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## Assessment of soil resource characterization along the Toposequence of Koranahalli Subwatershed, Chikmagalur district, Karnataka

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**Abstract**

A detailed soil survey was conducted to characterize soil properties and classified the soils along the toposequence Koranahalli subwatershed of Tarikere taluk, Chikkamagaluru district at cadastral scale was carried out by using remote sensing and GIS techniques. One hundred and fifty-six profiles were studied for the morphological, physical and physico-chemical properties. Fourteen soil series were identified, all the pedons were characterized by shallow to very deep in depth. The texture of the soils was sandy clay loam to clay. The consistence of pedons varied from moderately to very sticky and moderately to very plastic. pH and CEC of the soils increases as the depth of the soil increases. The organic carbon content of pedons ranged from 2.20 to 8.70 g kg<sup>-1</sup>, low to medium content was observed in most of the soil series. Soils studied were classified up to family level according to revisions in soil taxonomy.

**Keywords:** Soil characterization, watershed, remote sensing, physico-chemical properties

**Introduction**

Soil, one of the most heterogeneous substances evolved from weathering of the earth crust and organic residues. Soil is the mother earth nourishes and nurtures all forms of life on earth termed as 'soul of infinite life'. It is most precious non-renewable natural resource which requires thousands of years to develop an inch of soil. Its proper usage decides the capability of life support system and socio-economic development of any nation. All soils are naturally variable with their properties changing across the landscape and vertically down the soil profile. Soils commonly occur in groups, each member of the group occupying a characteristic and different sequential topographical position from top to bottom of a slope, termed as toposequence. Soil continually undergoes development by way of numerous physical, chemical and biological processes, which include weathering with associated erosion. Keeping this in view, the present study was undertaken to characterize, obtain detailed information pertaining to the nature, extent and distribution of different kinds of soils occurring in Koranahalli subwatershed of Tarikere taluk, Chikkamagaluru district.

**Location and extent of the study area**

The study area Koranahalli subwatershed (Fig.1) located in Tarikere taluk of Chikkamagaluru district lies between 13°36'50.16'' and 13°43'03.92'' North latitude and between 75°52'08.50'' and 75°57'21.80'' East longitude, having 12 microwatersheds with a spatial extent of 5820.710 Ha. The study area belongs to southern transition agro-climatic zone with a mean annual rainfall of 750-900 mm.

**Materials and Methods**

Visual interpretation of False Colour Composites (FCC) of Quick bird satellite data on 1:7920 scale was carried out to identify the physiographic units in the subwatershed. The delineated physiographic boundaries were transferred on to a cadastral map overlaid on satellite imagery. Physiographically, Koranahalli subwatershed area has been covered by peninsular gneisses of Archean age. The study area is divided into ridges, mounds, uplands and lowlands based on slope. They were further subdivided into physiographic or image interpretation units based on image characteristics. The cadastral map and satellite image were used as base map for traversing the entire subwatershed area. The transects were delineated in such a way that each transect should cut across at least three or more physiographic units. About 156 pedons were studied depending upon soil heterogeneity, morphological characters, physical and chemical properties. Based on the soil pedon characteristics the profiles were grouped into 14 soil series. A soil series is the most homogeneous unit having similar horizons and properties and behaves

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similarly for a given level of management. The final soil maps were vectorized by using GIS software.

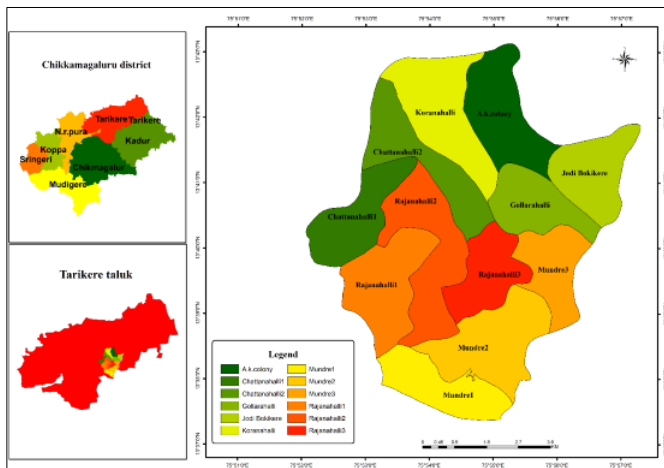


Fig 1: Location map of Koranahalli subwatershed

## Results and Discussion

### Morphological characteristics

Soils of Koranahalli subwatershed area are derived from peninsular gneisses of Archean age. Based on land heterogeneity and physiography fourteen soil series were identified. The morphological characteristics of all the soil series shown in table 1. On the basis of depth of the solum, Hanumapura and Hortithimmanahalli series grouped under shallow soil (25-50cm), followed by moderately shallow (50-75cm) soil depth observed in Tadaga, Hebburu, Baggavali Kaval and Kedihalli series respectively. Whereas Sigehadlu, Timmapura, Kere Basavanahalli and Santhaemaraadi Kaval

series grouped under moderately deep soil (75-100cm), Koranahalli, Siddarahalli and A K colony series classified under deep soil (100-150cm) and very deep soil (>150cm) were grouped under B Kodihalli series.

The soils were reddish brown (5YR 4/4) to dark reddish brown (5YR 3/4) in Hanumapura and Tadaga series, whereas in Kedihalli, Sigehadlu and Kere Basavanahalli series the colour of the soil was dark Siddarahalli reddish brown (2.5YR3/4) to red (2.5YR4/6), followed by dark brown (7.5YR3/3) to very dark brown (7.5YR2.5/3) in Baggavali Kaval, Timmapura, Santhaemaraadi Kaval, Koranahalli, Siddarahalli and B Kodihalli and very dark grey (10YR3/1) to very dark grayish brown (10YR3/2) observed in A K colony, Hebburu and Hortithimmanahalli series. The variations in solum colour are attributed due to the differences in content and hydration of iron oxide and variation in mineral contents and other pedological features (Shamsudheen *et al.*, 2005) [5]. The soil texture varied from sandy loam to clay. In all the series soil structure was observed moderate medium sub angular blocky to weak medium sub angular blocky. The consistence of all the pedons surface horizons varied from slightly hard to hard when dry, friable to firm when moist, slightly sticky to moderately sticky and slightly plastic to moderately plastic when wet. Whereas in sub surface horizons were mostly very firm to very friable and moderately sticky and very sticky to moderately plastic to very plastic. This may be due to differences in parent material, physiography, weathering, higher clay content in the subsurface horizons, and translocation of clay (Basavaraju *et al.*, 2005) [1]. The weakly developed structure in the surface horizons and well developed in subsurface horizons could be due to finer materials received from higher topographic positions and higher rate of weathering. Similar results were also reported by Sireesha and Naidu (2013) [6].

Table 1: Site and morphological characteristics of the soils of Koranahalli subwatershed

Horizon	Depth (cm)	Boundary	Diagnostic Horizon	Colour (Moist)	Texture	Gravel (%)	Structure	Consistency			
								Dry	Moist	Stickiness	Plasticity
<b>Pedon 1 Hanumapura series</b>											
Ap	0-17	AS	Ochric	5YR4/6	SCL	40	2msbk	sh	fr	ss	sp
Bt	17-43	CS	Argillic	5YR4/6	SC	40	2msbk	sh	fr	ms	mp
BC	43-52	CW	--	5YR4/6	C	50	2msbk	sh	fr	ms	mp
<b>Pedon 2 Hortithimmanahalli series</b>											
Ap	0-29	GS	Ochric	10YR5/4	SCL	20	2msbk	sh	fi	ss	sp
Bw	29-49	AW	Cambic	10YR5/5	SCL	10	2msbk	sh	fr	ss	sp
<b>Pedon 3 Tadaga series</b>											
Ap	0-10	AS	Ochric	5YR4/4	SL	50	2msbk	sh	fr	ms	mp
Bt	10-45	CS	Argillic	5YR3/4	C	75	1msbk	sh	fr	vs	vp
BC	45-73	AB	--	5YR3/4	C	0	1msbk	sh	fi	vs	vp
<b>Pedon 4 Hebburu series</b>											
Ap	0-15	AS	Ochric	10YR3/4	C	0	2msbk	h	fr	ms	mp
Bw1	15-39	GS	Cambic	10YR3/3	C	0	2msbk	vh	fr	ms	mp
Bw2	39-60	GS	Cambic	10YR3/1	C	0	2msbk	h	fr	ms	mp
BC	60-75	GS	Cambic	10YR3/1	C	0	2msbk	sh	fi	ms	mp
<b>Pedon 5 Baggavali Kaval series</b>											
Ap	0-23	AS	Ochric	10YR2/2	SCL	0	2msbk	sh	fi	ss	sp
Bt1	23-40	CS	Argillic	7.5YR2.5/3	CL	10	1msbk	sh	fr	ms	mp
Bt2	40-63	CS	Argillic	7.5YR3/3	C	10	1msbk	sh	fi	ms	mp
<b>Pedon 6 Kedihalli series</b>											
Ap	0-10	CS	Ochric	5YR3/3	SL	10	2msbk	sh	fr	ss	sp
Bt1	10-30	GS	Argillic	5YR3/4	SC	30	2msbk	sh	fi	ms	mp
Bt2	30-46	GS	Argillic	2.5YR4/6	C	50	2msbk	sh	fr	ms	mp
BC	46-77	0		2.5YR5/6	C	0	2msbk	sh	-	ms	mp
<b>Pedon 7 Sigehadlu series</b>											
Ap	0-16	CS	Ochric	5YR3/4	SL	30	2msbk	sh	fr	ss	sp
Bt1	16-28	CS	Argillic	2.5YR4/6	SC	50	2msbk	sh	fi	ms	mp
Bt2	28-73	CS	Argillic	2.5YR3/6	SC	40	2msbk	sh	fr	ms	mp

BC	73-96	0		2.5YR3/4	SC	10	2msbk	sh	fr	ms	mp
<b>Pedon 8 Timmapura series</b>											
Ap1	0-10	CS	Ochric	7.5YR3/3	SL	0	1msbk	sh	fr	ss	sp
Ap2	10-22	CS	Argillic	7.5YR3/2	SCL	0	2msbk	sh	fr	ss	sp
Bt1	22-41	GS	Argillic	5YR4/4	SC	40	1msbk	h	fr	vs	vp
Bt2	41-80	0	Argillic	5YR4/4	SC	45	1msbk	h	fr	vs	vp
<b>Pedon 9 Kere Basavanahalli series</b>											
Ap1	0-13	AS	Ochric	2.5YR3/4	SCL	40	1msbk	sh	fr	ss	sp
Ap2	13-32	AS	--	2.5YR3/4	SCL	60	1msbk	sh	fr	ss	sp
Bt	32-61	CS	Argillic	2.5YR3/4	C	20	1msbk	sh	fr	ms	mp
BC	61-88	0		2.5YR3/6	C	0	1msbk	sh	fr	ms	mp
<b>Pedon 10 Santhaemaradi Kaval series</b>											
Ap	0-18	CS	Ochric	7.5YR3/4	SCL	10	1msbk	sh	fr	ss	sp
Bt1	18-42	CS	Argillic	7.5YR3/3	SC	10	1msbk	sh	fr	ss	sp
Bt2	42-79	CS	Argillic	7.5YR4/3	SC	10	1msbk	sh	fr	ms	mp
Bt3	79-94	0	Argillic	7.5YR4/3	C	10	1msbk	sh	fr	ss	sp
<b>Pedon 11 Koranahalli series</b>											
Ap1	0-20	CS	Ochric	5YR3/4	SCL	10	2msbk	sh	fi	ss	sp
Ap2	20-39	CS	--	7.5YR4/3	SCL	0	2msbk	sh	fr	ss	sp
Bt1	39-76	CS	Argillic	7.5YR 2.5/4	C	20	2msbk	sh	fr	ms	mp
Bt2	76-99	CS	Argillic	7.5YR3/3	SC	0	2msbk	sh	fr	vs	vp
BC	99-138	0		7.5YR3/4	C	10	2msbk	sh	fr	vs	vp
<b>Pedon 12 Siddarahalli series</b>											
Ap	0-19	AS	Ochric	7.5YR3/6	SL	0	1msbk	sh	fi	ss	sp
Bt1	19-43	CS	Argillic	7.5YR3/3	C	0	2msbk	sh	fr	ms	mp
Bt2	43-84	CS	Argillic	7.5YR 3/4	C	0	2msbk	sh	fr	vs	vp
Bt3	84-117	CS	Argillic	7.5YR3/3	SC	0	2msbk	sh	fr	vs	vp
Bt4	117-148	0	Argillic	7.5YR3/4	C	0	1msbk	sh	fr	vs	vp
<b>Pedon 13 A K Colony series</b>											
Ap	0-12	AS	Ochric	10YR3/2	C	0	2msbk	h	fr	ms	mp
Bw1	12-50	CS	cambic	10YR3/1	C	0	2msbk	sh	Fr	vs	vp
Bw2	50-80	CS	cambic	10YR3/2	SC	0	2msbk	sh	Fi	vs	vp
Bw3	80-120	0	cambic	10YR5/6	SC	0	1msbk	sh	fr	vs	vp
<b>Pedon 14 B Kodihalli series</b>											
Ap	0-14	CS	Ochric	7.5YR2.5/3	C	0	1msbk	sh	fr	ms	mp
Bw1	14-27	CS	cambic	7.5YR2.5/3	C	0	2msbk	sh	fr	ms	mp
Bw2	27-55	GS	cambic	7.5YR2.5/2	C	0	2msbk	sh	fi	vs	vp
Bw3	55-76	GS	cambic	7.5YR2.5/2	C	0	2msbk	sh	fi	vs	vp
Bw4	76-96	GS	cambic	7.5YR2.5/2	C	0	1msbk	sh	fi	vs	vp
Bw5	96-120	GS	cambic	7.5YR3/3	C	20	1msbk	sh	Fi	vs	vp
Bw6	120-153	GS	cambic	7.5YR3/3	C	20	1msbk	sh	fr	vs	vp

(Note: Boundary: A-abrupt, C- clear, G-gradual, D-diffuse, S-smooth, W-wavy, I-irregular, B-broken. Texture: LS-loamy sand, SL-sandy loam, SCL-sandy clay loam, SC-sandy clay, C-clay. Structure: 1-weak, 2- moderate, m-medium, sbk-subangular blocky. Consistency: h-hard, sh-slightly hard, vh-very hard, fr-friable, fi-firm, ss-slightly sticky, ms-moderately sticky, vs-very sticky, sp-slightly plastic, mp-moderately plastic, vp-very plastic.)

**Table 2:** Physico-chemical properties of the soils of Koranahalli subwatershed

Horizon	Depth (cm)	Particle size distribution (%)			pH	EC (dS/m)	OC (g/kg)	CEC (C.mol (P+)/ kg)	MWHC (%)
		Sand	Silt	Clay					
<b>Pedon 1 Hanumapura series</b>									
Ap	0-17	66.00	10.75	23.25	5.75	0.03	4.70	9.20	40.17
Bt	17-43	54.00	9.50	36.50	6.38	0.05	5.80	12.70	38.89
BC	43-52	30.00	27.50	42.50	6.85	0.10	5.90	34.60	41.16
<b>Pedon 2 Hortithimmanahalli series</b>									
Ap	0-29	67.75	9.75	22.50	5.34	0.04	4.80	7.60	36.42
Bw	29-49	62.00	10.00	28.00	5.87	0.06	5.90	10.10	34.12
<b>Pedon 3 Tadaga series</b>									
Ap	0-10	71.00	11.50	17.50	5.49	0.05	4.80	22.40	30.66
Bt	10-45	42.00	17.00	41.00	6.55	0.14	5.50	29.80	41.68
BC	45-73	40.00	16.50	43.50	7.02	0.14	6.80	33.80	40.39
<b>Pedon 4 Hebburu series</b>									
Ap	0-15	24.50	23.00	52.50	8.09	0.19	7.90	21.30	43.02
Bw1	15-39	31.00	24.00	45.00	8.12	0.20	8.30	24.70	47.10
Bw2	39-60	35.00	18.50	46.50	8.42	0.23	10.70	26.80	45.97
BC	60-75	29.50	23.00	47.50	8.33	0.19	9.70	20.30	49.59
<b>Pedon 5 Baggavali Kaval series</b>									
Ap	0-23	53.50	14.00	32.50	5.41	0.07	5.10	17.20	38.72
Bt1	23-40	38.50	21.00	40.50	7.60	0.13	9.30	17.10	38.31
Bt2	40-63	41.00	17.00	42.00	8.12	0.20	10.50	26.30	42.64

<b>Pedon 6 Kedihalli series</b>									
Ap	0-10	67.50	17.50	15.00	6.10	0.08	6.00	14.50	28.44
Bt1	10-30	57.50	5.00	37.50	6.73	0.08	6.90	16.00	40.07
Bt2	30-46	42.00	8.00	50.00	6.84	0.09	7.20	15.30	43.48
BC	46-77	42.50	12.50	45.00	7.12	0.10	9.30	17.70	41.71
<b>Pedon 7 Sigehadlu series</b>									
Ap	0-16	54.50	38.00	7.50	6.34	0.084	6.00	15.40	23.52
Bt1	16-28	48.90	10.10	41.00	6.39	0.08	6.30	14.80	42.68
Bt2	28-73	56.65	8.35	35.00	6.51	0.092	7.20	16.50	40.83
BC	73-96	51.50	9.50	39.00	6.92	0.089	7.80	17.30	36.46
<b>Pedon 8 Timmapura series</b>									
Ap	0-10	63.98	15.00	10.00	7.34	0.284	6.90	10.30	25.00
Bt1	10-22	61.05	10.00	21.00	7.87	0.281	4.50	11.77	30.64
Bt2	22-41	47.01	14.00	36.00	7.74	0.335	3.90	12.58	32.85
Bt3	41-80	44.44	11.50	41.00	7.81	0.361	3.30	13.73	37.78
<b>Pedon 9 Kere Basavanahalli series</b>									
Ap1	0-13	53.50	14.00	32.50	5.41	0.07	5.10	17.20	38.72
Ap2	13-32	55.00	13.50	31.50	6.09	0.08	4.20	25.40	37.12
Bt	32-61	30.00	27.50	42.50	6.85	0.10	5.90	34.60	41.16
BC	61-88	33.50	22.50	44.00	6.97	0.12	5.50	35.60	39.94
<b>Pedon 10 Santhaemaradi Kaval series</b>									
Ap	0-18	66.5	11.00	22.50	7.46	0.143	8.70	19.20	36.43
Bt1	18-42	55.00	13.50	31.50	7.04	0.146	8.10	20.40	42.98
Bt2	42-79	47.5	17.00	35.50	7.07	0.154	8.70	22.55	46.35
Bt3	79-94	37.25	20.22	42.53	7.05	0.197	8.10	25.35	49.61
<b>Pedon 11 Koranahalli series</b>									
Ap	0-20	58.50	15.50	26.00	6.69	0.11	5.40	27.40	35.79
Bt1	20-39	52.50	15.25	32.25	7.01	0.13	4.50	35.60	31.68
Bt2	39-76	44.50	10.50	45.00	7.15	0.14	7.20	33.60	49.10
Bt3	76-99	39.50	23.00	37.50	7.25	0.15	6.50	37.00	41.59
BC	99-138	37.50	21.50	41.00	7.16	0.13	4.80	30.20	37.49
<b>Pedon 12 Siddarahalli series</b>									
Ap	0-19	63.50	24.00	12.50	6.95	0.12	5.80	9.60	26.04
Bt1	19-43	42.90	13.60	43.50	7.23	0.15	6.50	12.40	42.69
Bt2	43-84	36.50	22.17	41.33	7.96	0.17	7.30	13.30	40.91
Bt3	84-117	49.50	13.00	37.50	6.87	0.11	6.20	15.00	39.85
Bt4	117-148	40.45	18.05	41.50	7.09	0.12	6.70	12.50	43.44
<b>Pedon 13 A K Colony series</b>									
Ap	0-12	24.50	23.00	52.50	8.09	0.19	7.90	21.30	43.02
Bw1	12-50	42.00	14.00	44.00	7.20	0.09	8.70	16.80	39.72
Bw2	50-80	50.00	7.50	42.50	7.45	0.09	9.30	19.10	45.51
Bw3	80-120	47.00	14.00	39.00	7.68	0.10	9.60	20.40	38.47
<b>Pedon 14 B Kodihalli series</b>									
Ap	0-14	44.00	16.95	39.05	7.09	0.19	7.20	15.21	36.22
Bw1	14-27	41.75	17.25	41.00	7.37	0.22	7.70	18.42	40.83
Bw2	27-55	37.50	19.75	42.75	7.03	0.25	6.00	15.60	39.81
Bw3	55-76	42.50	15.75	41.75	7.61	0.25	6.90	18.16	43.90
Bw4	76-96	40.75	18.75	40.50	7.78	0.22	8.30	19.67	41.67
Bw5	96-120	38.50	18.90	42.60	8.04	0.37	10.50	27.31	45.97
Bw6	120-153	38.50	18.90	42.60	8.04	0.37	10.50	27.31	45.97

(Note: EC- electrical conductivity, OC-organic carbon, CEC-cation exchange capacity, MWHC-maximum water holding capacity)

**Table 3:** Classification of soils of Koranahalli sub watershed

Pedon	Order	Suborder	Great group	Sub group	Family	Soil series
1	Alfisol	Ustalfs	Haplustalfs	Lithic Haplustalfs	Clayey skeletal, Isohyperthermic	Hanumapura
2	Inceptisol	Ustepts	haplustepts	Lithic haplustepts	Loamy, Isohyperthermic	Hortithimmanahalli
3	Alfisol	Ustalfs	Haplustalfs	Typic Haplustalfs	Clayey skeletal, Isohyperthermic	Tadaga
4	Inceptisol	Ustepts	haplustepts	Typic haplustepts	Fine, Isohyperthermic	Hebburu
5	Alfisol	Ustalfs	Haplustalfs	Typic Haplustalfs	Fine loamy, Isohyperthermic	Baggavali Kaval
6	Alfisol	Ustalfs	Haplustalfs	Typic Haplustalfs	Clayey skeletal, Isohyperthermic	Kedihalli
7	Alfisol	Ustalfs	Rhodustalfs	Typic Rhodustalfs	Clayey skeletal, Isohyperthermic	Sigehadlu
8	Alfisol	Ustalfs	Haplustalfs	Typic Haplustalfs	Clayey skeletal, Isohyperthermic	Timmapura
9	Alfisol	Ustalfs	Rhodustalfs	Typic Rhodustalfs	Fine, Isohyperthermic	Kere Basavanahalli
10	Alfisol	Ustalfs	Haplustalfs	Typic Haplustalfs	Fine, Isohyperthermic	Santhaemaradi Kaval
11	Alfisol	Ustalfs	Haplustalfs	Typic Haplustalfs	Loamy, Isohyperthermic	Koranahalli
12	Alfisol	Ustalfs	Haplustalfs	Typic Haplustalfs	Fine, Isohyperthermic	Siddarahalli
13	Inceptisol	Ustepts	haplustepts	Typic haplustepts	Fine, Isohyperthermic	A K Colony
14	Inceptisol	Ustepts	haplustepts	Typic haplustepts	Fine, Isohyperthermic	B Kodihalli

### Physical characteristics

The soil separates i.e., sand, silt and clay contents of pedons varied from 24.50 to 71.00, 5.00 to 38.00 and 7.50 to 52.50 per cent, respectively (Table. 2). In Hanumapura, Koranahalli, Siddarahalli, Tadaga, Kedihalli, Kere Basavanahalli, Baggavali Kaval and Santhaemaradi Kaval series clay content increased as depth of the soil increases due to illuviation of clay content and its accumulation was found to be concentrated in the sub soil. Earlier Qureshi *et al.* (1996) [4] also reported similar trend for clay accumulation in subsoil. The vertical distribution of total sand and silt fractions in all the soil series was found to be irregular. Maximum water holding capacity was found to be more in Santhaemaradi Kaval series and least was observed in Sigehadlu series.

### Chemical characteristics

The soil reaction of all the pedons varied from 5.34 to 8.42. The soil reaction of the pedons was found to be increasing with depth, which might be due to the leaching of exchangeable bases from the surface horizon and accumulated in subsoil. Electrical conductivity values of the pedons ranged from 0.04 to 0.37  $\text{dsm}^{-1}$  and thus all the soil series were grouped under non saline. Similar results were also reported by Pillai and Natarajan (2004) [3], Nayak *et al.* (2000) [2] and Vijayakumar *et al.*, (1994) [8]. The organic carbon content of pedons ranged from 2.20 to 8.70  $\text{g kg}^{-1}$ , low to medium content was observed in all the soil series except Santhaemaradi Kaval and AK colony series, where organic carbon content was high in surface horizons. Decreasing trend of soil organic carbon was observed with depth. The overall low to medium soil organic carbon status of the Koranahalli subwatershed was due to decomposition of organic matter under high temperature regime, which caused rapid oxidation of organic matter coupled with low biomass production. Similar findings were reported by Basavaraju *et al.*, (2005) [1]. The cation exchange capacity (CEC) increases with depth. This variation might be due to the quantity of clay and organic matter present. Similar results were obtained by Mclean and Owne, (1969) and Sharma and Anil Kumar (2003).

### Classification of soils

Based on the soil morphological, physical and physico-chemical characteristics, the soils of Koranahalli subwatershed were classified upto family level (Soil Survey Staff 2014) [7] (Table 3). Most of the soil series were classified under soil order Alfisol due to the presence of illuvial horizon i.e., argillic horizon in the sub surface soil and suborder due to the ustic soil moisture regime. Sigehadlu and Kere Basavanahalli series were classified Typic Rhodustalfs at sub group level due to presence of argillic horizons, soil colour Hue of 2.5YR and Value of 3 at moist condition. Soil series Hortithimmanahalli, Hebburu and B Kodihalli series were classified under soil order Inceptisol, due to the presence of Cambic sub surface horizon. Suborder Ustepts was coined for these three soil series based on the ustic soil moisture regime.

### Conclusion

The study of morphological, physical and physico-chemical property of Koranahalli subwatershed revealed that, soils depth ranges from shallow to very deep, the moist colour of the pedons varied from dark reddish brown to very dark grey. The soil texture pedons varied from sandy clay loam to clay and the soil textural consistency of sub surface soils of all the pedons varied from moderately sticky to very sticky and moderately plastic to very plastic. In most of the pedons clay content was

increased in sub surface horizons. Soil reaction (pH) and cation exchange capacity (CEC) of all the series increases as the depth of soil increases. All the soil series were grouped under non-saline and non-calcareous soils. Based on the morphological, physical and physico-chemical properties soils were classified up to family level. The present study certainly helps in taking effective measures for sustainable management of the soil for suitable land use.

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