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Gujarat Institute of Development Research

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Abstract

This paper takes on an older debate that the agriculture transformation in the regional economy of Kerala has been mainly driven by 'peasant rationality'. It argues that the agrarian transformation driven by peasant rationality, in turn, has created a dichotomous agrarian society in the state with a genre of rich farmers who have significantly benefited by the 'rational' switch over to commercial agriculture while another segment of subsistence farmers who got marginalised by the agriculture development process in the state. The paper argues that the agriculture development process driven by 'peasant rationality' has several ramifications in so far as the sustainable future of Kerala's agriculture economy is concerned from multiple perspectives. To substantiate this, the paper critically examines the agricultural development experience of the state over the past six decades and tries to bring out the impasse affecting the agriculture sector in the emerging context of growing market uncertainties and other challenges confronting the agro-ecosystems and natural environments.

Keywords : peasant rationality, natural resources, agro-ecosystems, rubber monoculture, governance

JEL Codes : Q1, Q5, P28, O380

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Rationalisation of Agriculture in Kerala: Implications for Natural Environment, Agro-Ecosystems and Livelihoods

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1. Introduction

Historically, the agricultural economy of Kerala is known for its export-oriented cash crop production with significant trade in spices (mainly pepper and cardamom), coffee, tea and rubber. Ever since the colonial period, the state's agriculture sector had witnessed tremendous transformation characterised by expansion of commercial crops essentially at the expense of food crops. The unique geographical features characterised by steep terrain and undulating topography has precluded the state from extensive cultivation of its staple grain, i.e., paddy on the hills and slopes, which have increasingly been utilised for growing commercial crops. Thus, overtime, the agriculture sector had profusely drifted away from food crop production, mainly paddy to cash crops and this trend had been justified on the grounds that rice, the staple food of Kerala, could be freely imported[1] from neighbouring states. The process of intensive commercialization of agriculture continued unrestrained over time, though the state had made serious efforts to reinvigorate the food production sector, especially, rice through massive public investment for agricultural and irrigation infrastructure development under the five year plans.

Agricultural development and growth scenario of the state underwent several twists and turns over time. The most critical phase in the history of development of the state's agriculture sector can be traced back to the early 1990s when the state launched economic reforms. It increased the market uncertainties posing serious challenges to the sustainability of agriculture sector across regions in the state, with the hilly regions of Wynad and Idukki districts becoming highly vulnerable to severe agrarian crisis, while

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[1] About a third of the total rice consumption of Travancore was met through imports (Raj and Tharakan, 1983).

the traditional food crop growing regions of Palakkad and Kuttanad in Alapuzha districts experiencing virtual collapse of the farm livelihoods.

The emerging crisis in the agricultural sector in the state is mystified by several contradictions arising from the agriculture development model driven by considerations of 'peasant rationality' alone, which in turn, has caused disruptions in the agrarian society destabilizing the livelihoods of a large segment of traditional food crop producers and farm workers. Ironically, the state of affairs of agriculture development in the state also opens up several issues and policy as well as governance dilemmas, raising concerns on the conventional role of the state in protecting the farmers and farm workers by conserving the agro-ecosystems, natural resources and the environment that shape their livelihoods.

Against this backdrop, the paper contests that the agriculture transformation in the regional economy of Kerala has been overtly driven by 'peasant rationality'. This in turn has created a dichotomous agrarian society in the state with a genre of rich farmers who have significantly benefited by the 'rational' switch over to commercial agriculture while another segment of subsistence farmers who have been victimized by the agriculture development model. The paper argues that the agriculture development process driven by 'peasant rationality'[2] has several ramifications in so far as the sustainable future of Kerala's agriculture economy is concerned from multiple perspectives. To substantiate this, the paper critically examines the agricultural development experience of the state over the past six decades and tries to bring out the impasse affecting the agriculture sector in the emerging context of growing market uncertainties and other challenges confronting the agro-ecosystems and natural environments.

The paper is organised into four sections, including introduction. Section two critically examines the agricultural development experience of the state

[2] Following the seminal work by Michael Lipton (1968) on the 'Theory of the Optimizing Peasant', the question of 'peasant rationality' has been dealt with by a large number of scholars in different country/ regional contexts. In this paper, (following Heller, 1999 and Herring, 2001) we define peasant rationality as 'rationalisation of cropping decisions by farmers as determined by increasing responsiveness to market forces as well as effectiveness of crop-specific institutional support systems'.

characterised by paradigm shift in cropping pattern driven by 'peasant rationality' and the outcomes across regions in a comparative perspective. Section three discusses the major implications of the agrarian transformation on the state's farming sector, agro-ecosystems, environment and the livelihoods. It then describes the important challenges and operational issues confronting the state's agriculture sector. Section four concludes the paper by highlighting the imperatives of policies, priorities and institutional strategies to reorient the state's agricultural sector from a long-term perspective.

2. Agricultural Development Experience of Kerala: A Critical Assessment

The process of agricultural development in Kerala, which was characterised by a paradigm shift towards commercial/ perennial cash crops mainly at the expense of food crops, especially, paddy has been widely debated in the development literature. The agrarian transition is often regarded as an outcome of the implementation of the much-celebrated land reforms, which primarily expanded the agrarian base of the state by distributing land in favour of small/ marginal farmers and landless labourers. At the same time, the distributive impacts of the land reforms have been contested by many scholars as the reforms have exempted all plantation crops from land ceiling legislations (Varghese, 1970; Raj and Tharakan, 1983; George, *et al.*, 1988; Balakrishnan, 2008; Rammohan, 2008), which in turn, created a dichotomy in the state's agriculture sector. This dichotomy got intensified over time as the production decisions of the large and medium sized plantation/ cash crop producers have always been influenced by 'peasant rationality' or the price (market) factor, which in due course, had resulted in a paradigm shift in cropping pattern in the state. This shift in cropping pattern has adversely affected a vast segment of small and marginal farmers and landless labourers, who have been engaged in traditional and low valued food crop production activities.

As scholars (Heller, 1999; Herring, 2001) argue, agricultural transformation in Kerala has been a distinct case of *rationalisation of cropping decisions* by the peasantry, where the choice of crops and agricultural land use decisions

have been dictated by an increasing responsiveness to market forces[3]. While the early indication of the commercialisation has been quite evident from the colonial period onwards, the process gathered momentum since the 1950s with the large scale entry of native peasantry in commercial agriculture[4]. Thus, the trajectory of agriculture development in Kerala has been quite different from rest of the Indian states where growth of agriculture was greatly influenced by the policies, technologies and institutions of the green revolution era. Unlike the agriculture development that took place in most of the Indian states in the 1960s through the 1980s, Kerala's agriculture growth dynamism characterised by a radical shift towards commercial crops, has been mostly driven by the market and price factors alone [than anything else], which was also legitimized by the state and the crop-specific developmental interventions and support policies enunciated by the commodity boards over time.

An analysis of Kerala's agricultural development in retrospect reveals that in the beginning of the sixties, the state had allocated a substantial size of its gross cropped area (almost 48%) for growing food crops, mainly, paddy, tapioca, pulses, banana and plantain, etc as evident from Table 1.

The share of commercial crops in total cropped area (TCA) was about 38 per cent, mostly contributed by coconut (21.4%) rubber (5.8%) and pepper (4.3%). Among the food crops, rice area was dominant (33.3%), followed by tapioca (10.3%).

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[3] Heller argues that 'as economic maximizers, Kerala's farmers have responded to shifting price signals by reallocating their resources from paddy to more lucrative crops' (Heller, 1999: 124).

[4] Varghese (1970) notes that the redistributive public policies originated in the state during the 19th century had been instrumental in the process of commercialisation.

Table 1: Long-term Trends in Cropping Pattern in Kerala, 1960/61 to 2009/10

Crops	Area cultivated ('000 ha) during				Percentage change between		
	1960-61	1980-81	2000-01	2009-10	1960-61 & 1980-81	1980-81 & 2000-01	2000-01 & 2009-10
I. Commercial / Non-food crops							
Coconut	500.76 (21.4)	651.37 (22.8)	936.29 (31.0)	778.62 (29.2)	30.1	43.7	-16.8
Rubber	135.8 (5.8)	237.8 (8.3)	474.36 (15.7)	525.41 (19.7)	75.1	99.5	10.8
Coffee	16.8 (0.7)	57.56 (2.0)	84.74 (2.8)	84.8 (3.2)	242.6	47.2	0.1
Tea	37.61 (1.6)	36.16 (1.3)	36.85 (1.2)	36.84 (1.4)	-3.9	1.9	0.0
Cardamom	28.68 (1.2)	54 (1.9)	41.29 (1.4)	41.59 (1.6)	88.3	-23.5	0.7
Pepper	99.75 (4.3)	108.07 (3.8)	199.37 (6.6)	171.49 (6.4)	8.3	84.5	-14.0
Cashew	54.32 (2.3)	141.3 (4.9)	86.23 (2.9)	48.97 (1.8)	160.1	-39.0	-43.2
Arecanut	24.26 (1.0)	61.24 (2.1)	85.38 (2.8)	99.22 (3.7)	152.4	39.4	16.2
Sub total	897.98 (38.4)	1347.5 (47.1)	1944.5 (64.4)	1786.94 (67.0)	50.1	44.3	-8.1
II. Annual/ Food crops							
Rice	778.91 (33.3)	801.7 (28.0)	347.46 (11.5)	234.01 (8.8)	2.9	-56.7	-32.6
Banana & plantain	44.42 (1.9)	49.26 (1.7)	92.89 (3.1)	99.08 (3.7)	10.9	88.6	6.7
Tapioca	242.2 (10.4)	244.98 (8.6)	111.18 (3.7)	74.86 (2.8)	1.1	-54.6	-32.7
Pulses	44.12 (1.9)	33.86 (1.2)	10.81 (0.4)	4.45 (0.2)	-23.3	-68.1	-58.8
Ginger	12 (0.5)	12.66 (0.4)	11.26 (0.4)	5.41 (0.2)	5.5	-11.0	-52.0
Sub Total	1121.65 (47.9)	1142.46 (39.9)	573.6 (19.0)	417.8 (15.7)	1.9	-49.8	-27.2
Other crops	321.37 (13.7)	372.04 (13.0)	503.6 (16.7)	463.97 (17.4)	15.8	35.4	-7.9
Gross Cropped Area	2341 (100.0)	2862 (100.0)	3021.7 (100.0)	2668.71 (100.0)	22.3	5.6	-11.7

Note: Figures in brackets indicate relative share in gross cropped area.
Source: Compiled from GOK, *Economic Review; Statistics for Planning; Agricultural Statistics.*

As evident, the cropping pattern underwent dramatic changes since 1961 through the 1980s and thereafter leading to the virtual collapse of the food production sector. The magnitude of decline in area under food crops has been beyond imagination in the 1990s and 2000s as the share of area under food crops had reached the lowest at 16 per cent by 2009-10 with the share of area under commercial crops peaking at 67 per cent. A crop-wise analysis may be quite interesting as the agrarian change was triggered by area expansion in few commercial crops, viz., coconut and rubber at the decline of major food crops, viz., rice and tapioca. When the relative share of coconut in the total cropped area had increased by about 8 per cent between 1960-61 and 2009-10, that of rubber had increased by 14 per cent during the same period. More importantly, growth in rubber area has been the highest, with an average growth of 53 per cent as compared to coconut (12%) between the sub-periods.

In sharp contrast, area under rice, the staple food crop of Kerala, had declined by 57 per cent between 1980-81 and 2000-01 (from 28% to 11.5% of TCA) and further by 33 per cent between 2000-01 and 2009-10. There was also remarkable decline in area of other food crops as well such as pulses and tapioca, which is a major cause for concern. This eventuality of simultaneous decline in case of major food crops including rice could be considered as a permanent shift from food to cash crops or land conversion for growing non-food crops as well as non-agricultural uses[5].

From the above, it may also be observed that much of the agrarian transformation in the state has happened since late 1970s which continued through the 1980s up to the early 1990s, until the launching of economic reforms in 1991. The 1980s was the period of transition as the state's agriculture sector experienced a critical phase of persistent stagnation during the decade as caused by a host of price and non-price factors[6]. By and large,

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[5] The period also witnessed significant change in land use at the aggregate level with an increase (58%) in land put to non-agricultural uses from 2.28 lakh ha in 1965-66 to 3.62 lakh ha in 2009-10 along with almost twofold increase in fallow lands (current fallow and fallow other than current fallows), mainly because of the non-profitability of food crops in the state.

[6] For a critical and very extensive discussion on the stagnation controversy, see the series of papers published by the Centre for Development Studies, *viz.*, Pushpangadan (1988); Kannan and Pushpangadan (1988); Narayana (1990) and Kannan and Pushpangadan (1990).

these factors included: a) a major crop shift in favour of commercial crops on account of loss of comparative profitability and high cost of production of food crops, especially, paddy; b) perceptible decline in the size of operational holdings; c) institutional constraints in the development of land and water resources; d) changed agrarian relations; e) dynamics of the agricultural labour market - scarcity of labour even at high wage rates; (f) loss of interest in traditional farming among farmers and neglect of less dignified farming operations by the labourers (Narayana and Nair, 1983; Kannan and Pushpangadan, 1988, 1990; Nair, 1997; Kannan, 1998; Thomas and Thomas, 1999); (g) relative profitability of cash crops, especially, rubber (George, 1999); and (h) effective institutional support mechanisms provided by the commodity development boards, such as the Rubber Board (George et al., 1988; Lekshmi and George, 2003; Viswanathan, 2005).

A detailed analysis of the cropping pattern changes in the state is useful to delineate the trends as well as to understand the current status of major crops with respect to area, production and yield. For analysis, we consider 15 year time series data on area, production and productivity of major crops of Kerala, covering both food and commercial crops. The entire period, 1995/96 to 2009-10 has been further divided into three sub-periods of five years, viz., (a) 1995/96 to 1999/00; (b) 2000/01 to 2004/05; and (c) 2005/06 to 2009/10. The results of the analysis are presented in Table 2.

Table 2 reveals that the performance of state's agriculture sector has been afflicted with problems of persistent stagnation that experienced in the 1980s. In fact, barring few crops, *viz.*, rubber, arecanut, banana & plantain and coffee, all the other major crops face problems of deceleration in growth in area and production, though productivity levels have not declined significantly. This is clearly shown by the annual average changes in area and production of crops, such as rice, pepper, cashew, ginger, tapioca and tea, for the entire period of analysis. The extent of decline in area has been more or less the same (around 5%) for crops, *viz.*, rice, cashew and ginger. This was followed by a 3% decline in area under tapioca, coconut (-1.12%), pepper (-0.5%) and cardamom (-0.41%). Decline in production has been the highest for cashew (-4.99%), followed by rice (-2.78%), ginger (-1.66%) and pepper (-1.56%). Crops that experienced decline during the entire period are pepper (-1.32%) and tea (-0.92%).

Table 2: Trends in Area, Production and Productivity of Crops in Kerala, 1995/96 to 2009/10

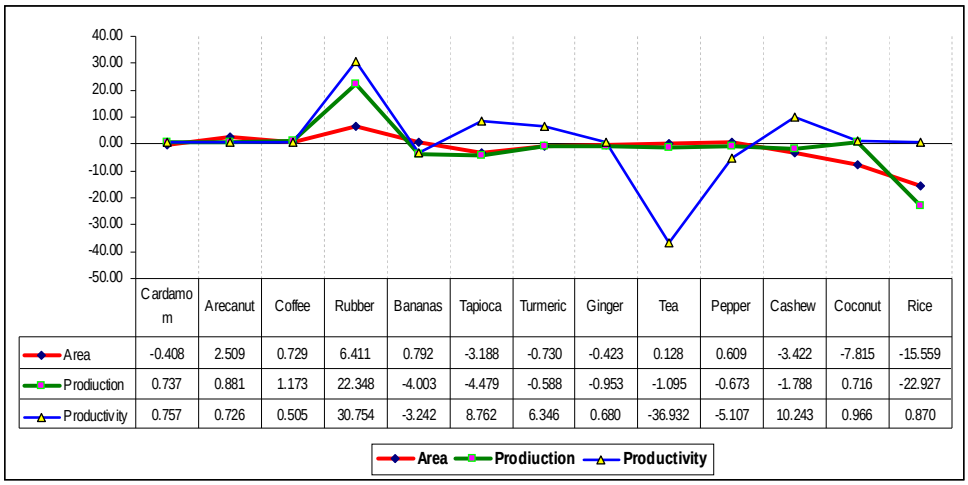
Crop/ Period	Area	Production	Yield	Area	Production	Yield
	1. Rice			2. Coconut		
1995/96 - 1999/00	398.30	817.29	2057	901.63	5290.6	5867
2000/01 - 2004/05	373.47	776.88	2085	903.95	5366.8	5935
2005/06 - 2009/10	351.71	743.41	2117	904.73	5407.4	5975
Annual avg. change (1995/96 – 2009/10)	-4.77	-2.80	1.88	-1.12	0.77	1.89
3. Rubber				4. Pepper		
1995/96 - 1999/00	338.73	532.23	1571	187.13	57.44	308
2000/01 - 2004/05	371.39	620.21	1668	213.76	66.1	309
2005/06 - 2009/10	402.85	760.35	1888	197.41	54.47	269
Annual avg. change (1995/96 – 2009/10)	1.71	3.36	1.68	-0.5	-1.56	-1.32
5. Tapioca				6. Banana and Plantain		
1995/96 - 1999/00	116.01	2618.97	226	81.08	742.32	9146
2000/01 - 2004/05	102.55	2479.37	244	107.77	813.05	7537
2005/06 - 2009/10	84.76	2576.01	305	108.70	690.33	6340
Annual avg. change (1995/96 – 2009/10)	-2.78	0.19	3.20	2.35	5.35	3.38
7. Arecanut				8. Coffee		
1995/96 - 1999/00	75.17	54.69	721	83.23	50.67	608
2000/01 - 2004/05	97.62	99.15	1014	84.39	63.74	755
2005/06 - 2009/10	101.43	119.5	1181	84.56	64.04	758
Annual avg. change (1995/96 – 2009/10)	2.54	32.36	30.94	0.22	3.33	3.12
9. Cashew				10. Tea		
1995/96 - 1999/00	95.15	65.1	681	34.67	64.01	1846
2000/01 - 2004/05	88.04	64.78	736	36.84	59.53	1615
2005/06 - 2009/10	62.30	50.1	806	35.99	54.27	1508
Annual avg. change (1995/96 – 2009/10)	-5.04	-4.99	0.14	0.49	-0.38	-0.92
11. Ginger				12. Cardamom		
1995/96 - 1999/00	12.17	43.43	3570	41.86	5.36	128
2000/01 - 2004/05	9.96	38.71	3888	41.35	8.43	204
2005/06 - 2009/10	8.63	36.5	4300	41.13	8.34	203
Annual avg. change (1995/96 – 2009/10)	-4.91	-1.66	3.32	-0.41	3.69	3.98

Note: Area in '000 ha; Production in '000 Tons; Productivity in Kg/ha except coconut (nuts/ha). The figures are simple averages for the respective periods.
Source: Estimated from GOK sources.

The performance of crops has also been analysed in terms of linear trend growth rates and the results are presented in Figure 1. Apparently, rice experienced the highest decline in area (-15.6), followed by coconut (-7.8),

cardamom (-4.1), cashew (-3.4) and tapioca (-3.2). Decline in production was also the highest for rice (-22.9), followed by tapioca (-4.5), banana & plantain (-4.0), cashew (-1.8), tea (-1.1), ginger (-0.95), pepper (-0.67) and turmeric (-0.6). In case of productivity, tea experienced highest decline (-37%), followed by pepper (-5.11), banana & plantain (-3.24). Productivity growth during the entire period was highest for rubber (31%), followed by cashew (10.24), tapioca (8.7) and turmeric (6.3). However, productivity levels were not impressive as growth was less than one per cent in 6 of the 13 crops, *viz.*, coconut (0.97), rice (0.87), ginger (0.68), cardamom (0.76), arecanut (0.73) and coffee (0.5).

Figure 1: Trend Growth Rates in Area, Production And Productivity of Crops in Kerala, 1995/96 to 2009/10



	Cardamom	Arecanut	Coffee	Rubber	Bananas	Tapioca	Turmeric	Ginger	Tea	Pepper	Cashew	Coconut	Rice
Area	-0.408	2.509	0.729	6.411	0.792	-3.188	-0.730	-0.423	0.128	0.609	-3.422	-7.815	-15.559
Prodiuction	0.737	0.881	1.173	22.348	-4.003	-4.479	-0.588	-0.953	-1.095	-0.673	-1.788	0.716	-22.927
Productivity	0.757	0.726	0.505	30.754	-3.242	8.762	6.346	0.680	-36.932	-5.107	10.243	0.966	0.870

Source: Same as Table 2.

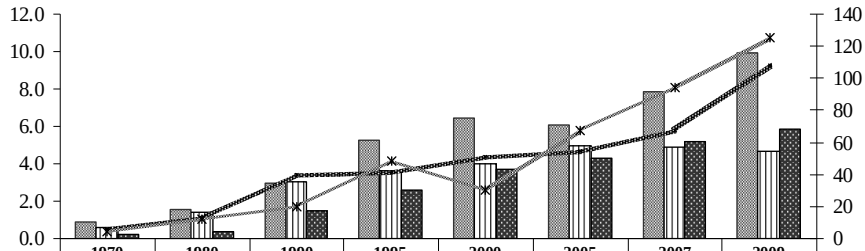
Thus it emerges that agricultural growth in Kerala has been experiencing significant strain in terms of deceleration or stagnation in area and production with less impressive growth in most of the crops during the 1990s and 2000s. The contradiction of positive growth in productivity along with decline in area and production in case of crops may not be related as an outcome of increased technology adoption or irrigation facilities, as improved technology other than HYV seeds as well as increased irrigation facilities have been serious casualties in most cases. Rubber has been an exception, as output and yield of the crop has been remarkable though there has been a slowdown in area expansion during the 1990s. The growth in production and productivity of rubber has been mainly due to near complete adoption

of the indigenous high yielding clone, RRII 105, especially, by the rubber small growers.

It may be noted that a variety of factors have been responsible for the remarkable growth in area, production and productivity of commercial/ plantation crops in the state over time. Nevertheless, the most crucial factor that contributed to the growth has been the comparative price advantage and the resultant profitability enjoyed by these crops, especially, rubber, tea, coconut and cardamom. Especially, in the case of rubber, it may be observed that the policies and institutional interventions through effective R&D support, extension and market intervention including price support under the aegis of the Rubber Board have been instrumental for the tremendous growth in its area in the state.

Figure 2 shows the historic movements in prices of major agricultural commodities of Kerala. It is evident that the increase in prices of commodities, viz., rice, tapioca and coconut has been quite slow as compared to rubber and tea. For instance, it took almost 15 years for price of rice to reach the mark of Rs. 10 per kg from Rs. 5 per kg. Quite surprisingly, coconut prices continued to stagnate at Rs. 4.9 per nut during most of 2000, followed by a steep fall to Rs. 4.6 per nut during 2009. In contrast, prices of rubber and tea have been consistently on the increase over time, except a steep fall in rubber prices from Rs. 48.7 per kg to Rs. 30 per kg between 1995 and 2000.

Figure 2: Trends in Farm Prices of Important Crops in Kerala, 1970 to 2009



	1970	1980	1990	1995	2000	2005	2007	2009
Paddy	0.9	1.5	3.0	5.3	6.5	6.1	7.9	9.9
Coconut	0.6	1.4	3.0	3.6	4.0	4.9	4.9	4.6
Tapioca	0.2	0.4	1.5	2.6	3.7	4.3	5.2	5.9
Tea	5.8	13.1	40.1	41.9	51.3	54.4	67.3	107.8
Rubber	4.6	12.1	20.2	48.7	30.4	67.0	93.9	124.9

Note: Prices are expressed in Rs. per kg except for coconut, which is Rs. per nut.

The relative price advantage along with reasonably lower input requirements, especially, labour demand, have made commercial crops quite attractive among the farmers, leading to a dramatic increase in area of these crops in the state at the cost of food crops as already observed. As a cumulative outcome, all districts in Kerala had experienced tremendous deterioration in the area under food crops, with few exceptions as evident from Table 3. The data reveals that the share of food crops, mostly represented by rice, had declined to as low as 9 per cent at the state level with 11 of the 14 districts showing a share much below the state average (lowest being 0.8% in Idukki and highest being 7.4% in Ernakulam). Only three districts bear the testimony of being the traditional food crop producing regions with Palakkad and Alapuzha keeping one third of the gross cropped area (32%) under food crops, followed by Thrissur (16%).

Table 3: District-wise Cropping Pattern and Relative Share of Major Crops in Kerala

District	Share of major crops in Gross Cropped Area (%) during 2008-09					
	Food crops	Non-Food crops	Rice	Coconut	Rubber	Coconut & Rubber
Trivandrum	2.0	65.5	1.8	43.9	18.4	62.3
Kollam	2.5	60.9	2.3	35.0	21.4	56.4
Pathanamthitta	2.7	72.2	2.6	16.4	49.0	65.4
Alapuzha	32.5	46.3	32.5	37.0	4.1	41.1
Kottayam	5.1	75.3	5.1	16.1	52.0	68.1
Idukki	0.8	49.0	0.7	6.2	13.8	20.0
Ernakulam	7.4	62.9	7.2	25.8	32.5	58.3
Thrissur	16.1	57.1	16.1	44.3	8.5	52.8
Palakkad	32.2	41.6	30.6	18.8	11.1	29.9
Malappuram	4.6	65.7	4.5	43.6	15.2	58.8
Kozhikode	2.0	72.0	2.0	59.1	9.8	68.9
Wynad	6.9	53.4	6.7	5.8	4.9	10.7
Kannur	3.8	63.7	3.6	36.5	19.9	56.4
Kasargode	3.7	67.4	3.6	37.5	21.1	58.6
STATE	9.0	59.9	8.7	29.2	19.2	48.4

Source: Government of Kerala, *Agricultural Statistics, 2008-09* (Estimated).

In the case of commercial crops, the two major crops, viz., coconut and rubber together constitute almost half of the TCA in the state with the highest share reported from Kozhikode (69%), followed by Kottayam (68%), Pathanamthitta (65%), Thiruvananthapuram (62%), Malappuram and Kasargod (59% each) and Ernakulam (58%). While 9 of the 14 districts

report the dominance of coconut in the total cropped area (ranging from 59% in Kozhikode to 19% in Palakkad), four districts show the dominance of rubber in the total cropped area (Kottayam [52%], Pathanamthitta [49%], Ernakulam [33%] and Idukki [14%]). From this analysis, it may be inferred that if rubber area expands at the currently reported trend growth rate of 5.26 per cent per annum against coconut (0.76%), it may even surpass the coconut area, relegating the latter to the second position in most of the districts in less than a decade.

To further validate the growth and dominance of commercial crops across regions, we examine the changes in the relative share of three major crops, viz., rice, coconut and rubber in the gross value of agricultural output between 2003-04 and 2007-08. Table 4 shows that the share of rice in the gross value of agricultural output (GVAO) had declined by 2 per centage points from 5.9 per cent to 4.1 per cent between 2003-04 and 2007-08 with significant decline reported from the three traditional rice producing regions, viz., Palakkad (5%), Thrissur (4.4%) and Alapuzha (2.5%). The relative share of coconut also declined in the GVAO in all the districts, mainly because of a fall in production along with a decline in coconut prices. In contrast, the relative share of rubber recorded significant increase in all the districts with an increase of 14 per cent at the state level between 2003-04 and 2007-08. Interestingly, most of the districts which experienced significant loss in relative share in coconut have reported an increase in share of rubber in GVAO, which could be mainly attributed to the price advantage that rubber had, leading to a consistent rise in tapped area and production during the five year period.

Table 4: Changes in the Share of Major Crops in Gross Value of Output in Kerala, District-wise, 2003/04 and 2007/08 (Rs. Crores)

District	Rice		Coconut		Rubber		Tapioca		Banana		Total (Rs. Crores)		Change in GVO (2003/4- 2007/8, %)
	2003-4	2007-8	2003-4	2007-8	2003-4	2007-8	2003-4	2007-8	2003-4	2007-8	2003-4	2007-8	
TVM	1.7	0.7	43.2	26.1	25.0	40.4	24.0	19.7	3.7	5.8	711	965	35.6
KLM	2.7	0.8	34.4	18.0	30.9	42.9	24.6	24.6	1.7	4.2	793	1147	44.6
PTA	2.4	0.5	14.3	6.2	61.4	66.8	13.2	14.9	4.2	4.8	554	988	78.4
ALPZA	21.4	18.9	56.1	35.9	7.6	14.1	10.6	8.6	1.4	4.3	324	422	30.1
KTYM	2.7	2.1	12.9	6.0	70.8	79.6	7.8	5.3	3.7	3.6	1085	1867	72.1
IDKI	0.9	0.6	6.3	2.7	23.7	32.7	10.1	7.9	1.6	3.3	1017	1501	47.5
ERNKM	7.0	2.1	24.1	12.0	49.5	63.3	7.7	7.3	7.6	7.8	794	1235	55.5
TRISR	13.9	9.5	55.1	35.2	18.0	32.6	1.7	2.9	3.8	5.9	601	693	15.2
PLKD	27.4	22.4	25.1	12.3	25.8	35.8	4.1	2.4	9.9	13.3	793	1256	58.4
MLPM	4.1	1.8	45.5	24.2	22.2	37.8	8.4	10.5	9.0	6.3	879	1272	44.8
KZKD	1.1	0.8	65.4	40.9	15.2	33.9	5.2	3.4	2.4	4.3	793	773	-2.5
WYND	6.3	5.3	6.1	3.8	6.6	10.8	7.6	6.8	16.7	15.9	470	657	39.8
KNR	2.1	1.5	38.9	19.2	30.7	51.1	4.3	2.9	2.8	3.0	823	1037	26.0
KSGD	1.8	1.1	47.7	17.8	19.9	32.8	1.0	0.7	1.2	2.1	749	1030	37.5
STATE	5.9	4.1	32.7	16.2	31.3	45.3	9.2	8.5	4.8	5.8	10386	14842	42.9

Note: The figures are percentage share of the respective crops in the Gross Value of Output at the district level.

Source: Estimated from GOK, *Agricultural Statistics*, 2004-05 and 2008-09.

3. Rationalisation of Agriculture: Constraints and Implications for Natural Environment, Agro-ecosystems and Livelihoods

The foregoing analysis clearly brings out that the pattern of agriculture development in Kerala has been quite distinct in terms of the growth of commercial crops, essentially driven by 'peasant rationality' driven by the price or market factor as well as economic efficiency of farmers in allocating scarce resources, especially, land[7]. In fact, this scenario of 'rationalisation of agriculture' might appear to be quite ironic or irrational as it happened at the cost of domestic food sufficiency of the state. At the same time it is important to consider that such an agrarian transformation had witnessed the emergence of a mighty commercial crop production sector in the state, which also turned out to be nationally and internationally important with the state benefiting from the increased inflow of export earnings in case of products such as coffee, tea and spices (pepper, cardamom and turmeric) and avoiding the import dependence in case of products, mainly, rubber.

The agriculture development outcome in Kerala as driven by 'peasant rationality' raises two interesting questions that need some explanation. First, why to bother if the process of rationalisation of agriculture in Kerala had gained it a significant status at the national and international levels. Second, why to blame the farmers of Kerala who all along had behaved very rationally by choosing to grow crops based on market/ price signals and with favourable institutional support measures. Rest of the paper tries to dwell on these two points to offer some logical explanations to the peasant rationality driven agrarian transformation in the state.

First of all, one may ponder over the 'classic argument' of lack of comparative profitability of food crops, mainly, rice in Kerala as historically clamored by the supporters of commercial agriculture development in the state. This classic argument of 'rice production losing its ground in terms of loss of profitability' has been overwhelmingly upheld by researchers and policy makers based on mere economic logic of costs and prices involved in rice cultivation. To a large extent, these claims get legitimized if we examine the comparative economics of rice production vis-a-vis the

[7] Kerala's farmers are quite efficient in making the best use of the limited land available through crop selection, mixed cropping, and the application of modern technology (Kannan, 2011).

competing commercial crops in Kerala. For instance, an analysis based on the data on costs and value of output per ha of crops for the year 2011-12, as reported by the Department of Economics, Kerala, validates the above claims (Table 5).

Table 5: Comparison of Costs and Returns of Important Crops in Kerala, 2011/12 (Rs./ha)

Crops	Total Cost (Rs./ha)	Value of output (Rs./ha)	Benefit cost Ratio (BCR)	Ratio of rice in relation to major crops in	
				Costs	Returns
1. Coconut	33919 (7)	45157 (7)	1.33 (6)	1.07	1.11
2. Arecanut	49249 (5)	56697 (5)	1.15 (8)	1.56	1.39
3. Tapioca	51234 (4)	79984 (4)	1.56 (3)	1.62	1.96
4. Banana	129693 (1)	206181 (1)	1.59 (2)	4.11	5.05
5. Pepper	41568 (6)	56234 (6)	1.35 (5)	1.32	1.38
6. Turmeric	62029 (2)	92117 (3)	1.49 (4)	1.96	2.25
7. Rubber	58000 (3)	167209 (2)	2.88 (1)	1.84	4.09
8. Rice	31571 (8)	40859 (8)	1.29 (7)	----	----

Note: Parenthetic figures indicate the respective ranking of crops. Cost figures relate to 'Cost A' as defined by the Commission for Agricultural Costs and Prices (CACP).
Source: Department of Economics and Statistics, Government of Kerala (except for rubber). For rubber, cost and value figures are based on survey by the author.

Table 5 reveals that rice cultivation ranks 7th among the crops in terms of profitability ratio (BCR being 1.35). Though rubber ranks fourth in profitability (BCR at 2.43), it may be noted that the crops reporting higher BCRs, viz., tapioca, ginger and banana are seasonal crops and grown by smaller proportions of farmers compared to rubber. Though the unit costs of cultivation of commercial crops are higher in relation to rice, the returns are much higher than rice as indicated by the ratio of value of output of rice to other crops. For instance, for growing rubber, a farmer incurs higher costs than rice (rice to rubber cost ratio being 2.89), the returns are five times higher than rice (rice to rubber returns ratio being 5.2). Similarly, growing banana involves a cost ratio of 3.35 and benefit the ratio is 6.25 in relation to rice cultivation. It may be noted that though rice cultivation involves lower costs per ha, the price advantage enjoyed by commercial crops along with the operational constraints make rice cultivation less attractive among the farmers as is quite known in the state.

One might also logically presume that the rational behaviour of farmers in Kerala is greatly influenced by the proactive crop development programmes

and policies enunciated by the specific commodity boards, such as the Rubber Board, Coconut Development Board, Spices Board (SB), Coffee Board, Kerala Horticulture Development Programme (KHDP), etc. that are operational in the state. In fact, many of these specialized agencies have been hyper-active in vigorously promoting the 'target crops' through price as well as institutional support measures and market development programmes, which have been quite exemplary and effective than the parallel R&D programmes implemented by the Government of Kerala for intensification of rice production from time to time. In this respect, the case of rubber has been quite outstanding in terms of almost 100 per cent adoption of the indigenously developed high yielding rubber varieties, viz., RRII 105 and RRII 400 series clones and the resultant high productivity of rubber in Kerala (1852 kg/ha) even as comparable with the productivity of Thailand. Such a dramatic growth in productivity of rubber has been contributed by a host of favourable factors ranging from remunerative prices to effective implementation of institutional support measures encompassing production, extension and marketing of rubber (George *et al.*, 1988; George and Chandy, 1996; Viswanathan and Shah, 2009).

However, there are several challenges posed by the process of 'rationalisation of agriculture' that happened in Kerala over time. These challenges assume serious dimensions in the current context of increasing local food security issues along with the potential risks emerging from changing trade regimes in the specific case of rubber. The changing agro-climates and natural environments in the context of climate change also pose further issues. Already there are some reports of the instances of impending food security as well as climate change threats in Kerala in recent times as demonstrated by the agrarian crisis induced farmer suicides in Wynad, Idukki and Palakkad districts (Mohandas, 2007). In fact, the livelihood implications of the agrarian crisis become much severe in these districts given that they lag behind not only economically, but also in terms of the composition of the population of SC and ST (Jeromi, 2005).

Given the scenario, one could posit that Kerala might experience serious agrarian crisis in future due to the persistence of a large number of dilemmas as well as socio-economic and institutional constraints that already started weakening the strong agrarian base of the state it once had. In what follows, we discuss some of the imminent operational constrains and issues that seriously challenge the paradigm of agriculture development of the state

driven by peasant rationality alone. We argue that the outcomes on the agrarian front in the state raise several concerns affecting the integrity of agro-eco-systems, natural resources (land and water) and the sustainable livelihoods of the food-crop based farming communities and the landless labourers in the state.

3.1 Socio-economic and institutional constraints

There are several operational constraints having significant implications for sustaining the agriculture performance of the state on the one hand and the sustainability of farm production systems through protecting the agro-ecosystems and environment in future. First of all, in the context of the growing market uncertainties arising from the liberalisation induced policy changes and the trade reforms, the comparative as well as competitive advantage of the agriculture sector is seriously eroded. In this regard, some of the important operational impediments are: (a) declining size of farm holdings creating non-viable farms across the major commercial crops, especially, coconut (0.25 ha) and rubber (0.42 ha); (b) already disappeared genre of full-time farmers leading to the emergence of absentee landlordism and growing dependence on hired labour; (c) shortage of skilled/ unskilled labourers for almost all farming activities (including rubber tapping) even at high wage rates; and (d) the growing inertia of the state in resolving the agrarian impasse of the state through long-term policies and institutional interventions. The technological constraints confronting the agriculture sector in the state relate mostly to the challenges posed by the available infrastructure facilities and levels of technology adoption across crops and regions. Moreover, the tiny structure of the holdings along with lack of proper irrigation[8] facilities has resulted in lower levels of adoption of inorganic fertilizers (40%), plant protection measures (30%) and other farm level secondary investments in the coconut holdings in the state (Viswanathan, 2005). The technological constraints facing other crops, viz., cardamom, arecanut and banana may also be regarded as similar to that of coconut.

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[8] The existing institutional framework for development of irrigation systems in Kerala is largely constrained in terms of their technical orientation towards paddy, which obstructed any farm level investments to diversify cropping pattern and thereby increased the acreage under coconut and banana, which are water-responsive (Viswanathan, 2001).

Interestingly, the reported agricultural productivity in the state is significantly lower than the national average as evident from the ratio of Kerala's productivity to national level in case of crops such as banana (0.31), pineapple (0.48), rice (0.70) and cardamom (0.72), and abysmally lower than the international level for all the crops, except rubber. The ratios of Kerala's productivity vis-à-vis the world have been observed the lowest for pepper (0.06), followed by pineapple (0.18), tea (0.22), rice (0.23), banana (0.24), Arecanut (0.32), coffee (0.41), coconut (0.57) and tapioca (0.82). This mismatch in productivity underlies that in the process of growing market integration, the crop production systems and the harvesting and processing strategies in the state need to be recast so as to achieve competitiveness in cost and quality on par with the emerging global market and environmental standards (Viswanathan, 2005).

A major socio-economic issue affecting the state's agriculture is the looming labour market crisis. As it emerges from various studies, Kerala's sustainable agriculture future is highly dependent on the sustained stock of highly productive labour, which emerges as the major casualty in the current context. A large segment of rice grown area in the state has already been converted either into less labour demanding crops (like coconut, arecanut, tapioca, banana, etc) or permanently gone out of cultivation due to the rampant labour market crisis[9]. Of late, the rubber production sector has also been facing acute labour shortage in Kerala with the labour market dynamics assuming several twists and turns, about which little is known.

3.2 The issues of rubber monoculture

One of the testimonies of the rationalisation induced agrarian transition in Kerala has been the emergence and domination of rubber as a monoculture system across the districts as discussed above. Though monoculture rubber has been in existence in Kerala ever since the colonial times, by and large, it was confined to limited areas in the form of large estates in few districts, mainly, Kottayam, Idukki, Pathanamthitta, etc. However, as already observed, massive area expansion under rubber gathered momentum in the state since the late 1950s with the large-scale entry of native peasantry,

[9] Labour market crisis in Kerala has been caused by the massive withdrawal of labour from farming operations due to the substantial improvement in the socio-economic status of labour owing to social development interventions by the state (Thomas and Thomas, 1999; Kannan, (1999).

facilitated by a host of political and institutional factors, including the land reforms and effective institutional support measures provided by the Rubber Board, besides the favourable agro-climatic conditions. As a result, the smallholder sector has far exceeded the estates sector in area and production of rubber and currently, the share of smallholdings is as high as 89 per cent in area and 93 per cent in production of rubber (Viswanathan and Shah, 2012). An interesting aspect of the area expansion under the smallholder sector in the state has been the perpetuation of rubber monoculture system as in the case of the large plantations.

It may be argued that the institutional interventions and support regime evolved by the Rubber Board for promoting rubber cultivation in India (and Kerala) has been quite pervasive in terms of its focus on monoculture as it was deemed that rubber grown in a mixed cropping system may not yield its fullest potential. Seemingly, such a system of rubber monoculture has been widely promulgated by the stringent institutional and policy regulations followed by the Rubber Board from time to time. For instance, the rubber planting (newplanting and replanting) subsidy offered by the Rubber Board is distributed on the condition that only minimum numbers of trees are allowed inside the rubber holding, such that the growth of rubber plants is undisturbed (Viswanathan and Shivakoti, 2008). More importantly, in order to expand rubber area in view of the fast growing domestic demand for rubber, the Rubber Board had also been highly proactive even by reducing the minimum required holding size to as low as 0.1 ha, fixing an initial density of 450 rubber plants per ha (Rubber Board, 2005).

These proactive institutional support policies initiated by the Rubber Board have been highly successful in reaching out to the small and marginal farmers in the state leading to massive expansion of rubber as a monoculture system all across the districts. As may be argued, much of this area expansion posed a major threat to the pre-existed mixed cropping/ integrated food crop systems in Kerala, which were already losing their grounds in view of poor returns as discussed. Incidentally, planting rubber in a monoculture format has been widely preferred by the small and marginal holders as they are otherwise hard-pressed by various operational constraints, including smaller size of farms and the lack of profitability of alternate farm livelihood options. In fact, a serious outcome of the monoculture rubber in the state has been the near complete adoption of the monoclone, viz., RRII 105 by the rubber farmers in view of its yield record even as compared to the

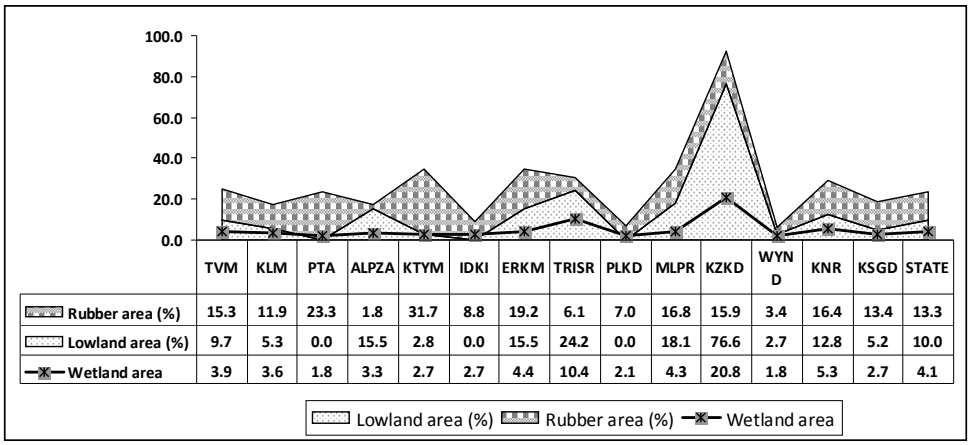
prominent Malaysian rubber clone RRIM 600 and the Indonesian rubber clone GT1 (Joseph et al., 1999).

Apparently, this sort of intensive adoption of the rubber monoclone by farmers runs the risk of massive devastation caused by spread of plant diseases or other biotic or abiotic stresses. In fact, the outcomes of such events may prove to be highly disastrous for the small and marginal rubber farmers in particular. Moreover, the spread of rubber monoculture in the state may also have significantly impacted on the hydrological cycle and the diversity of agro-ecosystems of the regions, about which little is known. There have also reports of plantation induced deforestation in many parts of the state causing significant loss of forest cover over time (George and Chattopadhyay, 2001). It is also widely reported that the rubber growing regions face serious water shortage (including drinking water) during peak summer as a result of the decline in groundwater aquifers. Further, it is widely known that rubber is a competitive monocrop as its shade and canopy do not tolerate any other crop. The adoption of intercrops has also been found to be as low as 15 per cent in immature rubber and 25 per cent in mature rubber holdings in the state (Viswanathan and Shivakoti, 2008).

The next important issue is the degradation of water bodies (rivers, streams, groundwater sources) as caused by the inflow of effluents originated from rubber processing (rubber sheet making) units (Sreelakshmi et al., 2007) as well as the fertiliser and pesticide residues originate from rubber holdings. However, these issues still remain to be grossly under-reported in the state and hence, there is an urgent need for detailed investigations across rubber growing regions in the state.

There are also concerns emerging from rubber area far exceeding the agro-ecological limits imposed by the geographical features of the state. For instance, it may be observed that rubber monoculture area has already grown out of proportions in relation to the proportions of lowland and wetland areas across districts in the state (Figure 3).

Figure 3: Distribution of Area under Low-Land, Rice and Rubber in Kerala by District



	TVM	KLM	PTA	ALPZA	KTYM	IDKI	ERKM	TRISR	PLKD	MLPR	KZKD	WYND	KNR	KSGD	STATE
Rubber area (%)	15.3	11.9	23.3	1.8	31.7	8.8	19.2	6.1	7.0	16.8	15.9	3.4	16.4	13.4	13.3
Lowland area (%)	9.7	5.3	0.0	15.5	2.8	0.0	15.5	24.2	0.0	18.1	76.6	2.7	12.8	5.2	10.0
Wetland area	3.9	3.6	1.8	3.3	2.7	2.7	4.4	10.4	2.1	4.3	20.8	1.8	5.3	2.7	4.1

Note: The figures for lowland area, rubber area and wetland area represent the relative share in total geographical area.

Source: GOK (1980), *Land Resources of Kerala*; *Economic Survey 2010* for Rubber area; *SAC/ ISRO: National Wetland Atlas 2010: Kerala* for wetland area.

To be more precise, rubber monoculture may already have created significant strains on the lowland and wetland ecosystems in terms of depleting the low-lying water bodies as well as groundwater sources and degrading the agro-ecosystems. This argument is reasoned by the fact that in most cases, expansion of rubber area had been at the expense of coconut, which, in turn, had replaced rice growing fields located in the interfaces of lowlands and wetlands in the state.

3.3 Crisis of governance in development and management of natural resources

It may not be illogical to conclude that the agrarian transformation of the sorts described also reflects the impending crisis of governance in respect of development and sustainable management of land and water resources in the state. This issue of governance crisis needs some elaboration with respect to the ineffective state policies in protecting the paddy based wetlands and the agro-ecosystems they support as well as the development and management of water resources.

3.3.1 Implications of wetland conversion

The fact that wetland agro-ecosystem provides valuable goods and services to society are more often than not overlooked in the policies of the state. Conversion of paddy involves irreversible damage of the ecosystem. There was a 65 per cent fall in the paddy wetland area in the last 30 years in Kerala. Though farmers are independent as individuals to decide on the use of farm lands, more often the conversion of the paddy wetlands is highly motivated by an urge to maximize the economic returns by converting paddy fields into garden crop lands or plots for real estate development[10]. It emerges that majority of farmers are not aware of the long term impact of ecological and environmental imbalances that may result due to conversion of the wetland agro-ecosystems in the state. Environmental problems caused by deforestation, disruption of backwater ecosystems and paddy land conversion have already affected the livelihoods of large numbers of the economically backward sections in rural areas (Gopikuttan and Kurup, 2004; Kurian, 1995; Narayanan, 2003).

These eventualities point to the governance failure of the state in particular in arresting the process of massive conversion of paddy wetlands for growing commercial crops, especially, banana which consumes high doses of pesticides (Latha and Madhusoodhanan, 2004; Devi, 2010), construction of buildings, clay mining by tile industries, brick kilns, etc. Despite the Land Utilisation Order of 1967 insisting continuance of food crops in lands traditionally so used, unabated paddy conversion continued in the state with views for and against such conversion (Narayanan, 2003). Though, the Kerala Conservation of Paddy Land and Wetland Bill 2007 has been aimed at protecting rice fields from illegal reclamation, the irony is that a vast tracts of paddy lands have already been irreversibly converted for various uses. Even otherwise, the bill is likely to be a burden on the small-scale farmers of Kole wetlands since it allows the government to seize land that is not cultivated.

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[10] Filling up wetlands and paddy growing areas and converting them into built-up areas has become a practice since late 1980s because of increased cash flow and economic development due to NRI remittances. This massive leveling is likely to have serious ecological implications in terms of flooding, scarcity of drinking water, vector borne epidemics and loss of livelihoods of lower income groups. Since 1995 about 63-76% of the total area of Kuttanad, an important wetland system of Kerala has been filled up for non-agriculture or non-ecological purposes (Raj and Azeez, 2009).

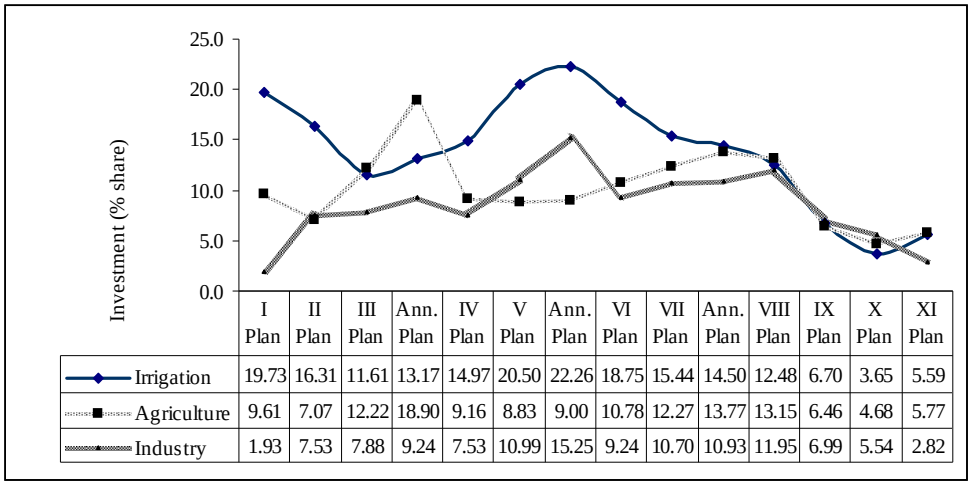
Real benefits of conversion of paddy wetlands need to be reconciled in terms of the costs of conserving the ecological functions and ecosystems supported by paddy wetlands in the state. The estimates on the value of major economic and ecological functions lost due to paddy conversion would help to convince the farmers and other potential stakeholders about the need for conservation. In sharp contrast, the strong conviction of the farmers in converting paddy lands is also being legitimized by the state in recent times through populist measures of supplying highly subsidized rice through PDS at Rs. 1-2 per kg. In due course, this may also act as a disincentive in formulating policies and interventions at the state and regional levels with respect to conservation of paddy based wetlands in the state.

3.3.2 Implications for performance of irrigation systems

The perceptible decline in area under food crops, mainly paddy and the resultant expansion in area under commercial/plantation crops raises serious concerns about the development and performance of irrigation systems in the state. Logically, the shift in cropping pattern goes a long way in explaining the sub-optimal performance of the irrigation sector in the state, as most irrigation systems have been technically designed for irrigating food crops, mainly, paddy. The eventual shift from food to cash crops had resulted in lack of effective demand for water for irrigation purposes in most parts of the state. It also obstructed the process of effective and timely implementation of irrigation systems in Kerala causing large-scale capacity under-utilisation in case of completed irrigation projects and non-commissioning of the ongoing schemes (Viswanathan, 2001).

The bleak performance of irrigation systems in the event of crop shift may seem to be an irony as the irrigation sector (including flood control) in the state has always been flooded with massive financial allocations during the plans even at par with (more in proportion as well) the agriculture and industrial sectors as also evident from Figure 4.

Figure 4: Plan-wise Investment in Irrigation and Other Sectors in Kerala



	I Plan	II Plan	III Plan	Ann. Plan	IV Plan	V Plan	Ann. Plan	VI Plan	VII Plan	Ann. Plan	VIII Plan	IX Plan	X Plan	XI Plan
Irrigation	19.73	16.31	11.61	13.17	14.97	20.50	22.26	18.75	15.44	14.50	12.48	6.70	3.65	5.59
Agriculture	9.61	7.07	12.22	18.90	9.16	8.83	9.00	10.78	12.27	13.77	13.15	6.46	4.68	5.77
Industry	1.93	7.53	7.88	9.24	7.53	10.99	15.25	9.24	10.70	10.93	11.95	6.99	5.54	2.82

Source: Estimated from State Plan documents.

This irony may be further explained in terms of the almost stagnant area (hovering around 30% of the net irrigated area) under surface (canal) irrigation schemes despite such massive financial allocations in the state over the past 4 decades.

3.3.3 Implications for food security

Now it comes to discuss the implications of agrarian transition on food security in the event of the growing deficiency in food production in the state. It is reported that the State's deficit in rice has increased steadily from 50 to 55 per cent during the early 1950s to mid-1970s to more than 80 per cent of its requirement at present (Gopikuttan and Kurup, 2004). Yet, scholars seem to be divided on the food security implications arising from decline in area under food crops in Kerala. For instance, Kannan (2011) argues that though Kerala has lost a major chunk of its rice area to non-food crops and non-economic as well as real estate activities, the concern about food insecurity is misplaced[11]. To him, food security is not entirely dependent on production but, more on ability of the people to access and

[11] Citing empirical evidence as described in several studies, including the *Report on the State of Food Insecurity in Rural India* published by the M S Swaminathan Research Foundation (2008, Chennai), Kannan (2011) observes that 'Kerala was the only state in India that was Least Food Insecure during 1998-2000'. It retained its position in 2004-06 as well.

consume an adequate amount of food. Hence, Kerala is food secure in view of its high purchasing power as well as a relatively well functioning PDS compared to rest of the country (Kannan, 2011). On the contrary, Tharamangalam (2011) refutes such a claim by arguing the reverse. Kerala now produces less than 15 per cent of its food requirements, down from over 50 per cent in the 1950s. In line with Patnaik (2010) he points that Kerala's heavy dependence on food imports from neighbouring states (at higher costs) is bound to affect intake adversely for the lower fractiles of the population unless their real incomes also rise adequately.

Notwithstanding the two arguments, one might tend to take a realistic view that the domestic food security issue is a cause for concern, especially, in regions where farm livelihoods are severely constrained by limited resources and farming options. For instance, farmers and farm workers in the districts such as Wynad, Palakkad and Idukki are highly vulnerable to food security as it emerges from several studies in the context of persistent agrarian crisis (Mohandas, 2007; Mohanakumar and Sharma, 2006; Mohanakumar, 2008; Jeromi, 2007). Incidentally, these three districts have the largest concentration of cultivators (both male and female) and agricultural labourers (both male and female), majority belonging to the weaker (SC/ST) sections.

4. Conclusions and Policy Imperatives

This paper brings out that the emergent scenario of agriculture development in Kerala poses a major crisis undermining the domestic food security of the state as well as the dynamic performance of commercial agriculture sector. This crisis in agricultural sector in the state is mystified by several contradictions arising from the agriculture development model driven by considerations of 'peasant rationality' alone, which in turn, has caused disruptions in the agrarian society destabilizing the livelihoods of a large segment of traditional food producers and farm workers. The scenario of agriculture development in the state also poses several developmental issues and policy as well as governance dilemmas, raising concerns on the conventional role of the state in protecting the farmers and farm workers by conserving the agro-ecosystems, natural resources and the environment that shape their livelihoods.

The analysis brings out that there is a strong case for revamping the agriculture sector in the state by strengthening the food crop production sector while

protecting the natural environments including the wetland ecosystems through highly responsive policies and institutional interventions on a priority basis. From a policy angle, the ongoing rubber expansion programmes in the state should receive immediate interventions that restrict the further expansion of the crop compromising on the agro-ecosystems and the hydrological regimes served by the inland wetlands, including paddy fields. This also necessitates close co-ordination between the crop promotional agencies at the state level as well as the nationally sponsored commodity boards, such as the Rubber Board and Spices Board in matters of devising action plans for promoting integrated farming systems instead of the mutually exclusive promotional schemes as exist today.

Similarly, the dynamism cast by the expansion of commercial crops, especially, rubber in Kerala is at serious stake in view of the emergent labour shortage, especially, of rubber tappers in the smallholding as well as the plantation sectors. The emerging scenario essentially calls for the rubber production sectors to be highly sensitive to resolve the labour market dilemmas. Development of technological solutions to address the labour market crisis in agriculture is an important challenge needing immediate attention across crops in the state. While some innovations are already being tried in case of plucking coconut and harvesting in rice, it is essentially important to evolve and scale up innovative models and incentive systems to address the labour market dilemmas in case of most of the crops in the state. The state should also devise means and ways of supporting the paddy farmers through proper incentive mechanisms by supporting rice production and paying premium price (over and above the MSP) for procuring paddy from farmers. The paddy and horticulture production programmes enunciated through the Kudumbashree need to be further scaled up, which could make the regions self-reliant to a greater extent with sustainable impacts on livelihoods.

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