



Research Paper

An economic analysis on land use and cropping pattern in Dharwad district

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ABSTRACT : Agriculture in India is one of the most important sectors of its economy. Agriculture accounts for 15 per cent of India's GDP (2012). It is still the single largest contributor to the GDP and plays a vital role in the overall socio-economic development of country. Agriculture mainly depends on the natural resource that is land. Land availability, type of land and soil type are the main determinants of crops to be grown. Land utilization pattern and cropping pattern differs from one region to other. So, the present study was undertaken to analyse the land use pattern and cropping pattern in Dharwad district of Karnataka. Study was based on both primary and secondary data. Total sample size was 150. Data were analysed using statistical tools like Markov analysis and tabular analysis. Results of the study revealed that, in case of land utilization pattern, forest area retained its share of 71.5 per cent and lost remaining 28.5 per cent to agriculture land (13.6 %), cultivable waste land (7.70%), fallow land (2.80 %), Cultivable waste land lost its share to land not available for cultivation (54.60 %) and forest (45.40 %). Agriculture land lost its share to forest land (53.20 %), cultivable waste land (20.30 %) and land not available for cultivation (16.90 %). Cropping intensity in all the talukas of Dharwad district namely Dharwad, Hubli, Kalagakagi, Kundagol and Navalgund were 155.27 per cent, 136.77 per cent, 146.88 per cent, 157.61 per cent and 177.44 per cent respectively. Highest cropping intensity was observed in Navalgund taluka, indicates that efficient utilization of land in Navalgund taluka compared to other talukas of Dharwad district due to canal irrigation facility available to the sample farmers. Second highest cropping intensity was observed in Navalgund taluka. There major proportion of the area was occupied by chilli (18.84 %), sorghum (6.24 %), cotton (5.61 %), and very less proportion by red gram (2.25 %) during *Kharif*. During *Rabi* and *Summer*, major proportion of the area was occupied by chickpea and groundnut. It is due to attention given by the sample farmers towards yield improvement of food grain crops so that balance could be maintained in the food grain basket. Efficiency with which we are cultivating the land is indicator by cropping intensity. So cropping intensity were increased by more effective utilization of land by growing two to three crops in a year.

KEY WORDS : Land use pattern, Cropping pattern, Cropping intensity

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INTRODUCTION :

Agriculture in India is one of the most important sectors of its economy. Agriculture accounts for 15 per cent of India's GDP (2012). Though, the share of Indian agriculture in the GDP has been steadily declining over the years. Yet it is still the single largest contributor to the GDP and plays a vital role in the overall socio-economic development of country. Agriculture is the primary and critical sector of our country

giving livelihood and employment opportunities for vast majority of Indian population. India is still the home to the large number of poor and malnourished people in the world, a higher priority to agriculture will achieve the goals of reducing poverty and malnutrition as well as of inclusive growth (Vivekananda and Sathyapriya, 1994).

Land use is highly a dynamic process. Land resources constitute the fundamental base for all human activities. It is the most important natural resource of a country like India where agricultural sector is relatively more prominent than the

manufacturing sector (Arvind Kumar, 2010). The way and the extent to which the land is utilized sets the pace of a country's economic development. Land is important not only for producing foodstuffs, cereals, pulses and other crops for consumption but also for generating surpluses to meet increasing demands created by rising population and developing industrial sector, for laying down the transport network, communication, construction of dwellings and public institution etc. Land use pattern is a process, which assigns each tract of land in an area to its proper class in a system of classes. The classes in the system are defined in terms of the qualities or characteristics with which the classification is concerned (Wani *et al.*, 2009). The land use pattern of a country at any particular time is determined by the physical, economic and institutional framework taken together. In other words the existing land use pattern has been evolved as the result of the action and interaction of various factors such as the physical characteristics of land, the institutional framework, the structure of other resources such as capital, labour etc. (Virenderkumar *et al.*, 2002). Total geographical area of Dharwad district is 4,27,329 ha out of this 35,235ha under forest, 26,042 ha land is not available for cultivation, 48,279 ha is fallow land and total net sown area is 3,10,816 ha. Among the different land use patterns, land available for cultivation is most important from the point of view of agriculture. In case of agriculture, regional specific cropping patterns are followed by the farmers. Cropping pattern determines the output mix in a particular region. Cropping pattern refers to adoption of particular type of crops by the farmers in a particular region. The cropping pattern in Dharwad district during 2011-12, indicated that out of the net cultivated area, maize occupied major area 1,33,587 ha, followed by sorghum (66,271 ha), cotton (63,402 ha), oilseeds (43,229 ha), pulse (38,858 ha) and paddy (37,313 ha) crops (DES 2012).

So the study was undertaken to analyse the land use pattern and cropping pattern in Dharwad district.

MATERIALS AND METHODS :

Present study was based on both primary and secondary data was used for the study. Secondary data related to land use pattern in Dharwad district (1998 to 2012) was collected from Directorate of Economics and Statistics (DES) Bangalore. Primary data regarding cropping pattern was collected from sample farmers of Dharwad district.

Multistage sampling technique was used for selection of respondents. In the first stage, Dharwad district was selected as it is known for its varied agro-climatic regions and diversified soil types. In the second stage, all the five talukas were covered in order to study the major crops of the district. In the third stage, from each taluka, two villages were selected based on highest area under cultivation of the selected crops. From Dharwad taluka, Hebballi and Amminabhavi villages were

selected. Similarly, from Hubli taluka- Shiraguppi and Kusugal, from Kalghatgi taluka- Tabakadhonnalli and Hirehonnalli villages, Kundagol and Samshi villages from Kundagol taluka and Annigeri and Shelwadi villages from Navalgund taluka were selected. In the fourth stage, 15 farmers from each village were selected randomly. Total sample size was 150. Data was obtained from the selected sample farmers with the help of a pre-tested and well-structured schedule.

Shift in land use pattern was analyzed using the first order Markov chain approach. Central to Markov chain analysis is the estimation of the transitional probability matrix (P). The elements P_{ij} of the matrix P indicates the probability that area under different uses will switch from one pattern i to another j with the passage of time. In the context of the current application, from 1998-99 to 2012-13; six major forms of land utilization were considered.

$$E_{jt} = \sum_{i=1}^r E_{it-1} \times P_{ij} + e_{jt}$$

$$i=1 \dots (6)$$

where,

E_{jt} = Area under forest to j^{th} purpose during the year t.

$E_{i,t-1}$ = Area under i^{th} purpose during the period t-1

P_{ij} = Probability that the area will shift from i^{th} purpose to j^{th} purpose.

e_{jt} = The error term which is statistically independent to $E_{i,t-1}$.

t = Number of years considered for the analysis.

r = Number of purpose for which land is used.

Tabular analysis was used to analyse cropping pattern, cropping intensity and to identify most profitable cropping pattern. To achieve meaningful presentation of results, the data were compared and contrasted with the averages and percentages.

RESULTS AND DATA ANALYSIS :

The findings of the present study as well as relevant discussion have been presented under the following heads :

Land use pattern in Dharwad district:

Transitional probability matrix was presented in the Table 1. Forest area retained its share of 71.5 per cent and lost remaining 28.5 per cent to agriculture land (13.6 %), cultivable waste land (7.70%), fallow land (2.80 %), land not available for cultivation (2.40 %) and pasture land (2 %). Because of intensive cultivation of agriculture land it gets converted into barren land and land not available for cultivation. In order to increase the agriculture production to meet food security forest land was brought for cultivation. Land not available for cultivation lost its complete share to agriculture land (95.9 %) and pasture land (4.10 %). Cultivable waste land lost its share to land not available for cultivation (54.60 %) and forest (45.40 %). Pasture land retained its complete share during the study area. Fallow

Table 1 : Transitional probability matrix for land use pattern in Dharwad district

Land use pattern	Forest	Land not available for cultivation	Cultivable waste	Pasture	Fallow	Area sown
Forest	0.715	0.024	0.077	0.020	0.028	0.136
Land not available for cultivation	0.000	0.000	0.000	0.041	0.000	0.959
Cultivable waste	0.454	0.546	0.000	0.000	0.000	0.000
Pasture	0.000	0.000	0.000	1.000	0.000	0.000
Fallow	0.000	0.000	0.000	0.000	0.516	0.484
Area sown	0.532	0.169	0.203	0.000	0.002	0.094

land retained its share of 51.60 per cent and lost its share of 48.4 per cent to agriculture land. Agriculture land lost its share to forest land (53.20 %), cultivable waste land (20.30 %) and land not available for cultivation (16.90 %). Because of the extensive use of chemical fertilizers, pesticides and herbicides productivity of the land was showing declining trend. This

leads to reduction in land fertility and crop productivity. So agriculture land was converting into cultivable waste land.

Cropping pattern of sample farmers in Dharwad Taluka:
Dharwad Taluka :

It is clear that cropping pattern in Dharwad taluka (Table

Table 2 : Cropping pattern followed by sample farmers in Dharwad taluk

Crop/season	Area (ha)	Percentage
Kharif		
Sorghum	23.48	13.05
Maize	17.41	9.68
Green gram	7.69	4.28
Black gram	1.62	0.90
Cowpea	1.30	0.72
Red gram	2.83	1.58
Groundnut	9.72	5.40
Soybean	2.43	1.35
Sunflower	3.04	1.69
Onion	10.73	5.96
Cotton	31.58	17.55
Jowar+Green gram	3.24	1.80
Onion+Cotton	0.81	0.45
Sub Total	115.87	64.40
Rabi		
Sorghum	4.45	2.48
Wheat	12.15	6.75
Chickpea	24.70	13.73
Wheat+Safflower	8.50	4.73
Jowar+Chickpea	5.95	3.31
Sub total	55.75	30.98
Summer		
Maize	1.62	0.90
Groundnut	3.64	2.03
Sugarcane	1.21	0.68
Groundnut+Cowpea	1.82	1.01
Sub total	8.30	4.61
Gross cropped area	179.92	100
Net cropped area	115.87	
Cropping intensity (%)	155.27	

Table 3 : Cropping pattern followed by sample farmers in Hubli taluk

Crop/season	Area (ha)	Percentage
Kharif		
Sorghum	14.98	7.65
Green gram	9.92	5.07
Black gram	2.02	1.03
Red gram	2.43	1.24
Cowpea	2.02	1.03
Groundnut	10.73	5.48
Cotton	42.91	21.92
Chilli	15.38	7.86
Onion	13.77	7.03
Cotton+Chilli	13.97	7.14
Jowar+Red gram	9.31	4.76
Groundnut+Green gram	2.83	1.45
Groundnut+Cowpea	0.81	0.41
Groundnut+Coriender	2.02	1.03
Sub total	143.12	73.11
Rabi		
Wheat	10.12	5.17
Sorghum	4.45	2.28
Chickpea	16.40	8.38
Safflower	0.40	0.21
Wheat+Safflower	13.56	6.93
Sub total	44.94	22.96
Summer		
Maize	4.86	2.48
Chickpea	1.21	0.62
Sunflower	1.62	0.83
Sub total	7.69	3.93
Gross cropped area	195.75	100
Net cropped area	143.12	
Cropping intensity (%)	136.77	

2) have variety of crops in both the seasons. The proportion of area accounted by each crop varied from 17.55 per cent up to 0.45 per cent in *Kharif* season. Similarly in *Rabi* season chickpea occupied highest per cent of area under cultivation. Their tendency might be towards those crops which give more remunerative returns like cotton and maize. This concluded that though the shift in cropping pattern was a welcome sign in terms of the theories of economic development. Cropping intensity is one of the indices of measuring land use efficiency. The cropping intensity depends on many factors *viz.*, natural conditions and also socio economic factors. However, in Dharwad taluka cropping intensity was 155 per cent indicating efficient utilization of land. The findings of the study are in line with the results obtained by Hazare (2001).

Hubli taluka:

In Hubli taluka variety of crops were grown (Table 3). During *Kharif* the proportion of area occupied by each crop varied from 21.92 to 0.41 per cent. Highest area was occupied by Cotton. Similarly during *Rabi* and *Summer* highest proportion of area was occupied by chickpea and maize respectively. These results are in line with results obtained by Jayakumar and Velayudhan (2002). The area under food crops had been declining over the years, while the area under cash crops had increased. The prevalence of obsolete technology in the state and the relative profitability of commercial crops influenced the farmer's decision to allocate land under different cash crops. Cropping intensity was 136.77 per cent, which indicate that land is not efficiently utilized compare to other taluka, due to erratic monsoon during the study period.

Kalghatgi taluka:

In Kalaghatgi taluka (Table 4) major proportion of the area during *Kharif* was accounted by cotton (18.03 %), Soybean (14.71 %), paddy (19.93 %) and maize (6.17 %). In *Rabi* and *Summer* season major proportion of the area was occupied by sugarcane and groundnut, respectively (Table 4). Credit availability from both institutional and non-institutional sources had made a significant contribution on the change in cropping pattern. In the study area availability of the credit is one of the constraints faced by the sample farmers. So small and marginal farmers in the study area were undertaking paddy cultivation whereas, large farmers who had strong financial support were undertaking cash crop cultivation like cotton which needs high cost for production. The findings of this study are in line with results obtained from Ray (2007) and Behur and Naik (1994). The cropping intensity in the study area was 146.88 per cent, which indicate that land is efficiently utilized due to good monsoon in Kalghatgi taluka compare to other talukas of Dharwad district.

Kundagol taluka:

In Kundagol taluka, sample farmers were cultivating

Table 4 : Cropping pattern followed by sample farmers in Kalaghatagi Taluka

Crop/season	Area (ha)	Percentage
Kharif		
Paddy	34.01	19.93
Maize	10.53	6.17
Cowpea	3.24	1.90
Green gram	2.43	1.42
Soybean	25.10	14.71
Cotton	30.77	18.03
Sugarcane	10.12	5.93
Sub total	116.19	68.09
Rabi		
Maize	17.00	9.96
Wheat	10.53	6.17
Sorghum	10.32	6.05
Sub total	37.85	22.18
Summer		
Paddy	6.88	4.03
Maize	1.62	0.95
Groundnut	8.10	4.74
Sub total	16.60	9.73
Gross cropped area	170.65	100
Net cropped area	116.19	
Cropping intensity (%)	146.88	

variety of crops in both the seasons (Table 5). Major proportion of the area was occupied by chilli (18.84 %), sorghum (6.24 %), cotton (5.61 %), and very less proportion by red gram (2.25 %) during *Kharif*. Farmers in the study area were diverted towards commercial crops because of availability of institutional credit and required inputs for production, market infrastructure development and certain other price related support induces the farmers to take up this cropping pattern. These results were in line with findings of Hazare (2001). During *Rabi* and *Summer*, major proportion of the area was occupied by chickpea and groundnut. It is due to attention given by the sample farmers towards yield improvement of food grain crops so that balance could be maintained in the food grain basket. These results were in line with findings of Lal and Singh (1994). Cropping intensity in the study area was 157.61 per cent, indicates efficient utilization of land in the study area.

Navalgund taluka:

Variety of crops was grown in Navalgund taluka by the sample farmers (Table 6). Major proportion of area was accounted by maize (15.08 %), groundnut (5.61 %) and sunflower (5.53%) during *Kharif* and again maize in *Rabi* season, sugarcane in Summer season. These results were in line with findings of Goswami *et al.* (2003). Because of availability of high yielding varieties and irrigation facility sample farmers

Table 5 : Cropping pattern followed by sample farmers in Kundagol taluk

Crop/season	Area (ha)	Percentage
Kharif		
Sorghum	10.12	6.24
Maize	9.11	5.61
Green gram	5.06	3.12
Red gram	3.64	2.25
Cowpea	5.06	3.12
Groundnut	5.51	3.39
Cotton	9.11	5.61
Chilli	30.57	18.84
Jowar+Red gram	6.48	3.99
Maize+ Red gram	8.91	5.49
Chilli+cotton	9.39	5.79
Sub total	102.96	63.45
Rabi		
Sorghum	8.50	5.24
Wheat	5.26	3.24
Chickpea	11.54	7.11
Safflower	1.62	1.00
Sorghum + Safflower	7.29	4.49
Chickpea+Safflower	7.29	4.49
Wheat+Safflower	6.88	4.24
Sub total	48.38	29.81
Summer		
Groundnut	10.93	6.74
Sub total	10.93	6.74
Gross cropped area	162.27	100
Net cropped area	102.96	
Cropping intensity (%)	157.61	

Table 6 : Cropping pattern followed by sample farmers in Navalgund taluk

Crop/season	Area (ha)	Percentage
Kharif		
Maize	40.28	15.08
Green gram	8.91	3.33
Red gram	13.68	5.12
Groundnut	14.98	5.61
Sunflower	14.78	5.53
Cotton	10.93	4.09
Chilli	12.79	4.79
Onion	10.12	3.79
Maize+Red gram	9.31	3.49
Cotton+chilli	5.87	2.20
Cotton+Onion	8.91	3.33
Sub total	150.57	56.36
Rabi		
Wheat	19.43	7.27
Sorghum	23.08	8.64
Maize	8.10	3.03
Chickpea	11.34	4.24
Safflower	7.49	2.80
Chickpea+Safflower	20.24	7.58
Chickpea+Jowar	2.02	0.76
Sub total	91.70	34.32
Summer		
Sugarcane	24.90	9.32
Sub total	24.90	9.32
Gross cropped area	267.17	100
Net cropped area	150.57	
Cropping intensity (%)	177.44	

were practicing this cropping pattern in the study area, where most of these crops demand more water. Maize and Sugarcane crops required many irrigations and yield levels will be much higher than the rain-fed condition. Cropping intensity in the study area was 177.44 per cent, indicates that efficient utilization of land in Navalgund taluka compared to other talukas of Dharwad district due to canal irrigation facility available to the sample farmers. Similar work related to the present investigation was also carried out by Gadge (2003), Kumar and Singh (1994), Nagabhushan (1994), Ramappa and Venkata Naidu (2009), Sharma and Pandey (1992)

Conclusion:

It is concluded from the study that agriculture land in Dharwad district is declining due to more exhaustive cultivation of land by using more amount of chemicals. To meet food security, forest land has been brought under cultivation. It is

not good sign of development. Farmers should use the organic components in agriculture land and can bring back the land to its original status. By doing this cropping intensity can also be increased. By growing two to three crops in a year farmers can increase cropping intensity.

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