RESEARCH ARTICLE

SPATIAL DISTRIBUTION AND SOCIO-ECONOMIC STATUS OF TRIBAL SETTLEMENTS IN THE WESTERN GHATS

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Manuscript Info

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Abstract

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The Western Ghats, also known as Sahyadri is a mountain range that covers an area of 140,000 square km parallel to the Western coast of the Indian Peninsula .It traverses the states of Kerala , Tamilnadu , Karnataka ,Goa ,Maharashtra, and Gujarat. It is a UNESCO world heritage site and is one of the eight hottest hot spots of biological diversity in the world. It covers 5000 species of flowering plants ,139 mammals species ,508 birds species, and 179 amphibian species ,many discovered species live in the Western Ghats . At least 325 globally threatened species occur in this region. The region glitches many anthropogenic intervention like illegal mining, the establishment of human settlement and deforestation etc. From a Historical view, the Western Ghats is the home for tribes > 50 types of tribes are living in the Western Ghats from the anecdotal period. The majority of the tribal are largely dependent on forests for their livelihood. After the implementation of the forest policy , the tribal livelihood status really worsened in the Western Ghats , they are unable to meet the daily requirement of recommended food intake >2500 Kcl. After post-independence (73years) of India many development programs are implemented in the tribal area for improvement of livelihood status , but as of calendar date they are facing many problems like economic instability , lack of literacy , lower level of quality of life and not politically empowered . In this context , in the interest of policy implication at the tribal area , the present study was undertaken to study the socioeconomic status and spatial distribution of tribal in the Western Ghats. This study practically helps the policymakers , planners of the policy, and researcher scholars to extrapolate the tribal settlement through the geo-spacing tag of tribal , socio-economic level, Knowledge and attitude of Conservation of Western Ghats at the population level .

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Introduction:-

Tribals constitute 8.6 percent of India's total population, about 104 million people (according to the 2011 census; Basavarajaiah DM et al., 2020). This is the largest population of tribal people in the world. The largest population of

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tribes is found in central India and the Western Ghats. Tribal people in India are called Adivasi (Ministry of Social Justice & empowerment, 1998). Adivasi is an umbrella term for a heterogeneous set of ethnic and tribal groups considered the aboriginal population of India (Population Census of India report, 2011). There are some 573 communities that have been recognized by the government of India as Scheduled Tribes and therefore eligible to receive special benefits from the Government, as per the Constitutional framework (Article 342 of Indian Constitution, 1949). A tribe is a group of distinct people, dependent on their land for their livelihood, who are largely self-sufficient, and not integrated into the national society (Merlin Mathew et al., 2019). The social formation of India has mainly three components sharp distinction amongst them because they share some common characteristics and historical taboos etc (Basavarajaiah DM et al., 2020). The tribal's has found many ways for adapting the existing environment rather than sophisticated living status (quality of life), when looking at tribal settlement the survey, found that many tribal people have found numerous ways for adapting the environment and becoming a part of it rather than a threat (Vaisakh et al., 2017). This tribal population in India, though a numerically small minor enormous diversity of groups, vary among themselves in respect of language and linguistic traits, ecological settings in which they live, physical features, size of the population, the extent of acculturation, dominant modes of making a livelihood, level of development and social stratification etc (Guruj et al., 2015; Brindha et al., 2014). They are also spread over the length and breadth of the country through their geographical distribution is far from uniform (Vaisakh et al., 2017). A majority of them still remain below the subsistence level failing to collect sufficient food by their own efforts (Sah et al., 2004). Tribal communities are isolated from the general population and are socially and economically vulnerable (Bipul et al., 2016). They are at risk due to geographical isolation, primitive agricultural practices, socio- cultural taboos, lack of formal education, poor infrastructure facilities, improper health-seeking behavior, malnutrition, lack of safe drinking water and hygienic conditions, poverty etc., In India, each state is practically equivalent to a country with its own specific socio-economic level, different ethnic groups, food habits, health infrastructures, and communication facilities (Dar et al., 2016). Tribal communities are acknowledged to have a very close association with the ecosystem and the environment because of their fulfillment of daily nutritional requirements with food foraged from nature (Somanna et al., 2018). Traditionally, the tribes in India pursued an economy, which was closer to nature, and used indigenous technology (Merlin Mathew et al., 2019). Some tribal communities have adopted a way of life, similar to the neighboring non-tribal communities (Sarkar et al., 2016). The indigenous knowledge of the tribal people, their conservation beliefs and values, environmentally adaptive and sensitive land use, resource management practices, and determined defense of territory and natural resources have enabled many of them to inhabit natural habitats for centuries without destroying their ecosystems and biodiversity (Sterens,1997). However, the tribal's live in widely dispersed villages; with families living on farms surrounded by fields, traditionally hunted and collected food in the forests (Swarup et al., 2009). Many Tribals believe that if someone is ill it is because they were attacked by an evil spirit cursed by a witch (Jayakumar et al., 2016). Alcoholism is a problem among some tribes; most of the population is concentrated in heavily forested areas that combine inaccessibility with limited political or economical significance (Mahalakshmi et al., 2020). Historically, the economy of tribes was subsistence agriculture or hunting, gathering and collection of non timber forest products (NTFPs) (Basavarajaiah DM et al.,2020).The Government policies on forest reserves have affected tribal peoples profoundly (Rajiv,2009). Wherever the state has chosen to exploit forests, it has seriously undermined the tribes' way of life (Prakash et al., 2009). As per the Forest act 1961, the Government should protect reserve forests, and precipitated armed resistance on the part of the tribal peoples involved (Ramanjineyulu et al., 2016). Intensive exploitation of forests has often meant allowing outsiders to cut large areas of trees and restricting the tribal's from the usage of forests for their daily needs on their forest dependent communities (Suresh et al., 2016), mainly tribal depends heavily on the forest that they prefer to live inside the forests rather than with so-called modernized human settlements (Subarna et al., 2014; Vaisakh et al., 2017). They get shelter, home and raw materials for house buildings, food, dress material, cultural equipments, spiritual life or pleasure together with psychological contentment from forests (Sunil et al., 2016). In general, these communities interact closely with forest, derive their economic livelihood and often their cultural and spiritual identity (Byron et al., 1999; Vishwa Ballabh et al., 2015).In India, there are about 100 million forest dwellers living in and around forest and for another 275 million too, forest have continued to be an important source of livelihood and means of survival (Lynch, 1992). They play an important role in the viability and survival of tribal households in India, by virtue of their importance in social, cultural and economic survival (Tewari, 1989; Tulikas et al., 2017; Vijayalakshmi et al., 2019), we need to extrapolate the tribal settlement scientifically by geospacing mapping for accurate settlement of tribes in the forested areas because for national policy implication for downtrodden population empowerment, the secondary data would be essential for revisiting our national policy structure after post Independence and measures the different livelihood charectistics of Indian tribal (Brindha et al., 2014). In this regard, the Present research study attempts to explore the spatial distribution for identification of tribal settlement and assess the socio-economic status of tribal in a selected region of Western Ghats.

Methods:-

Description of Study site

The WesternGhtas is the land of haven, it extends from the Satpura range in northern, stretching from Gujarat to Tamilnadu .It traverses south through the states of Maharashtra ,Goa,Karnataka and Kerala (Fig 1.1) .The range is known as Sahyadri in Maharashtra and Karnataka. Biogeography region in southern India runs along the west coast extending from 080 19'08"–210 16'24"N to 720 56'24"–780 19'40'E with a north to a south distance of 1,490 km, a minimum width of 48 km and maximum width of 210 km, covering a total area of 136,800 km^2.The Western Ghats is home to some of the world's most unique fauna ,flora and fungi. Compared to the other hotspots ,it has the highest human population per unit area (>300 humans/km2) ,making it that much more challenging to conserve .Whilst the Western Ghats region covers <1% of earth land surface it supports a significant proportion of species dependent upon freshwater habitats .the region contains 25% plant species representation and is significantly home for millions of living creatures . The study Intervention and economic feasibility, we selected Karnataka state for assessment of tribal spatial distribution and livelihood status .

Fig 1.1:- Geological map of Western Ghats.

Study area

Karnataka is home to 42, 48,987 tribal people, of whom 50,870 belong to the primitive group, these people represent only 6.95 percent of the population of the State. Kodagu District is purposively selected for the study because it is the hotspot of tribes. The district is home to about 15 tribes. The major tribes of Kodagu are Yerava, Kudiya, Jenu Kuruba, Kadu Kuruba, and Soliga who are believed to be the original settlers of the area. Almost 97 percent of the district''s Scheduled tribe population is concentrated in rural areas. The hilly and thickly forested terrain, lack of penetration of private infrastructure and the isolated regions of their habitation make the provision of health and sanitation, basic infrastructure and diverse choice of livelihoods difficult for these communities (Kodagu District Human Development Report, 2014). The present study was carried out in selected sites of Kodagu , Dubare and Devamachi reserve forest of Virajpet taluk was considered (The reserve forests belong to Madikeri and Virajpet forest division respectively),these reserve forests lies between 12^0 15' 10" N to 12^0 23' 19" N latitudes and 75^0 52' 53" E to 76^0 00' 55" E longitudes and covers an area of 87.11 sq.kms (Fig 1.2).The literacy rate of STs in Karnataka is a cause for concern, as it has consistently been lower than that of the total population. Scheduled Tribes (STs) form 10.47 percent of Kodagu''s population about, 58054 people (according to the 2011 census).
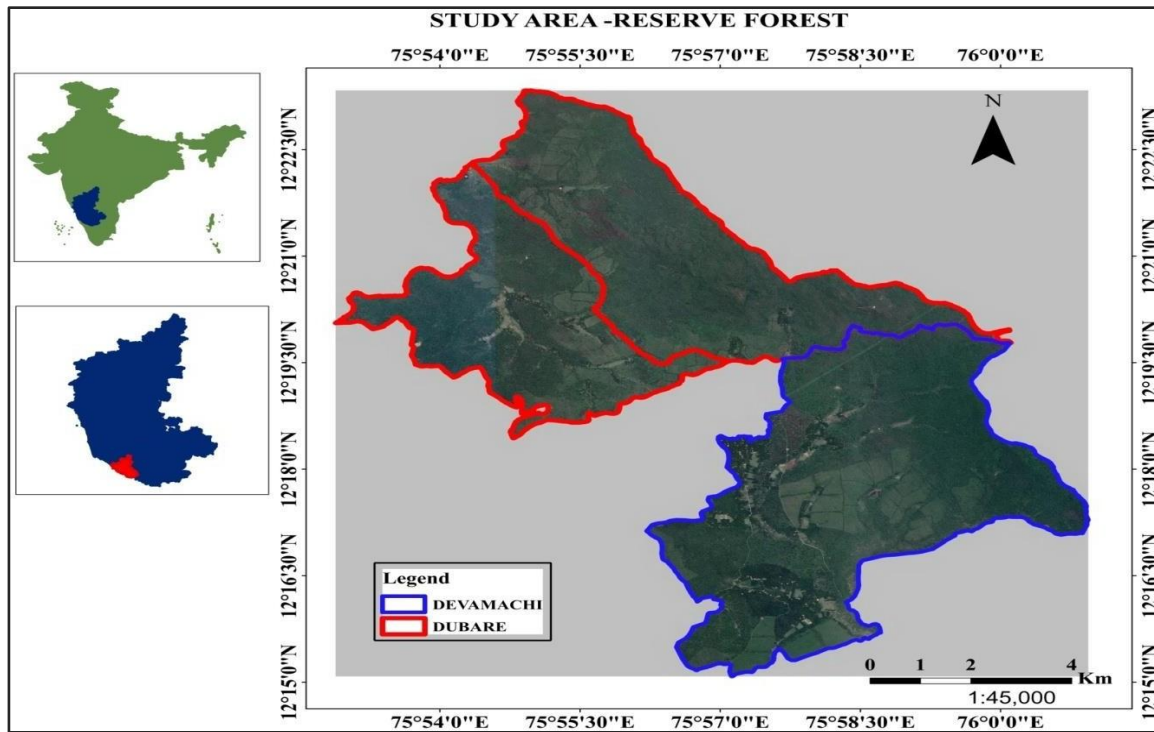
Fig 1.2:- Geographical map of the study area.

Sample population

The stratified random sampling was adopted for the selection of samples. An Individual respondent was selected based on the economic status of the Government record. Secondary data about the number of households were collected from the gram panchayats. A total of 130 of households in each selected sites of reserve forest was considered (design effect 10-15 percent sampling included for sample size determination with the power of test 0.85 and alpha is 0.05). A total of 260 households were selected for the study intervention (a sample of 130 respondents in each sites). Due to the lower economic index , paucity of data sets on an economic level . The high level and suitable models has not been formulated to explore the economic analysis

Data Collection

The present study requires two types of data i.e. primary and secondary data. The secondary data about the demographic status of the study area were collected from the gram panchayat office. The primary data was collected from the respondents through an interview schedule. This schedule mainly focused on the various socio-economic aspects and the resource utilization pattern. An interview schedule was used to collect the primary data about the socio-economic status and resource utilization pattern. The geospatial mapping was carried out using software like Arc-GIS, Q- GIS, and SAS Planet. The study was conducted during 2014-2015. As the study comprises of two objectives, mapping of the settlements was carried out using GIS tools and an interview schedule was used to collect information about the socio-economic status and resource utilization pattern. Cadastral maps of selected sites of reserve forests were collected from Kushalnagar and Thithimathi range forest office respectively. The data about tribal settlements within the reserve forests were also acquired. High -resolution satellite data of the study area was downloaded from the SAS Planet software. This software serves as a platform for the users to acquire high- resolution data of google earth free of cost. The cadastral maps which are in the Cartesian coordinate system are transformed to a geographical coordinate system by assigning latitudes and longitudes which is called georeferencing (Fig 1.2). Geo-referenced maps were carried out in Q-GIS using Gdal georeferencer plugin.After this process extraction of the shape file was carried out. In this process the SHP file of the outer boundary of reserve forests was extracted. The extracted shape file was overlayed on the high - resolution data` using SAS planet software and the desired image of the area was downloaded from the software.
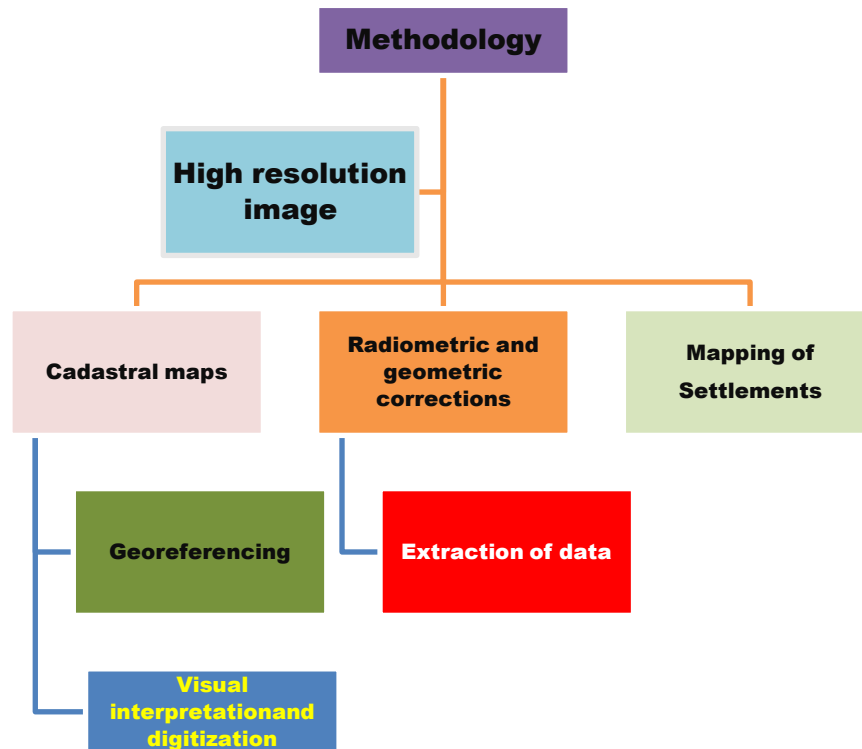
Fig 1.3 shows the flowchart of the research process with different steps, step 1: the mapping was done in the tribal settlements at reserved forests; it was carried out in ARC GIS. The settlements were demarcated by visual interpretation of the high-resolution raster data. Cadastral maps were analyzed based on SOP and genorefrencing and visual interpretation of data sets based on the objective of interest in Tribal resettlement.

Results:-

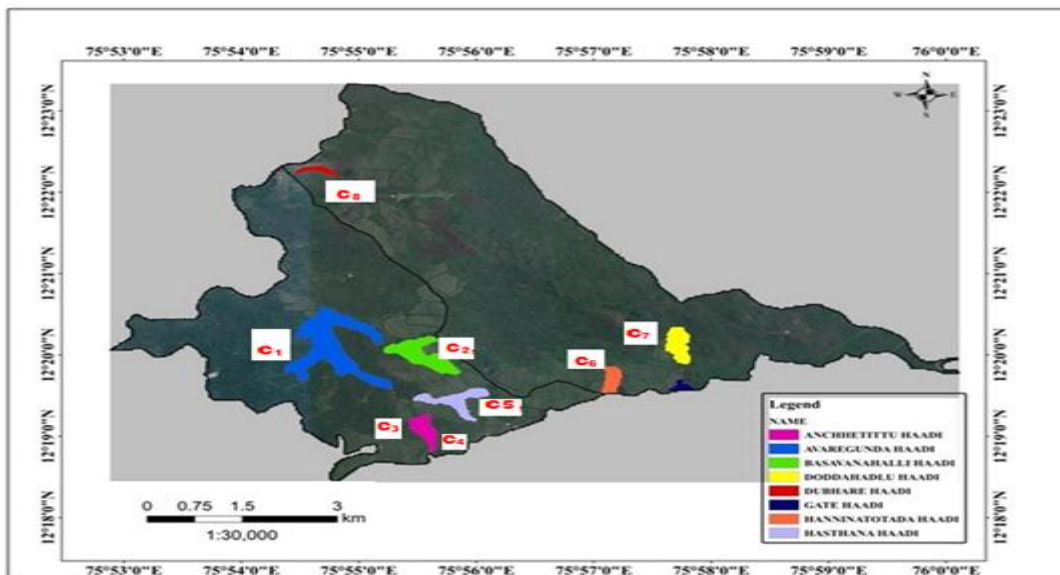**Fig 1.4:-** Human settlement map of reserve forest.

Model formulation of estimation of cluster distance
The geospatial mapping was done by using software like Arc-GIS, Q- GIS, and SAS Planet. Asper the raster image scale we extrapolated the various clusters in selected sites (C_1 to C_8;presented in geomapping Fig 1.4) .For each cluster, we measured the road map distance by using a standard scale of

1:30,000 (legend initial distance zero considered , 0.75 km , 1.5 km, and 3 km coded in different colors).The observed satellite imaginary data is converted into real data and we calculated the exact distance of clusters by using the Euclidian distance formula .

$$E_D = (X_2 - X_1)^2 + (Y_2 - Y_1)^2 + (Z_2 - Z_1)^2 \ldots \ldots (Z_i - Z_n)^2 \qquad (1.1)$$

Data points from geo map

Data points	Distance km (1:30000)		
0	0.75	1.5	3

Centroid (Cluster distance in Km)

Cluster	Centroid			
C1	2	3	1	4
C2	1	1.5	0.75	2.5
C3	3	2	2.1	1.6

$$C_{1D} = (0 - 2)^2 + (0.75 - 3)^2 + (1.5 - 1)^2 + (3 - 4)^2 = Average\ 10.31\ km$$

$$C_{2D} = (0 - 1)^2 + (0.75 - 1.5)^2 + (1.5 - 0.75)^2 + (3 - 2.5)^2 = Average\ 2.37\ km$$

$$C_{3D} = (0 - 3)^2 + (0.75 - 2)^2 + (1.5 - 2.1)^2 + (3 - 1.6)^2 = Average\ 12.88\ km$$

$$Geometric\ mean = antilog \left(\frac{\sum_{i=1}^{n=12} Log\ X_i}{N} \right) \qquad (1.2)$$

$$Geometric\ mean = antilog \left(\frac{\sum_{i=1}^{n=12} Log\ 10.31 + Log\ 2.37 + Log\ 12.88 + \cdots LogX_{12}}{N} \right)$$

Geometric mean = 1.82 km rate of distance observed in each clusters

Suppose we assessed the K-means clustering of different data points of geomapping tag

$$x = \begin{pmatrix} x_1 \\ x_2 \\ x_3 \\ . \\ x_n \end{pmatrix} \quad c = \begin{pmatrix} c_1 \\ c_2 \\ c_3 \\ . \\ c_k \end{pmatrix}$$

$$d(x,c) = \sqrt{\frac{(x_1 - c_1)^2}{\sigma_1^2} + \frac{(x_2 - c_2)^2}{\sigma_2^2} + \cdots \frac{(x_n - c_k)^2}{\sigma_k^2}} \qquad (1.3)$$

Table 1.1:- Socioeconomic status in Dubare Reserve Forest.

Variable	Dubare No (%)	Devamachi No (%)	Odd ratio
Classification			
Lower class	58.0%	74.13%	10.55
Lower Middle class	3.00%	13.0%	2.32
Middle Class	29.0%	9.50%	1.65
Upper Middle class	10.0%	3.25%	1.88
Upper Class	0.00%	0.00%	
Education			
Illiterate	98(75.38%)	116(89.23%)	13.66
Primary	19(%14.62)	8(6.15%)	2.54
High School	12(9.23%)	4(3.085%)	1.96
Pre University	1(0.77%)	2(1.54%)	<1
Graduation	0(0.0%)	0(0.0%)	-
Land holding			
Marginal(< 1 acre)	2(1.54%)	1(0.77%)	<1
Small(1-2acre)	4(3.08%)	2(1.54%)	<1
Medium(2-4acre)	2(1.54%)	1(0.77%)	<1
Land less	122(93.85%)	126(96.92%)	18.74

Annual Income (INR)			
Poorest of Poor	114(87.69%)	119(91.54%)	13.88
5000-10000	12(9.23%)	9(6.92%)	1.25
10000-20000	1(0.77%)	2(1.54%)	<1
25000-50000	2(1.54%)	0(0.00%)	<1
>50000	1(0.77%)	0(0.00%)	<1
Source of Energy			
Fire wood	98(75.38%)	102(78.46%)	4.73
LPG gas	32(24.62%)	28(21.54%)	2.07
Occupation			
NTFPs Collection	45(34.62%)	52(40.0%)	4.02
Harvesting of coffee	26(20.0%)	42(32.31%)	5.23
Harvesting of cardamum	45(34.62%)	21(16.15%)	6.14
Agricultural labour	12(9.23%)	15(10.77%)	1.87
Shift cultivation	2(1.54%)	-	<1

The binary logistic regression was employed to test the hypothetical statement of the research, the poorest of the poor population coded as 0 and lower mid and mid-income class coded as 1.The dependent variable like income of tribal class regressed with Independents variables. Asper the model construction, in the case of Devmachi and Dubare tribal settlement majority of the tribal's were assailed on lower class (74.13%) and (58.0%) respectively with odds 10.55,$p<0.05$ [CI95%;45.15- 78.22%]. The education status was found to be lowest and statistically insignificant between land holdings, quality of life and economic domain (>80th percentile) odds 13.66, $p<0.05$ [CI95% ; 71.25- 90.25%]. The land holding was assessed during the survey, majority of the tribal community is landless (95th percentile) odds 18.74 ,$p<0.05$ [CI 95% ; 88.87- 98.01%] and fewer number of tribal's were practiced Jum or Shifting cultivation, collection of NTFPs (65%) odds 4.02 ,$p<0.005$[CI95%:58.27-70.14%];Harvesting of coffee (26.15%) odds 5.23,$p<0.05$[CI95 % :20.63-28.36];Harvesting of cardamom (25.38%) odds 6.14,$p<0.05$ [CI 95 % : 19.87-26.01]; Agricultural labour (10.38%) odds 1.87 ,$p<0.05$ [CI 95 % : 6.55-11.85] .The Annual income of the tribal's is unpredictable, majority of the population is the poorest of poor, they are unable to meet the daily requirement of food >2500 Kcl per day and infringe economic deprivation was seen in Western Ghats (89.61%) odds 13.88, $p<0.005$ [CI 95 % :80.54-95.26].

Table 1.2:- Distance of K-Means Clusters on various selected study sites.

	C1	C_2	C_3	C_4	C_5	C_6	C_7	C_8
A	**0**	3.6	4.7	9.1	10.2	14.2	15.2	19.52
B	3.2	**0**	5.2	8.8	13.2	15.2	20.2	15.66
C	2.3	4.2	**0**	6.3	12.8	18.3	19.8	12.36
D	3.3	5.3	7.7	**0**	10.3	12.2	14.22	14.55
E	4.6	3.3	4.6	4.4	**0**	10.6	12.23	13.25
F	2.8	6.1	6.3	2.9	13.0	**0**	13.28	15.28
G	3.2	3.2	3.1	6.1	12.3	08.4	**0**	16.23
H	1.8	5.2	2.8	3.2	13.7	06.3	16.55	**0**

Table 1.3:- ANOVA of comparison of different groups of clusters.

Source	df	Sum of Square	Mean Square	F Statistic	P-value
Groups (between cluster)	7	1167.71	166.82	9.04**	<0.001
Error (within clusters)	56	1033.13	18.45		
Total	63	2200.84	34.93		

The variation of Western Ghats tribes can be incredibly intimate on the motherland .As such it is not possible to accurately categorize and estimate the distribution of population in the geographical area through individual survey ,we grouped the community based on cultural and indigenous knowledge of Medicinal plants and attitude of Conservation of forests. However , considering that numerous tribes in India are essentially non- nomadic in nature ,many tribes in Western Ghats resided in remoted areas on cluster approach of small settlements and it is more vicinity to the forest area . As such ,regional groupings are more precisely for implementation of

government policy and welfare schemes for their developments meanwhile we classified the population zonal wise , study attempt was made based on the geographical distribution of tribes in India. The spatial distribution of tribes is greatly uneven and sporadically distributed with the different geographical regions in the Western Ghats, the sceinentifc way estimating of tribal settlement is very important to explore the new innovation pertaining to culture, indigenous knowledge, attitude and behavioral parameters towards forest conservations . Importantly by using the spatial distribution we will incept many policy development programs from the Government without any overlapping .The term distribution refers to the way the people are spaced over the earth's surface; the emphasis is that , on the various pattern of actual settlement of population (The place will be connected to the mainstream viz roads , town and other population settlement) Fig 1.4 .The distribution of the tribal population over space in Western Ghats in the context of physiographic and socio economic aspects is endeavors of this discourse. The population displays a very high degree of ethnic diversity both in their racial composition and dialectal and linguistic affinity, there are >38 different tribal communities , which show an important index of their ethnic diversity in the Western Ghats. However , there is more impressive to identify the different patterns of their spatial distribution , it has been commonly observed that the tribes reveal strong tendencies of clustering and concentration in densely forested areas, geographically inaccessible tracts of the downtrodden population based on scientific ways or approaches. This is the main cause for their backwardness, population is concentrated in geographically inaccebile areas so one can describe the development of tribals mostly depending on the distribution of divergent populations in relation to resources available in the Western Ghats region. From (Table 1.3) scientifically we extrapolated the clusters based on the distance of K-means in various selected study sites. The metrics show the distance of clusters from the mainstream areas. Results depicted that, the average of 12.58 km transcends distance between the mainstream to tribal settlement .The ANOVA was employed to know the significant relationship between the clusters , results were seen statistically significant difference was observed in the distance . The median distance was 9.04 km (p<0.001). The Mean distance was tested by the Tukey Posthoc test. An observed mean difference is more than the Critical difference, we reject the null hypothesis H0 at a 5% level of significance (p<0.05). The significance of clusters is presented in (Table 1.4)

Table 1.4:- Mean differences of K-means clusters.

Pair	Difference	Q	CI-95% [Lower-Upper]	p-value
x_1-x_2	1.213	0.798	[-5.549-7.97]	0.999
x_1-x_3	1.650	1.087	[-5.111-8.41]	0.994
x_1-x_4	2.450	1.613	[-4.311-9.21]	0.945
x_1-x_5	8.038	5.293	[1.276-14.79]	0.010
x_1-x_6	8.000	5.268	[1.239-14.76]	0.010
x_1-x_7	11.285	7.431	[4.524-18.06]	0.000
x_1-x_8	10.706	7.050	[3.945-17.46]	0.000
x_2-x_3	0.438	0.288	[-6.324-7.19]	1.000
x_2-x_4	1.238	0.815	[-5.524-7.99]	0.999
x_2-x_5	6.825	4.494	[0.064-13.58]	0.046
x_2-x_6	6.788	4.470	[0.026-13.54]	0.048
x_2-x_7	10.073	6.633	[3.311-16.83]	0.000
x_2-x_8	9.494	6.252	[2.732-16.25]	0.001
x_3-x_4	0.800	0.527	[-5.961-7.56]	1.000
x_3-x_5	6.388	4.206	[-0.374-13.14]	0.077
x_3-x_6	6.350	4.182	[-0.411-1.11]	0.080
x_3-x_7	9.635	6.345	[2.874-16.39]	0.001
x_3-x_8	9.056	5.964	[2.295-15.81]	0.002
x_4-x_5	5.588	3.679	[-1.174-12.34]	0.177
x_4-x_6	5.550	3.655	[-1.211-12.31]	0.184
x_4-x_7	8.835	5.818	[2.074-15.59]	0.003
x_4-x_8	8.256	5.437	[1.495-15.01]	0.007
x_5-x_6	0.038	0.025	[-6.724-6.79]	1.000
x_5-x_7	3.248	2.139	[-3.514-10.09]	0.798
x_5-x_8	2.669	1.757	[-4.093-9.43]	0.915
x_6-x_7	3.285	2.163	[-3.476-10.04]	0.788

| x_6-x_8 | 2.706 | 1.782 | [-4.055-9.46] | 0.909 |
| x_7-x_8 | 0.579 | 0.381 | [-6.183-7.34] | 1.000 |

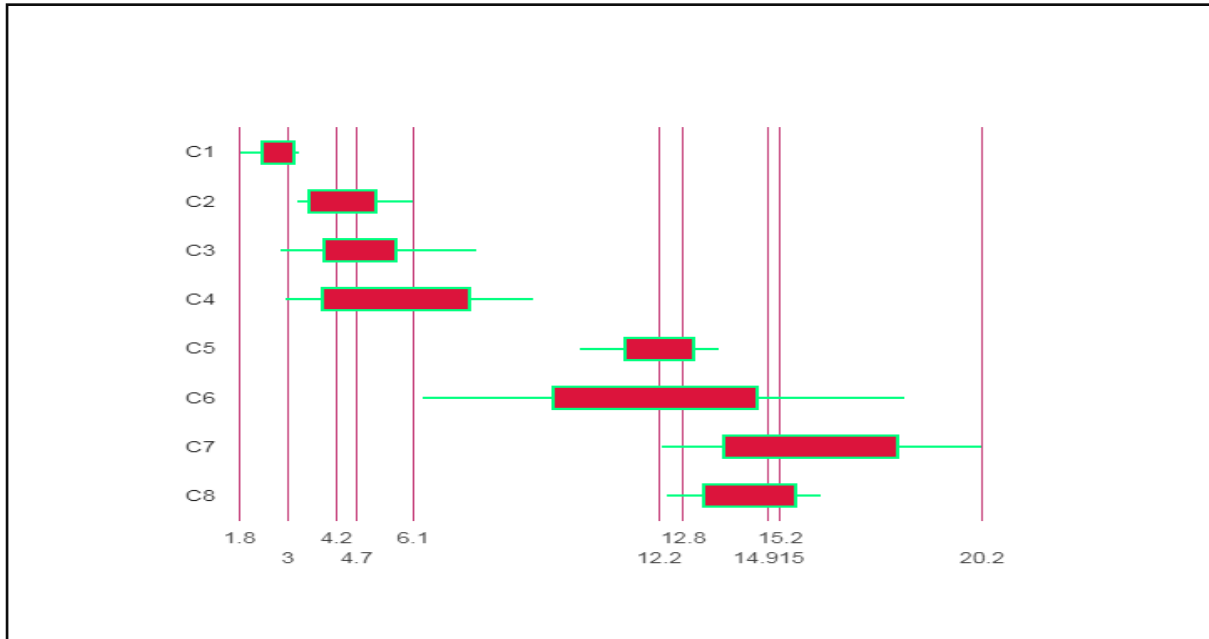Critical mean distance 6.76 km; SE =1.51

Fig 1.5:- Shows the distance variation of different clusters.

Economic status

The tribal economic index was constructed based on structured questionnaires by using Binary logistic regression analysis (Kuppuswamy socioeconomic scale 2020 was used for data collection) , each questions and sub-questions related to economic parameters were converted into a mean score of individual tribal clusters. Newton's iteration method was employed to compile the economic data -related primary data sets. The greater the log -likelihood the better the results. The age and QOL score (mean score <50 not good and >50 good) were obtained from the total score of questionnaires. Male and female responses were coded as 1 and 0 respectively. Asper the model output

$$I_1 = 3.15 - 0.0031X_{12} + 0.0734X_2 \text{ (}R^2\text{=75\%- Government policy benefited population)}$$

$$I_2 = -4.6 - 0.00739X_{12} + 0.250X_2 \text{ (}R^2\text{= 58\%- Not received Government benefited programme)}$$

Table 1.5:- Coefficients of age of the tribal respondent and QOL score (<50 mean score coded 0 and >50 coded 1).

Parameters	Coeff	SE	z-stat	lower $z_{0.025}$	upper $z_{0.975}$	exp(b)	P-value
b_0	3.15	1.58	1.99	0.049	6.25	23.37	0.04
Economic domain	-0.00	0.00	-0.27	-0.002	0.001	0.99	0.78
Government support-Tribal welfare	0.07	0.08	0.85	-0.09	0.24	1.07	0.39

Table 1.6:- Coefficient of male and female respondents and QOL score (<50 mean score coded 0 and >50 coded 1).

Parameters	Coeff	SE	z-stat	lower $z_{0.025}$	upper $z_{0.975}$	exp(b)	P-value
b_0	-4.61	3.61	-1.27	-11.70	2.46	0.00	0.20
Economic domain	-0.00	0.002	-0.31	-0.005	0.003	0.99	0.75
Awareness of	0.25	0.22	1.10	-0.19	0.69	1.28	0.26

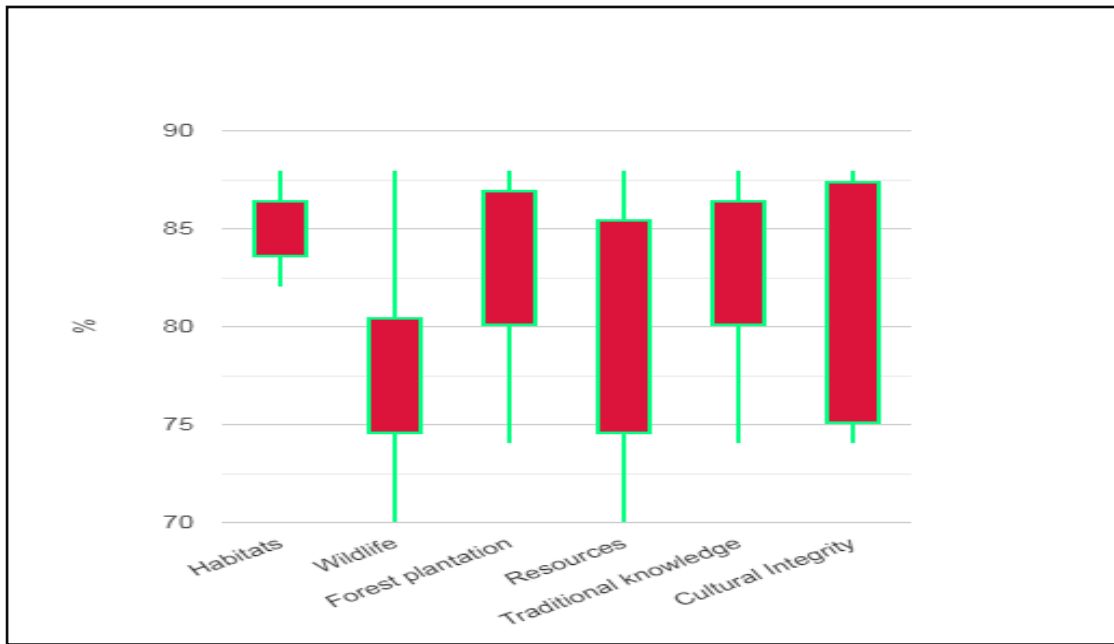| Government policy for tribal development						

Fig 1.5:- Responses of Tribals for Conservation of Western Ghats.

Assessment of socio-economic instability of tribals and resource utilization

The socio-economic instability was assessed based on the tested questionnaires; the score was obtained from the individual respondents. Economic instability was evaluated from the binary Logistic regression model, the results were depicted that , the movement of quality of life and economic domain of tribes were negative direction (coefficient is -4.61) and 75.0% is negatively associated with their quality of life. The Government would support the tribal's in the way of implementation of Government development programs. With the   support of the development of Government programs , the quality of life of tribal and economic levels is slightly improved (marginal differences was 1-2%) (Table 1.4 and 1.5).The forest resources were utilized significantly IQR (88-95%) by means of a collection of NTFPs , firewood for fuel and energy sources , fruits and nuts for their food. The response of tribal for conservation of Western Ghats is presented in (Fig 1.5). Findings of statement show, the conservation of natural habitat (84.0%) odds 6.32, Wild life conservation (80%) odds 4.77, p<0.05, Forest plantation (86.0%) odds 4.02, p<0.05, natural resources (88%) odds 6.27, p<0.05, traditional and indigenous knowledge (84.56%) odds 8.54, p<0.05 and tribal cultural integrity (87%) odds 5.08, p<0.05. The majority of the tribal living in Kutcha and Bamboo constructed house (71.0%) and (12%) (Fig 1.6)of the population living in Government constructed house (Fig1.7) and rest of them (17%) houseless and they are living in Coffee estate plantation Owners constructed houses for labour

Fig 1.6:- Tribals Kutcha House in Western Ghats.

Fig 1.7:- Government provided Constructed house for Tribals.

Discussion:-

After post independence India has many challenges triggered from the socioeconomic characteristics of the Population. To date, certain communities in India have been historically devasticating socially , economically, and Politically excluded from the mainstream. The elevated poverty and suboptimal literacy is the main cause for deprivation in downtrodden population because due to lack of policy administration , dishonesty of the bureaucrats and malafied financial disproportion for implementation of Government Policy. The main objective of the study filled the research gap to explore the accurate estimation of socio- economic level and spatial distribution status of tribal's in the Western Ghats (It is world heritage tag of UNESCO , the region had so many glitches) . During the study intervention, we assessed the tribal community with multilevel modelling techniques to explore economic instability, living status , quality of life and political empowerment at a large population level. (86.61%) of the Western Ghats tribal's infringe economic deprivation and isolated from the mainstream, they

have long suffered social and economic instability . These tribal communities have been characterized by primitive existence , geographical isolation , educational backwardness , not politically empowered and socially excluded. Asper the Indian constitutional frame work , many government innovative programs were incepted in Western Ghats but these development programs marginalized to develop QOL and low level to focus the tribal welfare because disproptionate of allocation. Tribals are living in the Western Ghats on a double sword knife , they are many challenges that are to be overcome every day because on one hand Implementation of the forest rights act in the Western Ghats region. The Forest Rights act,2006 (FRA) is effectively implemented to conserve the natural habitat , protect the wildlife ,and maintain the ecological balance on the other with a view to providing sustainable livelihood options to forest-dwelling scheduled tribes and providing other traditional forest dwellers , including those who were forced to relocate their dwellings due to state intervention .Thus , the underlying objective of the act has been to strike a balance between the potentially conflicting interests of the forest dwelling communities and protecting forests and wildlife resources for a longer time. The above act substantially affects the Western Ghats tribal because , they are symbiotic relationship between the forests and living status . The present study highlighted and explore the forest conservation aspects of tribal, majority of the respondents affixed the positive statements' of conservation of native mother land , originally they worshiped nature as family god and all evils destroyed by the power of nature . Each Cluster of tribal settlement is close approximate to the forest and reiun to participate in the conservation of natural flora fauna. Asper the cluster and spatial distribution model , the average distance of the cluster is 12km , all tribal communities united with each other and followed the customs and traditions. The majority of the population had a rich repository of indigenous knowledge of medicinal plants and the identification of rare species and threatened species in the Western Ghats (according to IUCN) .They had strong respect and affinity with the wild animals so much that they protect them, though the animals raid their house. As fervent animists, which is a positive driver in conservation ethics for maintain forest sustainability. There is no holistic clear picture of tribal development approach in the Western Ghats , concerned government authority to address this issue and consolidate indigenous and forest conservation strategies from the tribal community and document the same through virtual basis, other people should understand the real concepts of ecological restoration and vital part of the heritage of Western Ghats.

Conclusion:-
The summary of the resulted scientific findings concludes that, the Western Ghats is an unpredictable harbour with an extensive diversified tribal culture (>38 tribal) distributed. The majority of the tribal is homeless, lack of literacy and are economically instability. This deprived class is unable to meet the minimum recommended calorie of food intake and suffering from many ailments and animal conflicts. Tribal's settlement is always moulded away from the mainstream area and remoted to the basic amenities like health care centres. The researcher should intervene and extend their scientific knowledge for identification of real problems of tribal and address the issues in the appropriate platform to drop your opinion for implementation of revised constitutional amendments for the empowerment of tribal in existing law.

Recommendation:-
Analytical documentation should be done on a scientific basis , the spatial distribution multilevel modelling and the geospacingtag will be more beneficial for accurate estimation of the distribution of tribal settlement in the Western Ghats . This kind of analytical study furnishes realistic information to the planner of the policy , forest specialists and researchers for implementation of newer policy at the national level. Meanwhile, the 90th percentile of tribal communities had no proper housing facilities, lack of literacy and infrastructure. The government should take necessary steps for providing proper housing in the Western Ghats tribal, they are realized population for conservation of ecological balance and restoration of natural resources in their own ancestor acquired knowledge. Political empowerment is another challenge in tribal , make a plan to revisit the electoral policy and amend the constitution in favour of tribal in accordance with Constitutional privilege.

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Conflict of Interest
There is no conflict of interest , written consent obtained from the participants for taking photography,virtualrecording and other cultural beliefs of indigenous knowledge of forest resources.

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