percentage of paddy field. The highest rate of decrease was noticed in Eruthempathypanchayath, which had lost nearly 80.82 percentage of its land under paddy. Next comes Kozhinjapara (-45.96%) and Pattencherry (-42.26%) had decreased of more than 40 percent of land under paddy to other uses. They are followed by Perumatty (-39.33%) Vadavannur (-34.185%), Pudunagaram (-38.53%), Pallassena (-24.33%) and Koduvayur (-22.55%) their variation is from 20 percent to 40 percent at a moderate level. A small scale decrease of less than 20 percentages has been noticed in Nallepilly (-17.90%), Ayiloor (-14.79%) and Nemmara (-14.73%). The remaining panchayathVadakarapathy (-9.97%),

Elevancherry (-9.07 %), Muthalamada (-9.92%), and Kollengode (-6.27%) had decreased of more than 10 percentages of their paddy field.

6. Paddy land conversion and Food security Status of ChitturTaluk

The food security and Paddy production cultivation has a strong relationship in the taluk being the most important staple crop. It is indicated (table.2) that the food security of the taluk has been adversely affected by the marked decrease in paddy cultivation and a shift from food crops to cash crops. Since no other crops in the taluk can be supplemented towards food security, the panchayaths that have recorded a large scale decrease in paddy area have become insecure. The cultivation of paddy is mainly meant for household consumption especially to the small farmers, surplus to the market. The drop off of paddy production would affect the household expenditure. Large scale budget has to be kept for food consumption. A statistical analysis of food security has been made at the panchayaths of Chitturtaluk for two different periods for a comparison and current status.

Table 2

Sl. No	Panchayath	**Require Energy/ Day from Carbohydrates- 1250-1300Kcal**	**Required amount of Paddy in Grams 300- 400.**	Population	Total food availability in Kg/ Year	Annual food required in Kg/Year	Surplus in Kg	Status
1	Eruthempathy			13627	19807790	1554330	18253460.31	Secure
2	Kozhinjampara			20441	9298021	2331552	6966469.438	Secure
3	Nallepilly			22674	12746249	2586253	10159995.88	Secure
4	Pattencherry			17154	12741381	1956628	10784752.88	Secure
5	Perumatty			18973	19276626	2164108	17112518.19	Secure
6	Vadakarapathy			18283	4170505	2085405	2085100.313	Secure
7	Elevancherry			12794	6197122	1459316	4737806.375	Secure
8	Ayiloor			17300	3530264	1973281	1556982.75	Secure
9	Nemmara			24408	5249028	2784038	2464990.5	Secure
10	Pallassena			17431	9824510	1988223	7836286.563	Secure
11	Nelliyampathy			7337	83386	836876.6	-753490.563	**Insecure**
12	Koduvayur			25129	7688864	2866277	4822587.438	Secure
13	Kollengode			23710	6093107	2704422	3388685.125	Secure
14	Muthalamada			27078	7256655	3088584	4168070.625	Secure
15	Puthunagaram			6431	2952346	733535.9	2218810.063	Secure
16	Vadavannur			12693	6763665	1447795	5315869.688	Secure
17	CTM			28510	5782746.80	3251922	2530824.93	Secure

18	ChitturTaluk			**313973**	**139462265.60**	**35812545**	**103649720.50**

Food Security Status of ChitturTaluk in 1971

Note: CTM – Chittur-Thatamangalam **Source:** Calculated and combined by researcher

During 1971, Chitturtaluk had about 27734.34 hectares of paddy field and its annual co efficient of production was114786.46 tonnes. The required amount of Paddy for getting sufficient level of carbohydrates for the total consumption units of this taluk in one year was around 35812.5 tonnes and the required amount of energy for the population was about 1432501.81 lakh Kcal per year. So this amount of Paddy production was more than enough to feed the people of 3, 13,973 in the taluk during seventies as the production level were high as 137,964.5 tonnes per annually (table.2).

It is indicated that all the fifteen panchayaths out of sixteen panchayat in taluk were secure in 1971. Nelliampathypanchayaths alone was found to be insecure, mostly due to the predominance of forest cover, plantation agriculture and paddy being the least important. In 1971, majority of the panchayath accounted for more than 60% of their cultivated area under paddy. Food security can also be related to the proportion of cultivators and agricultural labours. Thus in 1971, the proportion of cultivators and agricultural labours together accounted for more than 60 percent of the total working population in almost all the panchayath. Another aspect that has supported food security of the taluk was an improved per capita production of paddy. Most of the panchayath show a surplus production in this period. Eruthempathypanchayath itself alone could have produced more than threefold of their requirement level. It has indicated that larger area under paddy, higher proportion of cultivators and agricultural labours has contributed surplus production makes to become food secure status of Chitturtaluk.

7. Food Security Status of Chittur Taluk in 2015

The reverse picture has been seen in 2015, the taluk has only 13029.09 hectares of paddy land and it produced only about 107351.96 tonnes of Paddy in 2015 and satisfied only 1997854.88 lakhs Kcal of energy per year. Currently the population of this taluk has increased to 437886 which required extra 49946.37 tonnes production from the present level.

There are five panchayaths out of sixteen panchayath have become insecure regarding food security in 2015 (table.3). Among them, the most insecure panchayaths were Nelliyampathy, followed by Ayiloor, Eruthempathy, Vadakarapathy and Nemmara in the order of insecurity. More over the panchayaths, that is found to be secure show only a moderate to meager surplus. Another important notable result is that the food production has not increased corresponding to the population growth in the taluk. It can be due to the shift of working population from agricultural to non agricultural sector. It would be help to highlight the status of food production, cultivators and agricultural laborers related to the panchayath which were found to be insecure in 2015. In Nelliyampathy which was the only panchayath that was insecure in 1971

continue to be in the insecure position with a decreased share of paddy fields, agricultural laborers and cultivator and its topographical features.

The most insecure panchayath is Eruthempathy, its food production and requirement of the internal demand is sufficient to just 22.50 percent (4087 person). As per the 2011 census, there is a total population of 18158. But paddy production level indicating a serious level of insecurity and need to be produced, more than three times of its requirement when we compared to 1971. In this panchayath area under paddy has decreased by about 80.82 percent in 2015 and the agricultural laborers decreased by 28 percent and the cultivators have also decreased by about 4%, these are all putting pressure to land conversion and decline in production.

Table.3

Food Security Status of Chittur Taluk in 2015

Sl. No	Panchayath	Population	*Require Emery/ Day from Carbohydrates- 1250-1300Kcal*	*Required amount of Paddy in Grams 300- 400.*	Total food availability in Kg/ Year	Annual food required in Kg/Year	Surplus Kg	Status
1	Eruthempathy	18158			466215.68	2071146.88	-1604931	**Insecure**
2	Kozhinjampara	28751			5874032.7	3279410.94	2594622	Secure
3	Nallepilly	32713			17864176.64	3731326.56	14132850	Secure
4	Pattencherry	26018			14189008.68	2967678.13	11221331	Secure
5	Perumatty	30445			15645195.2	3472632.81	12172562	Secure
6	Vadakarapathy	26459			1985372.52	3017979.69	-1032607	**Insecure**
7	Elevancherry	17940			11089153.92	2046281.25	9042873	Secure
8	Ayiloor	28419			2759291.46	3241542.19	-482251	**Insecure**
9	Nemmara	36549			4019238.6	4168870.31	-149632	**Insecure**
10	Pallassena	23729			11416192.48	2706589.06	8709603	Secure
11	Nelliyampathy	5545			77250	632476.56	-555227	**Insecure**
12	Koduvayur	29197			9565093.12	3330282.81	6234810	Secure
13	Kollengode	29587			10490015.52	3374767.19	7115248	Secure
14	Muthalamada	37060			6863715.04	4227156.25	2636559	Secure
15	Puthunagaram	17892			2504134.4	2040806.25	463328.2	Secure
16	Vadavannur	17126			8492786	1953434.38	6539352	Secure
17	CTM	32298			4242600	3683990.63	558609.40	Secure
18	ChitturTaluk	**437886**			**127543472**	**49946371.88**	**77597100**	

Source: Calculated and Combined by researcher

Ayiloorpanchayath which is found to be insecure, only less than 43.87 percent of its population can be fed from its own food production. During the period of study, paddy fields have

decreased to a meager 3.10 percent of its land use in 2015, but the panchayath had occupied 17.89 percent paddy land in 1971.The cultivators comprise only about 9.51% of its working population and agricultural laborers comprises only 42.98% in 1971, showing a decrease of 1.69% and 24.43% respectively during this period.

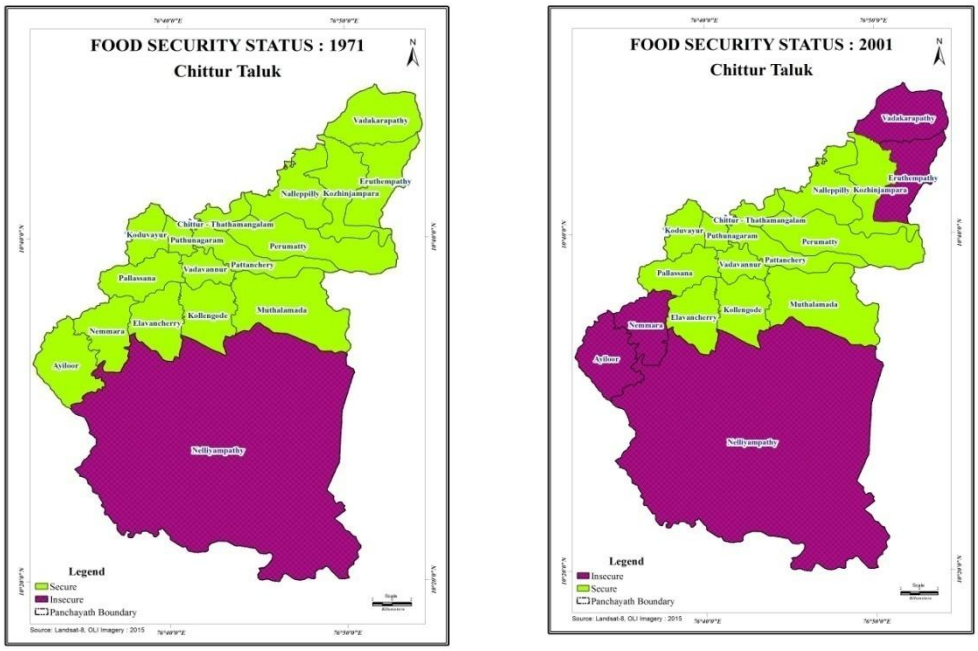


Fig: 3 Food Security status of Chitturtaluk

Nemmara is a next insecure panchayath. Its share of paddy fields which was only 29 percent in 1971 has further decreased to only about 14 percent in 2015.The proportion of agricultural laborers and cultivators also show a marked decrease of about 23 percent and 3 percent respectively during this period of study. The cultivators and agricultural labour occupies 50.49 percent and 8.54 percent in 1971. In Vadakarapathy where only about 18 percent of paddy fields were in 1971 has further decreased to less than 8 percent in 1971. Again, agricultural laborers have also decreased markedly by 25 percent and cultivators have again decreased by about 5 percent. It is to be noted that there were 22.15 cultivators and 58 .31 percent of agricultural labours in 1971.Vadakarapathy also exhibits almost similar situation, where the production is not sufficient to feed the internal need.

8. Conclusion

From the analysis of paddy land conversion vis a vis food security status in Chitturtaluk, Kerala has give a deep insight into the existing internal sufficiency of food production at the panchayath level. The fact identified from the statistical analysis was that most of the panchayath did not have enough area under paddy to produce paddy at the required level to feed

their people in 2011 but the situation was reveres in 1971 when most of the panchayath were sufficient enough to feed more than threefold times own its population. Over the 45 years from 1971-2015 the area under paddy was the highest and most of the panchayath occupy more than 60% of their land use. But after a span of 45 years, paddy had lost its maximum area in most of the panchayath. Some other panchayath still produce moderate to meager for the internal needs as well as for the market.

From the agricultural land use scenario of Chitturtaluk highlights that commercial crops have made more preferable than food crops. The decline in area is occupied by coconut and rubber. This change is mainly due to farmers decisions. That is farmers are more interested in mono cropping of perennial cash crops which requires less labour and are more remunerative as compared to food crops. The substitution of other crops at the cost of Paddy has far reaching implication on food security. Most of the people are still agricultural labours and are not afford to buy a food items because of increasing price for importing.

The aspects of security or insecurity of food production can be related to agricultural land use proportion of cultivators and agricultural laborers among the working population. The fluctuation in any one of these parameters can have a direct effect on food security. Since, the number of cultivator and number of agricultural laborers are directly linked to the area under paddy, a decline in paddy fields will have a corresponding negative impact on the cultivators (most of them are either small or marginal) and agricultural laborers, thus triggering a chain reaction culminating in the status of insecure in food availability. The major chunk of household income would be spent on food consumption again add the burden which was not the case in the year 1970. In such a situation, the Govt should focus more on implementing the laws including "Kerala conservation of paddy land and wetland act" to conserve paddy lands. Without government intervention it would be difficult for small and marginal farmers to survive, it is therefore suggested that suitable measures has to be taken by providing inputs at reasonable cost, ensuring reasonable profit from the farm and by giving special consideration to farmers who cultivate paddy and for the enhancement of production on the existing land by facilitating suitable technology.

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