EMERGING DEVELOPMENT ISSUES IN A RESOURCE REGION[1]

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Abstract

Sustainable development of a mountainous region is highly complex for its location specificity. The Western Ghats, a well-known hill-forest region has emerged as a highly developed region with the highest per capita income, infrastructure availability and decreasing and increasing importance of primary and secondary sectors respectively. The region has also recorded a higher rate of urbanization, industrialisation and literacy — especially female literacy — and female work participation. Hence, its development as a hill-forest region is at stake.

Introduction

Natural regions are the resource capitals of a country. Hence, their sustainable development is of vital significance to the country's economic growth and human well-being. Obviously, sustainable development of natural regions imposes the non-declining condition on production and utility of the natural capital stock within the framework of the stable ecosystem (Perman, Ma and Mcgilvray, 1997; Pearce and Barbire, 2000). Sustainable development of natural regions is a complex exercise for their unique 'location specificity' and 'fragility'. The problem gets compounded if the region is endowed with more than one resource base. The hill-forest is one such region in which a natural mix of resources prevails with the combined characteristic features of fragility, marginality, diversity and inaccessibility (Papola, 1996). In addition, three-dimensionality is the structural reality of the region. These complex structural characteristic features have made hill-forest regional development all the more difficult. Nevertheless, hill-forest regions have been characterised by unique hill-forest regional commonalities, which provide concrete clues to the evolution of an appropriate hill-forest regional development strategy. However, in the process of matching the location

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specificity and hill-forest regional commonalities, several development issues would emerge which attract special attention to achieve sustainable development of the region.

Hill-Forest Regional Commonalities

Hill-forest region, with its abundant natural endowment and unique socio-economic features, may be characterised as (a) a region of reliable and adequate water resource, (b) a region that sustains a significant proportion of its area under forest, (c) a reservoir of biodiversity with a huge concentration of innumerable species of flora and fauna, (d) a region of low population pressure as compared with other regions, (e) both climatic factor and low population pressure promote self-sufficiency in the region, at least in food production, (f) rich natural and cultural resources create high potential for tourism development, (g) a region of peasant economy (pastoral-agricultural) with predominance of small holding, (h) a region of subsistence agriculture with ample scope for organic farming using intermediary technology, (i) a region of low per capita income with predominance of low- paying occupations and low rate of increase in per capita income, (j) subsistence economy, low per capita income and limited employment opportunities encourage large-scale out-migration of adult male members to economically prosperous regions in search of gainful employment, (k) by and large the region experiences several gender-related issues on account of large-scale adult male out-migration, (l) the region is inhabited by a larger share of socially backward sections of society, (m) a region in which a strong nexus between inhabitants and resource base prevails for the livelihood of inhabitants, (n) a region of very low level infrastructure, and its development is costly and imposes serious environmental implications, and (o) low level of infrastructure results in a low rate of industrialisation and urbanization in the region (Juyal, 1983; Pande, 1983; Singh and Kaur, 1983; Shivaraman, 1983; Nira Ramachandran, 1990; Papola, 1996 and Dar, 1996).

This paper analyses the regional development problems, patterns and perspectives of the Western Ghats region of Karnataka. More specifically, the main objectives are to (a) identify the characteristic features of natural resources and the socio-economic base of the region, (b) identify the changes that have taken place in the natural resources and socio-economic characteristics over a period of time, (c) identify the development issues that have emerged in the context of prevailing as well as changing socio-economic and natural resource base within the background of the emerged location specificity of the region. The methodological framework adopted to achieve the said objectives is the location- specific sustainable development strategy. First, ecological, demographic, economic and infrastructure specificities of the region would be identified along with their changes over a period of time. The location

specificity, and converging and diverging characteristics with respect to hill-forest regional commonalities would enable identification of several development issues posed to achieve sustainable development of the region. The analysis is based on the secondary data base at the taluka level for two points of time (1971 and 1991) (Note 2, Figure1).

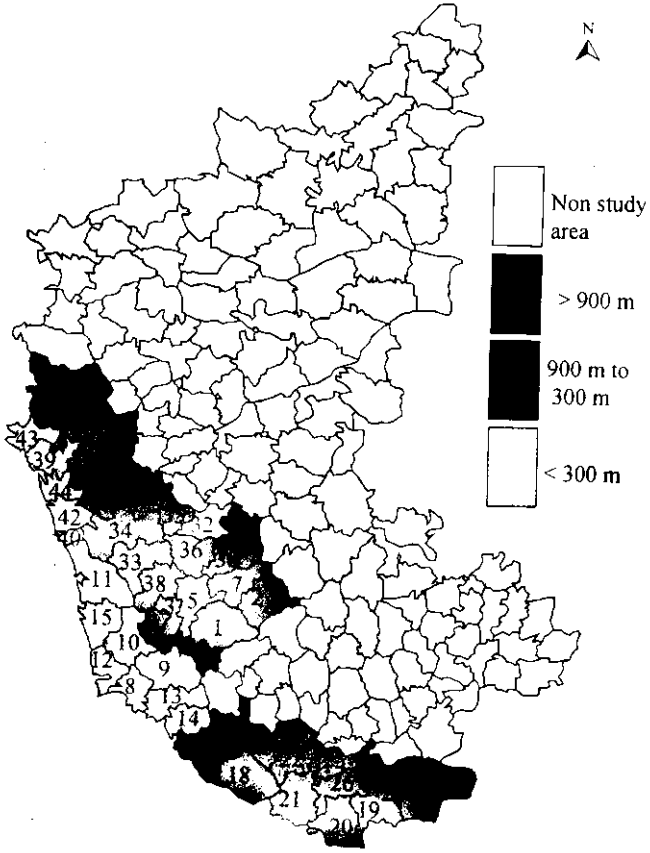
Western Ghats Regional Specificity

Ecological Specificity

The Western Ghats region of Karnataka has two distinct physiographical components -Coastal Plain and Malnad. Coastal Plain of Karnataka is a distinct transition zone of the entire Western Ghats region with elevations ranging from zero to 300 metres from the mean sea level. Its landscape is composed of sandy beaches, coastal sand dunes or mud flats, and alluvial tracts along the rivers and estuaries. The important westbound rivers that drain the coast are Kalinadi, Gangavati, Bedthi, Aganashini, Tadri, Sharavati and Netravati and numerous short and swift streams. Coastal Plain enjoys an equable climate with mean monthly temperature ranging from 24° C-31°C . April and May are the hottest months of the year. The rainfall in the Coastal Plain is most reliable and uniformly high with the peak season concentrated in the months of July and August. The mean annual rainfall of the Coastal Plain is over 2500 mm. The soil types found are alluvial and out wash materials from the parent laterite. The most prevalent vegetation of Coastal Plain is coconut or casuarina on the saline sandy beaches, with more prolific growth of palms and coconut in the backwater zones of southern Karnataka. Mangroves and swamp vegetation are found in marshes, tidal cracks and estuaries. Scrubs and bamboo are prevalent in the low laterite platforms of hills, and moist deciduous or tropical evergreen forest on higher slopes (Learmonth, 1962; Singh, 1971; Bhat, 1972 and Kamat,1982). Karnataka's coastline is endowed with naturally designed beaches of various order which are of high aesthetic and recreational potentials (Rao, 1993).

Malnad, the adjoining zone of Coastal Plain, popularly known as 'Sahyadri Hills' has a complex relief structure with elevation ranging from 300-2000 metres from the mean sea level with higher elevation on the southern part of the region. Malnad is adorned with some of the well-known peaks—Mullayanagiri (1,913m), Kudremuk (1,892m) and Kodachadri (1,343m). The region is drained by two main eastbound river systems: the Cauvery system (Arkavathi, Kabini, Lakshmanatheerth, Vedavathi, and Shimsha,) and Krishna system (Bhadra, Bhima, Ghataprabha, Malaprabha, Tunga, and Tungabhadra). The mean monthly temperature remains almost the same as that of the Coastal Plain with April and May as the hottest months. Malnad is the rainiest region having a reliable mean annual rainfall of about 3,000 mm. Places like

Fig 1: Western Ghats Region of Karnataka - Distibution of Taluk by Altitude



Source of Map Census of India, 1991

Bagamandala, Agumbi, Sringeri, Koppa and Thirthahalli receive more than 4,000 mm rainfall annually. Malnad is rich in forest wealth. The tropical evergreen forest cover is dense in the western slope of the Ghat which receives heavy rainfall. On the eastern slope, moist deciduous forest is very much dominant with tree types of teak and sal. In addition, sandalwood is the monopoly of Mysore district forest. Recently, eucalyptus, environmentally a controversial species, is found in plenty in Malnad as a part of the large-scale afforestation programme initiated by Karnataka Forest Department as well as some private industries to meet the pulp wood requirements. This monoculture-based afforestation programme has been posing a serious threat to the ecology of the region. The main soil types found in the region are medium red, mixed block and red and laterite. Malnad has rich deposits of iron and manganese ores. Malnad agriculture is characterised by coffee, arecanut, betal leaves, cardamom, pepper, cashew and paddy (Learmonth, 1962; Singh 1971; Bhat, 1972; Kamat, 1982 and Prasad, 1984). Malnad has 5 national parks, 20 wildlife sanctuaries, and 6 watersheds have been delineated for its development (Karnataka, 1995a). The Western Ghats region has been identified as one of the twelve biodiversity hot spots of the world (Sengupta, 2000: 171).

Demographic Specificity

The Western Ghats region occupies (52,950 sq.kms.) 27.8 per cent of Karnataka's area, hosting (16.5 million) 23.4 per cent of its population. The population of the region has recorded a compound growth rate of 1.85 during 1971-91, with 1991 population density 206 persons per sq.km. (Table 1). Though the said indicators of population pressure on the Western Ghats region are on the lower side as compared with the non-Ghat region (population growth rate : 2.27, population density : 251) and the state (population growth rate : 2.17, population density : 235), by considering fragility of the region, it appears that they are on the higher side to maintain intricacies of the hill-forest ecosystem. Another disturbing trend is that the region has recorded urban population growth rate of 2.94 (compound growth) during 1971(91.Although the rate of urbanization is once again lower than that of the non- Western Ghats (3.53) and Karnataka (4.30), it has resulted in a rapid urbanisation process as revealed through (a) increase in the share of urban population, (b) increase in the number of large and medium towns, and (c) increase in population of a large number of towns (24 out of 79 towns have recorded more than 3 per cent annual growth of population). In the region, only 17 per cent constitute scheduled caste/tribe (SC/ST) population (Table-1). The abundant natural resource base of the Western Ghats region has encouraged rapid industrialisation which is evident from (a) the number of industrial units having increased by 238.4 percent during 1970-89 (Karnataka, 1995b), (b) the total workforce engaged in the manufacturing

sector having increased by 204.4 per cent during 1971-91, and (c) in the region 18 out of the total number of towns (79) having been classified under industry related function (India, 1991b).

The Western Ghats region has a higher literacy rate (52.6) as compared with the non-Ghat (44.9) and Karnataka (46.7). More specifically, the female literacy (45.2) rate is higher in the Western Ghats region, and has maintained this supremacy, of course, with lower rates (35.9) in 1971. The literacy rates have recorded significant increase during 1971-91 (Table-1). Especially, a higher female literacy rate in the region has contributed significantly to the success of several family planning programmes. Some of the success stories are, (a) Western Ghats districts have a higher mean age at marriage of females (22.4(19.1) as compared with other districts (20.0-16.7), (b) Western Ghats districts have a higher rate of acceptance of family planning programmes (67.7 -43.9) as compared with non-Ghat districts (58.1- 38.1), and (c) as a result, the 'Crude Birth Rates' (CBR) in Western Ghats districts are lower (22.5-25.9) than those in non-Ghat districts (24.2-36.2) (ISEC & CPD, 1995).

The sex ratio in the Western Ghats region (986) is higher than in the non-Ghat (952) and the state (960) (Table-1). The same pattern persisted in 1971 as well. This indicates that the region is experiencing a higher rate of adult male out-migration. The factors that have influenced adult male out- migration in the region are (a) very high literacy rate, (b) very limited employment opportunities (only 38 per cent of the population is engaged as main workers) and more specifically, (c) the confidence that the adult-male has in his educated wife for smooth maintenance of the households during his absence respecting her higher literacy rate. To corroborate the higher incidence of out- migration in the region, migration rates for The Western Ghats and non-Western Ghats regions have been worked out (Note 3). From the derived migration rates, it is evident that the Western Ghats region has a higher migration rate (124) as compared with the non-Ghat region (112). In a separate study on the Western Ghats region, it was noted that the population decline in Uttara Kannada district—a part of the Ghat region—was confined to the uphill region as many labourers and cumri cultivators migrated from the district, and educated migrants gave up their lands and sought office jobs (Nadkarni,1989: 55). A higher prevalence of male out-migration in a mountain region was substantiated through high sex ratio in the Central Himalayas (Bora, 1996).

The settlement spectrum of the Western Ghats region has revealed a unique pattern of the declining percentage share of smaller size settlements and increase in larger size settlements in both rural and urban sectors during 1971-91. This change is mainly due to the reinforcement of potential growth centres through natural grown and realignment of both rural and urban population due to several completed and ongoing development projects. he Western Ghats rural settlement

Table 1 : Percentage Distribution of Population Indicators : Western Ghats, Non-Western Ghats and Karnataka, 1971, 1991

Variables	Western Ghats			Non-Western Ghats			Karnataka		
	1971	1991	Percent Change 1971-91	1971	1991	Percent Change 1971-91	1971	1991	Percent Change 1971-91
Population (in million)	7.3	10.5	44.4	22.0	34.5	56.5	29.3	45.0	53.5
Urban Population	21.3	26.4	78.3	25.0	32.0	100.0	24.0	31.0	95.3
Population Density	143	206	—	160	251	—	153	235	-
SC and ST Population	13.2	17.4	89 8	14.0	22.0	139.1	14.0	21.0	127.5
Literacy Total	35.9	52.6	111.7	30.1	44.9	133.8	31.5	46.7	127.5
Male	44.3	60.0	93.8	40.8	57.7	111.1	41.6	58.4	106.6
Female	27.5	45.2	139.6	18.8	34.4	186.4	21.0	37.0	171.0
Sex Ratio	969	986	—	953	952	—	957	960	—

Source: India, 1971a and 1991a

pattern is dominated by medium-size settlements (500-999) with average population size of 750 (Table.2)

Table 2: Settlement Spectrum of the Western Ghats Region :1971, 1991

Region	Population Range	1971		1991	
		Number	Percentage	Number	Percentage
Rural	Less than 200	1,450	22.1	1,150	17.3
	200 - 499	1,711	26.1	1,421	21.4
	500 - 999	1,532	23.3	1,581	23.8
	1,000 - 1,999	1,174	17.9	1,318	19.8
	2,000 - 4,999	637	9.7	1,000	15.1
	5,000 +	62	0.9	170	2.6
	Rural Total	6,566	100.0	6,640	100.0
Urban	Less than 5000	13	18.3	13	16.5
	5,000 - 9,999	21	29.6	21	26.6
	10,000 - 19,999	22	31.0	14	17.7
	20,000 - 49,999	11	15.5	22	27.8
	50,000 - 99,999	1	1.4	4	5.1
	1,00,000 +	3	4.2	5	6.3
	Urban Total	71	100.0	79	100.0

Source: India 1971b, 1991b

Economic Specificity

In the Western Ghats region only 35.1 percent of the total population was engaged in economically productive activity in 1971 which has recorded a marginal increase to 38.3 per cent in 1991. By share of work participation, though non-Ghat and the state are almost similar to that of the Western Ghats region, in terms of change in work participation, non-Ghat and the state have shown higher growth than the Western Ghats region. By sectoral participation of work force, obviously it is a primary sector dominant region (68.6%) with a moderate share in secondary (11.4%) and tertiary (17.7%) sectors. During 1971-91, primary sector's share has reduced from 68.6 per cent to 63.9 per cent, while secondary and tertiary sectors have recorded upward revision from 11.4 per cent to 13.4 per cent, and 17.7 per cent to 20.2 per cent respectively (Table-3). This might be due to introduction of several non-primary sector based development activities in the region for which the workforce also realigned

Table 3 : Percentage Distribution of Workforce in Western Ghats, Non-Western Ghats and Karnataka, 1971, 1991

Workers	Western Ghats			Non-Western Ghats			Karnataka		
	1971	1991	Percent Change 1971-91	1971	1991	Percent Change 1971-91	1971	1991	Percent Change 1971-91
Total	35.1	38.3	57.3	34.6	38.5	74.1	34.7	38.4	69.9
Male	52.8	53.7	45.5	54.9	53.5	52.5	54.4	53.5	50.8
Female	16.9	22.6	95.5	13.3	22.8	167.5	14.2	22.7	146.1
Primary	68.6	63.9	46.4	72.2	68.4	64.9	71.3	67.4	60.4
Male	68.0	70.0	35.3	70.4	65.0	35.4	78.3	66.1	35.4
Female	70.6	30.0	81.0	80.3	35.0	176.7	21.7	33.9	150.7
Secondary	6.2	12.0	204.4	5.8	7.9	137.1	5.9	8.8	154.9
Male	6.5	8.4	87.9	6.5	9.5	123.7	6.5	9.2	115.1
Female	5.3	20.7	665.9	2.9	4.0	266.0	3.6	7.9	440.2
Service	17.7	20	79.5	16.3	9.9	5.5	16.7	12.3	25.2
Male	19.3	23.7	78.5	17.6	11.3	-2.5	18.0	14.1	18.4
Female	12.3	11.6	84.1	10.9	10.0	146.0	11.3	10.4	126.0

Source: Census,1971a &1991a

itself to meet the regional needs. The shift in the work participation from primary to non-primary may be corroborated through decline in the share of primary sector (55.5% to 41.7%) and increase in the share of secondary (15.7% to 18.3%) and tertiary sectors (28.8% to 40%) in the District Domestic Product (DDP) of Western Ghats districts during 1981-91. Surprisingly, Uttara Kannada, the hard core primary sector district with almost 70 per cent of its area under forest cover, has recorded maximum decline in the primary sector (50% to 32%) and maximum increase in the secondary (16% to 25%) and tertiary sector (34% to 43%) (Murugaiah, 1997).

The work participation by sex has revealed that female work participation in particular has recorded significant increase during 1971-91 in the Ghat region, and this is more prominent under the secondary sector. The higher rate of female work participation in the secondary sector could be attributed to the latest production skills acquired by the female population due to their higher literacy rate. Economically, Western Ghats is a forward region as its share of contribution to the state economy is about 25.4 per cent. As a result, the per capita income of the Western Ghats region (Rs.2,589) is much higher than the non-Ghat region (Rs.2,043), and the state (Rs.2,267) (Karnataka,1995d).

By landuse pattern, although the region has higher percentage area under forest (38.8) as compared with the non-Ghat region, it is far below the national stipulation for a hill ecosystem (India, 1988). However, the area under forest has recorded a marginal improvement in its share during 1971-91. The Western Ghats region has a higher proportion of its area under pasture as compared with the non-Ghat region. However, this is not in correspondence with higher livestock population. Instead, it is due to large scale allotment of degraded forest lands by the Karnataka Forest Department to the villages for community use (Kamat, 1985 : 60-61). During 1971-91, the proportion of area under pasture has declined substantially, thus adding more pressure on the pasture. The decline in pasture is mainly due to large scale privatisation and acquisition for various development activities in the region (Nadkarni, 1990). For obvious environmental limitations, livestock density in Western Ghats region did not increase substantially as compared to other regions, although it was higher in 1971. Calf mortality is very high in Western Ghats region due to unsuitable climatic conditions (Learmonth, 1962). The recent field observation and discussion with the farmers have revealed that high prevalence of render pest, and foot and mouth diseases and non-availability of adequate veterinary infrastructure to treat this problem has been the major setback for livestock development in the region. Probably, this could be the main reason for almost stagnant livestock density in the Ghat region during 1971-91 as compared with the non-Ghat and the State (Table 4). Non-agricultural land in addition to higher proportion has recorded marginal increase during 1971-91 in the region. This is a matter of great concern in a hill-forest region.

Table 4 : Land Use and Resource Indicator for 1971 and 1991: Western Ghats, Non-Western Ghats and Karnataka

Variables	Western Ghats			Non-Western Ghats			Karnataka		
	1971	1991	Percent Change 1971-91	1971	1991	Percent Change 1971-91	1971	1991	Percent Change 1971-91
Livestock Density	74	76	—	68	74	—	69	75	—
Forest	36.2	38.8	7.3	7.0	7.4	5.3	15.1	16.1	6.6
Pastures	12.4	9.1	-26.9	6.5	4.5	-31.5	8.2	5.8	-29.6
Non-agriculture	5.3	6.7	23.8	5.0	6.1	22.7	5.1	6.2	23.0
Net cultivated area	27.2	32.7	20.3	63.9	65.3	2.1	5.4	56.2	4.7
Net irrigated area	25.0	24.9	20.4	9.0	19.6	123.7	11.2	20.5	91.3
Fertilizer cons. (kg/he)	28	87	—	16	37	—	18	42	—
HYV areas	10.8	40.4	—	7.4	15.3	—	7.9	17.9	—

Source: India, 1973, 1993; Karnataka, 1986, 1995c
Note: Land use figures are in percentages

The higher percentage of net cultivated area in the region is mainly due to the location specificity of the Western Ghat region as it has encouraged both agriculture and plantation activities. The Ghat region has promoted significant agricultural activities, especially irrigated agriculture, mainly due to abundant water resource potentials created by heavy rainfall and innumerable rivers and streams. As a result, the share of net irrigated area in the region is higher and has remained almost the same as compared with the non-Ghat region during 1971-91. Hence, net cultivated area has shown an increase during the same period (Table.4). The extension of cultivated area has been the major cause for the forest loss during 1951-98 (ISEC, 1999).

By natural settings, the region is dominated by marginal and small farmers (79.2%) (Table 5). However, the region has recorded higher productivity in cereals, pulses, foodgrains as well as plantation crops as compared with the non-Ghat and the state. These achievements are mainly attributed to intensive agricultural practices being followed in the region. Fertilizer consumption in the Ghat region is higher (87 kgs per hectare) than in the non-Ghat region (37 kgs per hectare), and has higher per cent area under HYV (40.38%) as compared with the non-Ghat region (15.32%). The Western Ghats region has also recorded significant increase in fertilizer consumption (1971 : 28 kg. per ha. 1991 : 87 kg. per ha.) and area under HYV (1971 : 10.8%, 1991 : 40.4%) during 1971-91 thus, corroborating intensive agricultural practices followed in the region (Tables 4).

The Western Ghats regions has an ideal environmental setting for plantation activities. Especially, The Western Ghats region is well known for coffee plantation and it assumes the lion's share in the total area under plantation. In order to meet the heavy demands of the national and international markets, the area under coffee has increased by 97.8 per cent, while its production has recorded a much faster increase of 213.7 per cent during 1971-91. Coffee production is gradually resulting in serious environmental problems in the region. First, the rapid expansion of plantation activities has led to gradual replacement of forest area in the higher altitudes. Recently, with the decontrol of coffee seed, the processing responsibility of coffee seeds which was hither to taken care of by the government has been shifted on to the individual growers. Due to lack of suitable infrastructure and high cost of treatment, coffee growers have failed to adopt suitable pollution control measures leading to water pollution problems in Chikmangalore, Kodagu and Sakaleshpura areas (Damodaran, 1997). This may gradually pollute all the major rivers in the region due to indiscriminate discharge of untreated water which normally possesses high BOD content. The above analysis has thrown several surprises on the Western Ghats regional characteristics as compared with the basic characteristics of a hill-forest region. This has tempted us to analyse the infrastructure availability in the region as well.

Hence, the most indicative sectors like education, health and transport have been selected for the analysis.

Table 5 : Productivity and Landholding Distribution in Western Ghats, Non-Western Ghats and Karnataka

Variables	Productivity (Tonnes/Hectares)		
	Western Ghats	Non-Western Ghats	Karnataka
Cereals	1.9	1.2	1.4
Pulses	0.4	0.3	0.4
Foodgrains	1.7	1.0	1.1
Arecanut	7.4	5.6	7.0
Cashewnut	0.6	0.4	0.6
Land Holding			
Marginal farmers	53.5	35.3	39.2
Small farmers	25.7	27.9	27.5
Medium farmers	19.9	34.1	31.1
Big farmers	0.9	2.6	2.2

Source: Karnataka,1991, 1993

Notes: 1. Productivity is based on 1991, 1992, 1993 average production.
2. Landholding distribution 1993.

Infrastructural Specificity

As indicated, the literacy rate in the Western Ghats region is higher than the non-Ghat and the state. The obvious hint to higher literacy rate is better per capita availability of educational infrastructure in the region. The Western Ghats region accounts for about 25 per cent of primary schools, 24 per cent of higher secondary schools, and colleges out of the total availability in the state. In 1994, by per capita availability of educational institutions, Western Ghats region had the lowest number of persons per institution for all categories of educational institutions as compared to the non-ghat region and the same pattern persisted in 1974 as well. However, by closer look into the per capita availability values, it is evident that they do not differ substantially from the non-Ghat region (Table-6). This implies that much more than the per capita availability of infrastructure, other factors are playing a significant role in the promotion of higher literacy in Western Ghats region. Two such factors could be (a) naturally inherited awareness about literacy in the region. This could be the most prominent reason as this region has been very active since colonial times towards forest conservation and freedom struggle. In fact, two

Kannada periodicals 'Kannada Vritta' from Karwar and 'Kannada Dhureena' from Kumata were launched as early as 1916 and 1917 respectively to air local grievances and to induce anti-British movement in the region (Nadkarni, 1989 : 56-58), and (b) the region has lower student-teacher ratio (53) as compared to non-Ghat region (56) (Karnataka,1995e).

Western Ghats region for its unsuitable climatic condition has been identified as a health hazardous region. It is the highest Malaria infected area in the state and also has identified other diseases (Learmonth, 1962). The recent data has also corroborated the higher incidence of Malaria in the Western Ghats region (Karnataka, 1996c). Probably to fight against these health problems, both government and NGOs have developed reasonably good health infrastructure in the region. As a result, in 1974, the region had least number of persons per health facilities, than the non-Ghat region (number persons per Hospital, Dispensary, Bed and Primary Health centre). However, during 1974-94, the rapid population growth which has outpaced the infrastructure development has reduced the per capita availability of infrastructure to a very great extent. Nevertheless, the Western Ghats region has maintained its supremacy in the availability of health infrastructure in 1994 as well (Table 6).

The most development oriented infrastructure is 'road' as it is popularly known as 'road to development'. As on 1994, the Western Ghats region has 42,208 kms of road length which is about 31.4 per cent of the total road length existing in the state. By availability of road length per 1,000 sq. kms area, the Western Ghats region has excelled by having the highest road length as compared to the non-Ghat and the same trend existed in the 1974 as well. This supremacy is in spite of significant increase in road length per 1,000 sq.kms area in both the regions and the state during 1974-94. The rapid increase in the availability of road length during 1974-94 could be attributed to the on-going rapid urbanization and industrialisation processes and other development activities in the region. Another associated factor of surprise is that Western Ghats region has revealed a stiff competition with other regions in the availability of vehicles per 1000 population. Although, all the three regions have recorded significant increase in the per capita availability of vehicles during 1974-94, the Western Ghats' competitive position has remained intact in 1994 (Table-6). Hence, by looking at the supremacy in the availability as well as growth in the infrastructure, it can be very well construed that Western Ghats region is the most forward region.

The Western Ghats region, a unique natural and religious resource base in the southern India has recorded higher tourist density (number of tourists per sq. km) as compared to the non-Ghat region of Karnataka (Karnataka,1996). The tourist density has also recorded a significant increase during just two years, thus, underlining the importance as well as potentialities of the tourism industry in the ghats region

Table 6 : Infrastructure Indicators for 1971 and 1991 : Western Ghats, Non-Western Ghats and Karnataka

Variables	Western Ghats		Non- Western Ghats		Karnataka	
	1971	1971	1971	1971	1971	1971
Primary School	839	1,069	930	1,157	905	1,135
High School	11,200	7,885	14,930	9,718	14,077	8,257
College	81,828	19,200	82,406	19,882	82,262	19,720
Primary Health Centre	46,059	26,499	85,738	38,542	70,644	34,877
Dispensary	23,814	2,02,668	35,550	2,36,259	31,678	2,27,538
Hospital	93,803	1,20,264	2,10,098	1,36,269	1,60,687	1,32,200
Bed	924	697	1,259	1,006	1,155	912
Roads Length	300	797	259	672	270	707
Number of vehicles	6	38	6	39	6	37
TOURISM						
1993-94	47	—	24	—	32	—
1995-96	59	—	26	—	36	—

Source: Karnataka, 1974, 1975 & 1995d, 1995e, 1996a

Notes: 1. Education and Health facilities - Number of persons per facility
2. Transport: Road length per 1000 sq.km. area and number of vehicles per 1000 population
3. Tourism: Number of tourists per sq.km.

(Table 6). However, tourism inflicts severe environmental problems if it is not properly managed. Hence, in the context of very high as well as increasing tourist density and future potentialities, eco-toursim practices should be encouraged. It may be noted that higher tourist density in the ghats region could have influenced the foster development of infrastructure in the region.

Summary

1. Sustainable development of hill-forest region is a complex exercise for its location specificity and three dimensional structural reality. However, hill-forest regional commonalities provide concrete clues to evolve an appropriate development strategy.

2. The Western Ghats region has unique ecological, demographic, economic and infrastructural specificity with more of divergence from the hill-forest regional commonalities than convergence. This has raised several development issues in achieving sustainable development of the region.

3. The most diverging characteristics are larger proportion of area under agriculture with intensive agricultural activities, smaller proportion of area under forest, declining share of primary sector and increasing share of secondary and tertiary sectors, higher per capita income, higher per capita availability of infrastructure, higher rate of industrialisation and urbanization. The region has a moderate share of schedule cast and schedule tribe population.

4. The converging characteristics of The Western Ghats region are dominance of small landholdings and high sex ratio as a consequence of higher rate of adult male out-migration.

5. The region has the highest literacy rate, specially female literacy, and highest female work participation in the secondary sector.

6. Agriculture and coffee plantation have expanded at the cost of forest and pasture lands in the region. In addition, coffee plantation for its non-compliance with the environmental standards in coffee seed processing has been posing serious water pollution problems in Western Ghats region.

7. Western Ghats region has been experiencing population pressure and in particular urban population pressure mainly due to rapid urbanisation. The larger size settlements in both rural and urban sectors have increased significantly.

8. The Western Ghats region has highest tourist potentials and as such has attracted large number of tourists in the reference years.

Emerging Development Issues

The Western Ghats region is endowed with abundant natural resources and unique biological diversity of global importance (Sengupta,2001). However, its peculiar demographic, economic and infrastructure characteristics emerged through various types of human interventions at different levels have posed several challenges for its sustainable development.

1. The Western Ghats region has been identified with forest characteristics since time immemorial. By looking at the topography of the region, larger area under forest cover is inevitable to maintain the ecological balance of the region as it has larger implications on the regional and national economy and environmental quality. However, currently, the area under forest in the region is just 38.8 per cent which is far below the stipulation for a hill-forest region by the national forest policy to maintain the ecological balance (India, 1988). Interestingly, almost 32.7 per cent of the area is under agriculture and plantation and has shown an increase during 1971-91. In addition, other landuse concentrations are 6.7 per cent under non-agricultural use and 9.1 per cent under pastures. Hence, given the landuse specificity and prevailing powerful plantation and agricultural lobby extension of the forest area to the 2/3rd share in the region has remained as the prime development issue.

2. The share of primary sector both in occupation and contribution to the regional economy has shown a decline. On the other hand, per capita income as well as infrastructure facilities are the highest in the region. The region is also experiencing rapid urbanisation and industrialisation and has emerged as an urban dominant region (Sastry and Rao,2000). With this on-going non-primary sector dominant development activities, the main issue is whether one should allow the non-primary sector's dominance to continue in the forest region which has already reached an alarming percentage in the region. According to the fragility of the region, any further reduction in the forest area would lead to ecological crisis. Hence, the main issue is what type of balancing approach to be adopted in the over all development process to retain the forest characteristics of the region.

3. The region has very good human resource potentials in terms of high literacy and specially female literacy. However, with the limited employment opportunity and higher rate of adult male out-migration, how do we reverse the resource drain and make efficient use of literate population in the over all development of the region. Here again the issue is how to orient the literate population to contribute to the primary sector's dominance in the region.

4. According to hill-forest regional commonalities, the hill-forest region has a low level of infrastructure. The main reservations on the infrastructure development in hill-forest region are (a) it is expensive and imposes serious environmental problems, and (b) infrastructure development would drain off the abundant natural resources thus reducing the hill-forest region into environmentally and economically poor. This is contrary to the very objective of sustainable development. More interestingly, the analysis has revealed that the Western Ghats region is enjoying the highest level of infrastructure facilities. The issue is should the current level of infrastructure be improved to maintain the supremacy of the region as it has been enjoying till now or convert in to a bi-functional or tri-functional region.

Notes

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2. Taluka names of The Western Ghats region (Figure No.1)

(1) Chickmagalur, (2) Kadur, (3) Koppa, (4) Mudigere, (5) Narashimarajpura, (6) Sringere, (7) Tarikere. (8) Bantwal, (9) Belthangadi, (10) Karkal, (11) Kundapura, (12) Mangalore, (13) Puttur, (14) Suliya, (15) Udupi. (16) Madikere, (17) Somvarpet, (18) Verajpet. (19) Chamrajanagara, (20) Gundulpet, (21) Heggadevana Kote, (22) Hunusur, (23) Kollegal, (24) Krishinarajendra Nagar, (25) Mysore, (26) Nanjanagudu, (27) Piriyapattan, (28) Tirumakodala Narasipura, (29) Yelandur. (30) Bhadravati, (31) Channagiri, (32) Honnali, (33) Hosanagara, (34) Sagara, (35) Shikaripura, (36) Shimoga, (37) Soraba, (38) Thirthahalli. (39) Ankola, (40) Bhatkal, (41) Haliyal, (42) Honnavara, (43) Karwara, (44) Kumta, (45) Mundgod, (46) Siddapura, (47) Sirsi, (48) Supa, (49) Yellapura.

3. Out-migration rates have been derived based on the available 1981 census data on migration (India,1981) using the following steps: (1) The total residents in Western Ghats (non-Western Ghats) are derived. (2) The number of persons who are living outside Western Ghats (non-Western Ghats) districts, but within the state are derived, and the per cent share of Western Ghats and non-Western Ghats in the total migration has been worked out. (3) The total number of migrants to the other states of the country from Karnataka have been derived and divided into Western Ghats and non-Western Ghats, by assuming within the state migration proportion derived for Western Ghats and non-Western Ghats. (4) The derived total

resident population and total migrant population have been used to derive the migration rate per 1000 population using the formula.

$$MR = \frac{X}{M} * 100$$

X : Total population currently living outside Western Ghats (non-Western Ghats) region but born in Western Ghats (non Western Ghats) region.

M : Total resident population of Western Ghats (non-Western Ghat) region + Total population currently living outside Western Ghats (non-Western Ghats) region, but born in Western Ghats (non-Western Ghat) region.

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