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SOIL QUALITY ASSESSMENT AND MAPPING FOR MANAGEMENT OF RESOURCES USING GEOSPATIAL TECHNIQUES OF SHEGAON WATERSHED, DIST. CHANDRAPUR. (M.S.)

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ABSTRACT

The assessment and mapping soil quality for management of resources of Shegaon watershed, Chandrapur district of Maharashtra were carried out. IRS LISS-IV and LISS-III data and GIS coupled with ground truth verification were used to delineate present land use/ land cover, slope and physiography of the watershed.The characterization and classification of soils through profile study, identified and mapped seven different soil series and complex with phases on 1:12,500 scale based on physiography-soil relationship. Soils occurring on moderately sloping (8-15%) isolated mound are very shallow, well drained, non-calcareous (Typic Ustorthents), whereas soils on subdued plateau are shallow Lithic to Typic Haplustepts in complexes. Typic and Vertic Haplusterts in complex are identified on gently sloping (1-3%) upper pediment. Soils of lower pediments are shrink-swell Typic Haplusterts. Upper plain lands of the watershed shows very deep, calcareous, shrink-swell soils (Typic Haplusterts) whereas, soils of lower plains are Sodic Haplusterts.Soil quality assessed by measuring soil attributes or properties that serve as soil quality indicators. The used dataset was the weighted mean of different variables from the pedons representing a particular soil series of the watershed for evaluating the soil quality index. The SQI has been calculated by goal finalization, found the MDS through PCA or expert opinion, assign the score to MDS by appropriate method. The soils under different soil series compared considering SQI by taking into account hydraulic conductivity, exchangeable sodium percentage, soil respiration (CO_2), clay, organic carbon and DTPA extractable Fe as parameters for the minimum data set, the SQI varied from 0.50 to 0.81.The Pohe-3 soils (Typic Haplustepts) showed highest SQI (0.81), whereas, the Shegaon-3 soils (Sodic Haplusterts) showed least SQI (0.50). The soil quality of the Shegaon watershed was mainly governed by hydraulic conductivity, soil pH, ESP and organic carbon, which were identified as soil quality indicators.Suitable conservation measures and interventions have been suggested to improve the productivity of these soils.

(Key words: Soil quality, PCA, Soil quality indicators, GIS)

INTRODUCTION

Sustainable management of land resources is essential for food security, maintenance of environment and betterment of the society. Soils are considered as the integral part of the landscape and their characteristics are largely governed by landform on which they are developed. (Sharma *et al.,* 1999). Systematic study of morphology and taxonomy of soils provides information on nature and type of soils, their constraints, potentials, capabilities and their suitability for various uses (Sehgal 1996). Precise scientific information on characteristics, potential, limitations and management needs of different soil is indispensible for planned development of land resources to maintain the soil productivity and to meet the demands of the future. Rational utilization of land resources can be achieved by optimizing its use, ensuring its sustainable use.

Remote sensing data provide multi-spectral, multi-temporal and multi-sensor information of the earth's surface and offers greater accuracy, economy and is more efficient in data collection and mapping of land resources than the conventional method (Kasturirangan *et al*., 1996). Several studies have initiated to characterize, evaluate and management of land resources at large scale using advanced tools (Srivastava and Saxena, 2004; Shukla *et al.,* 2009).An attempt has been made to characterize, evaluate and map the land resources of Shegaon watershed in Warora tahsil, district

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Chandrapur (MS) using IRS- P6 (Resourcesat-1) LISS-IV and LISS-III data in GIS.

Soil variability is the outcome of many processes acting and interacting across a continuum of spatial and temporal scales and is inherently scale dependent (Trangmar *et al.,* 1985). Spatial variability is an inherent and dynamic feature of soil. It may be both vertical (within a pedon) and horizontal (across the landscape).

The Shegaon watershed near Warora Tehsil of Chandrapur district, Maharashtra has varied soils faces several constraints related to erratic and uneven distribution of rainfall, thin soil cover, crusting, gravellines in some soils and reduction in productivity. The system of farming has changed considerably during the last few years due to peri-urban pressure. Rapid urbanization, deforestation, wastelands and unwise utilization of natural resources causing human induced environmental degradation and ecological imbalances that warrant sustainable development and optimum management of land resources. The study was focused on assessment of soil quality and status of soils of Shegaon watershed for better utilization of available soil resources for achieving the sustainable output.

MATERIALS AND METHODS

Shegaon watershed is located between $20^0 18^l$ to $20^0 22^l$ N latitude and $79^0 05^l$ to $79^0 10^l$ E longitude. The total area of watershed is 2249.88 ha. The study area falls in the Survey of India Toposheet No.55P/3. The general elevation of area varies from 220 to 280 m above MSL.The climate of the area is subtropical; dry sub-humid with ustic soil moisture regime and hyperthemic soil temperature regime. The average rainfall is 1100 mm which is received mostly from southern monsoon. The mean annual temperature of the area is 27.8°C. The maximum temperature ranges from 27°C to 43°C and minimum from 12°C to 28°C. The relative humidity in general varies from high 77.97% during monsoon to a low of 37.3% during pre-monsoon summer.

Based on the soil variability various typifying pedons were studied for their morphological, physical and chemical properties. Horizon wise soil samples were collected for laboratory analysis.The soil reaction (pH) and electrical conductivity (EC) were determined in 1:2.5 (soil: water) suspension (Jackson, 1973), organic carbon content was determined by wet oxidation method (Walkey and Black, 1934) , available nitrogen (Subbiah and Asija, 1956) , available P (Olsen *et al.,* 1954), available potassium (Jackson, 1973), the DTPA extract soil micronutrients (Zn, Fe, Mn, Cu) were determined by Lindsay and Norvell method (1978).To quantify soil quality, a minimum data set comprised of a small number of carefully chosen soil physical, chemical, and biological indicators is needed (Doran and Jones, 1996).SQI of identified soil series of Shegaon watershed has been calculated for suggesting better land use plan. For estimation of SQI, the weighted mean of different physical, chemical properties have been taken along with the depth of soil series. Biological properties *viz.*, soil microbial biomass carbon (SMBC), dehydrogenase activity (DHA) and soil respiration (CO_2 evolution) of surface samples of these series were also taken for soil quality index calculation.

RESULTS AND DISCUSSION

Present land use/ land cover

Based on image characteristics, the major land use / land cover identified are cultivated land, wasteland with and without scrub, habitation and waterbodies (Fig.1a). Cultivated land is again delineated into single and double crop based on temporal data. The extent of area under different land utilization types indicates that cultivated land occupies 83.85 per cent of the total geographical area (TGA) of which 55.44 per cent is under single crop. Double crop occupy 28.41 per cent of the cultivated area where assured / protective irrigation is available. Waste land occupy 11.16 per cent of the total geographical area, out which 7.88 per cent waste land without scrub while 3.28 per cent waste land with scrub. Waterbodies and habitation occupy 3.38 and 1.61 per cent area, respectively.

Landform-soil relationship

Six major physiographic units *viz.,* isolated mound, subdued plateau, upper pediment, lower pediment, upper plain and lower plain were identified and delineated (Fig.1c).Moderately sloping (8-15%) isolated mound occur at an elevation of 274 to 272 m above MSL and support mostly single crop land. The gently sloping (3-8%) subdued plateau occurs at an elevation 274 to 256 m above MSL supported also by single crop land. The very gently sloping (1-3%) pediments according their elevation subdivided into upper pediment occurs at an elevation 269 to 252 m above MSL lower pediment occur at an elevation 245 to 239 m above MSL and upper plain land occur at an elevation 260 to 245 m above MSL mainly supports both single and double crop with small area under waste land with scrub. Similarly level to nearly level (0-1%) lower plain lands occur at an elevation 235 to 225 m above MSL supports mostly double crop with few scattered orchards.

Seven soil series (Pohe-1, Pohe-2, Pohe-3, Pohe-4, Shegaon-1, Shegaon-2 and Shegaon-3) are identified and mapped as soil series and complex with phases at 1: 12,500 scale after establishment of landform-soil relationship (Table 1).

Physical and chemical properties of soils

The clay content of soil varied from 38.00 to 59.98 per cent. Higher clay content is noticed in soils of Shegaon-3 developed on lower plains associated with higher bulk density due to subsurface sodicity and compactness. The chemical properties indicated that the soils of isolated mound (Pohe-1) and lower pediment (Shegaon-1) are neutral in reaction whereas the soils subdued plateau (Pohe-3) upper pediment (Pohe-4) are slightly alkaline while soils of upper plain (Shegaon-2) and lower plain (Shegaon-3) are strongly alkaline in nature. The organic carbon in surface soils of study area ranges from 4.32 g kg^{-1} in soils (Pohe-1) of isolated mound to 8.46 g kg^{-1}in soils of subdued plateau (Pohe-2). The Shegaon-2 soils are calcareous in nature whereas other soils are non-calcareous in nature. In general all these soils are highly base saturated soils. The exchangeable sodium content ranged from 0.8 to 7.54 cmol(p+) kg^{-1} in sub-surface horizons of Shegaon-3 soils which is indicative of development of subsoil sodicity, which is also reflected in the increased pH and ESP and decrease in saturated hydraulic conductivity of these soils. The cation exchange capacity of soils of watershed varied from 32.29 cmol (p+)kg^{-1}in soils of Pohe-1 to 51.65 cmol (p+) kg^{-1} in soils of Shegaon-3 soil series. Relatively higher CEC values have been observed in the soils of lower plain region could be attributed to high clay content with smectitic mineralogy (Pal and Deshpande, 1987). Rajeev Kumar Yadhav and Verma (2019) also assesses the different soil physic-chemical properties which affect the soils health of Bareilly (U.P.)

Soil fertility

In general, the soils of Shegaon watershed are very low to medium in available nitrogen. The nitrogen content in soils ranged from 57.58 (Shegaon-3) to 287.88 kg ha^{-1} (Pohe-3).The available nitrogen content decreased with depth in all soils. Phosphorus content varied between 3.33 (Pohe-2) to 16.35 kg ha^{-1} (Pohe-3) and decreased with depth in all soils. Available potassium content in the soils of watershed varied from 250.88 kg ha^{-1} to 605.25 kg ha^{-1}, the potassium content also increased with the clay content. The DTPA extractable micronutrient cations (Fe, Mn, Cu and Zn) of the soils (Table 3) indicated that the DTPA-extractable Fe ranged from 0.84 to 10.24 mg kg^{-1} the critical value of DTPA- Fe is 4.5 mg kg^{-1} (Lindsay and Norvell, 1978).The soil developed on isolated mound, subdued plateau, upper pediment and lower plains are deficient while soils on lower pediment (Shegaon-1) and upper plain region (Shegaon-2) are found to be sufficient in DTPA-Fe.

The DTPA- Mn ranged from 5.2 to 24.72 mg kg^{-1} above the critical limit 3.0 mg kg^{-1} (Takkar *et al.,* 1989). DTPA-Cu varied from 0.7 to 2.35 mg kg^{-1} was higher than the critical value of 0.2 mg kg^{-1}(Katyal and Randhawa, 1983). The DTPA–Zn ranged from 0.18 to 0.48 mg kg^{-1} and was found deficient below critical level of 0.6 mg kg^{-1} as suggested by Katyal and Randhawa (1983). The micronutrient contents in general, decreased with depth. Deficient Fe and Zn may hamper crop productivity and needs further investigation.

Soil Quality assessment

Total 31variables were selected for PCA analysis. PCA analysis in scree plot and showed that six PCs had eigen value >1 and are able to explain 100% variance in the data. With each principal component, only highly weighted loading factor were retained for the MDS.

The soil quality index map of identified soil series in complexes is depicted in Fig.1 (d). When the different soil series of Shegaon watershed were compared by calculating the Soil Quality Index (SQI) by taking into variables from different principal components as the minimum dataset it is found that the Pohe-3 soil series showed higher SQI (0.81) while , Shegaon-3 soil series having least SQI (0.50) due to subsurface sodicity. Similar work were carried out for Rahat watershed of Vidarbha by Balpande *et al.,* 2020 and reported higher soil quality index for Vertisol and Inceptisol soils as compared with Entisol soils.Vasu *et al.* (2016) conducted a study for assessment of soil quality index (SQI), as a tool to evaluate crop productivity in semi-arid Deccan plateau, India.The results showed that consideration of both surface and control section soil properties help in establishing a good relationship between soil function and management goal. Pable *et al.* (2016) conducted study on assessment of soil quality is soils of two major cotton growing agroecological subregions (AESR)) of Vidarbha region of Maharashtra viz., AESR 6.3 and AESR 10.2.The SQI was computed for each pedon based on the thirteen soil properties obtained from five principal components which had eigen value> 0.9 and were able to explain > 85% variation. The SQI was found to be the highest in pedon 3 (1.63) from AESR 6.3 and pedon 12 (1.85) from AESR 10.2.

Suggested interventions

The gently sloping lower pediment, level to nearly level lower plain under double crop includes soil series Pohe-4, Shegaon-1, Shegaon-2, Shegaon-3, Shegaon-4 are the most potential zones in the study area. Under intensive cultivation practices, judicious soil and water conservation practices such as crop rotation including legumes mixed cropping, adoption of alternate beds and furrows for irrigation, proper application of manures and fertilizers and pesticides for pest control, etc. should be implemented to maintain productivity on sustainable basis. The gently sloping subdued plateau to very gently sloping upper pediment and upper plain comprising soil series Pohe-2, Pohe-3 and Shegaon-2 under single crop, with soil and water conservation measures and agronomic measures like crop rotation, raising of short duration crops like green gram, sesamum, sunflower this area can be turned up into double crop. The moderately sloping isolated mound and gently sloping subdued plateau having shallow soils, are under single crop and waste land needs to be protected through proper field bunding and mulching to reduce run-off and conserve moisture. Agroforestry and agri-horticultural interventions with suitable species may be needed. Trees of locally adaptable species useful to farmers can be planted along the bunds. The land between the bunds can be used for growing drought resistant crop species. Silvipasture systems with restricted grazing designed for dryland condition. It provides pastural activity for fodder and growing trees for timber and fuel. The practice also allows rearing of cattle for developing dairy as a side business, supporting agriculture.

Table 1. Soil Map legend

Sr. No.	Landform	Soil Series & its complex	Soil Characteristic	Soil Taxonomy
1.	Isolated Mound	Pohe-1	Very shallow, well drained, non -calcareous, very dark greyish brown, (10YR 3/2), clayey soils with moderate erosion.	Fine, smectitic, hyperthermic *Typic Ustorthents*
2.	Subdued plateau	Pohe-2+Pohe-3	Shallow, well drained, non-calcareous, very dark greyish brown, (10YR 3/2), clayey-skeletal soils with moderate erosion *in complex with,* well drained, non-calcareous, very dark greyish brown (10YR 3/2M) and clay-loam to clayey soils with moderate erosion.	Clayey-skeletal, smectitic, hyperthermic *Lithic Haplustepts* Clayey, smectitic, hyperthemic *Typic Haplustepts*
3.	Upper pediment	Pohe-4+Shegaon-1	Deep, moderately well drained, non-calcareous,dark brown (10YR 3/3) clayey soils with slight erosion *in complex with ;* Deep to very deep, moderately well drained, non-calcareous,dark greyish brown (10YR 4/3) clayey soils with slight erosion	Fine, smectitic, hyperthermic, *Vertic Haplustepts* Fine, smectitic, hyperthermic *Typic Haplusterts*
4.	Lower pediment	Shegaon-1	Deep to very deep, moderately well drained, non-calcareous,dark greyish brown (10YR 4/3) clayey soils with slight erosion	Fine, smectitic, hyperthermic *Typic Haplusterts*
5.	Upper plain	Pohe-3+Shegaon-2	well drained, non-calcareous, very dark greyish brown (10YR 3/2M) and clay-loam to clayey soils with moderate erosion *in complex with;* Deep, moderately well drained, calcareous, very dark greyish brown (10YR 3/2), fine soils with slight erosion	Clayey, smectitic, hyperthemic *Typic Haplustepts* Fine, smectitic, (Calcareous) hyperthermic *Typic Haplusterts*
6.	Lower plain	Shegaon-2+Shegaon-3	Deep, moderately well drained, calcareous, very dark greyish brown (10YR 3/2), fine soils with slight erosion, in complex with ; Very Deep, imperviously drained, very dark greyish brown (10YR 3/2), fine soil with slight erosion	Fine, smectitic, (Calcareous) hyperthermic, *Typic Haplusterts* Fine, smectitic, hyperthermic *Sodic Haplusterts*

Table 2. Physical properties of soils

Horizon	Depth (cm)	Sand	Silt	Clay	BD (Mg m^{-3})	HC (cm hr^{-1})	MWD (mm)	Water retention (%)		
		(%)						33 kPa	1500 kPa	AWC
Pedon- 1 (Isolated mound) Pohe-1: Fine, smectitic, hyperthermic *Typic Ustothents*										
Ap	0-20	24.67	34.58	40.75	1.58	2.52	0.78	32.49	20.25	12.24
Pedon- 2 (Subdued plateau) Pohe-2: Clayey-skeletal, smectitic, hyperthermic *Lithic Haplustepts*										
Ap	0-18	17.50	39.03	43.47	1.56	2.31	0.68	29.28	15.10	14.18
Bw	18-32	14.83	36.27	48.90	1.50	2.66	0.68	33.74	18.93	14.80
Pedon-3 (Subdued plateau) Pohe-3 : Clayey, smectitic hyperthermic *Typic Haplustepts*										
Ap	0-20	31.03	30.97	38.00	1.54	2.23	0.76	36.54	27.04	9.49
Bw1	20-60	26.57	34.10	39.33	1.58	2.49	0.78	35.25	23.65	11.60
Bw2	60-83	21.83	36.18	41.99	1.62	2.07	0.79	37.69	24.86	12.83
Pedon-4 (Upper pediment) Pohe-4: Fine,smectitic,hyperthermic *Vertic Haplustepts*										
Ap	0-20	19.47	31.63	48.90	1.45	2.51	0.75	33.18	21.37	11.81
Bw1	20-52	14.20	34.18	51.62	1.52	2.15	0.76	32.59	20.36	12.23
Bw2	52-89	10.33	32.62	57.05	1.54	1.97	0.79	39.85	26.96	12.89
Bw3	89-122	10.67	29.57	59.77	1.57	1.91	0.75	34.69	21.20	13.49
Pedon-5 (Lower pediment) Shegaon-1: Fine,smectitic,hyperthermic *Typic Haplusterts*										
Ap	0-18	31.00	26.89	42.11	1.44	2.43	0.81	34.11	22.18	11.93
Bw	18-42	27.00	28.18	44.83	1.48	2.08	0.83	34.58	20.37	14.21
Bss1	42-81	25.00	27.46	47.54	1.51	2.03	0.84	36.40	21.16	15.24
Bss2	81-118	21.67	29.43	48.90	1.55	1.67	0.81	41.57	24.79	16.78
Bss3	118-150	19.67	30.08	50.26	1.59	1.25	0.76	47.94	29.91	18.03
Pedon-6 (Upper plain) Shegaon-2 : Fine (Calcareous),smectitic,hyperthermic *Typic Haplusterts*										
Ap	0-19	28.13	33.83	38.03	1.55	2.22	0.79	28.87	17.65	11.22
Bw	19-42	25.53	31.00	43.47	1.57	2.19	1.80	31.07	17.72	13.36
Bss1	42-82	25.07	28.75	46.18	1.65	1.47	0.80	33.11	19.16	13.95
Bss2	82-125	23.17	27.93	48.90	1.67	1.41	0.86	38.84	22.00	14.83
Pedon-7 (Lower plain) Shegaon-3: Fine, smectitic hyperthermic *Sodic Haplusterts*										
Ap	0-17	21.78	32.58	45.64	1.68	2.46	0.77	28.06	14.78	13.29
Bw	17-54	19.48	31.62	48.90	1.70	2.38	0.74	30.98	17.38	13.60
Bss1	54-85	19.00	34.06	46.94	1.82	1.64	0.72	30.56	12.09	18.47
Bss2	85-120	8.88	32.44	58.68	1.76	0.66	0.73	32.81	13.45	19.36
Bss3	120-150	8.16	31.86	59.98	1.82	0.27	0.71	36.28	16.26	20.02

Table 3. Chemical and nutrient properties of soils

Horizon	Depth (cm)	pH (1:2.5)	EC (1:2.5)	O.C. (g kg^{-1})	$CaCO_3$ (%)	CEC cmol (p^+) kg^{-1}	B S (%)	Available micronutrients (mg kg^{-1}) Cu	Fe	Zn	Mn
Pedon- 1 (Isolated mound) Pohe-1: Fine, smectitic, hyperthermic *Typic Ustrothents*											
Ap	0-20	7.61	0.46	4.32	1.35	32.29	99.19	0.70	4.64	0.33	16.41
Pedon- 2 (Subdued plateau) Pohe-2: Clayey-skeletal, smectitic, hyperthermic *Lithic Haplustepts*											
Ap	0-18	7.54	0.37	8.46	7.17	33.73	96.78	2.35	5.12	0.48	20.41
Bw	18-32	7.64	0.6	6.49	3.88	33.92	97.52	1.66	4.71	0.42	16.588
Pedon-3 (Subdued plateau) Pohe-3: Clayey, smectitic, hyperthermic *Typic Haplustepts*											
Ap	0-20	8.03	0.15	7.94	0.82	32.93	95.66	0.86	6.12	0.48	10.03
Bw1	20-60	8.10	0.13	5.21	1.29	35.23	93.97	0.84	5.77	0.37	7.59
Bw2	60-83	8.10	0.16	3.62	2.23	37.88	92.80	0.83	5.07	0.33	5.26
Pedon-4 (Upper pediment) Pohe-4: Fine, smectitic, hyperthermic *Vertic Haplustepts*											
Ap	0-12	8.09	0.11	5.31	0.82	36.82	95.58	1.02	6.13	0.34	14.19
Bw1	12-42	8.12	0.13	4.14	2.23	36.06	96.59	0.88	5.38	0.24	11.35
Bw2	42-88	8.19	0.2	2.76	4.11	37.87	94.82	0.80	5.04	0.22	10.45
Bw3	88-122	8.27	0.23	2.94	1.53	38.92	92.94	0.68	4.92	0.18	8.95
Pedon-5 (Lower pedment) Shegaon-1: Fine, smectitic, hyperthermic *Typic Haplusterts*											
Ap	0-18	7.02	0.17	5.76	2.53	37.78	95.65	1.80	7.12	0.46	24.73
Bw1	18-42	7.28	0.16	3.84	3.35	38.37	93.94	1.15	6.45	0.42	22.86
Bw2	42-81	7.57	0.13	3.10	2.18	39.15	93.03	1.01	5.53	0.38	13.73
Bss1	81-118	7.42	0.15	2.57	3.82	39.69	92.32	0.96	5.04	0.37	15.11
Bss2	118-150	7.51	0.2	3.11	4.53	40.25	90.94	1.39	4.85	0.36	16.32
Pedon-6 (Upper plain) Shegaon-2 : Fine (Calcareous), smectitic, hyperthermic *Typic Haplusterts*											
Ap	0-19	7.89	0.33	6.87	4.55	35.65	91.06	1.55	10.25	0.37	21.30
Bw1	19-42	8.22	0.31	2.62	5.82	38.04	88.03	1.09	8.25	0.36	12.76
Bss1	42-82	8.38	0.22	2.18	9.46	41.26	89.41	1.15	6.24	0.33	11.59
Bss2	82-125	8.54	0.30	1.01	15.72	44.68	87.46	0.96	6.12	0.32	13.29
Pedon-7 (Lower plain) Shegaon-3: Fine, smectitic, hyperthermic *SodicHaplusterts*											
Ap	0-17	8.05	0.16	5.77	6.12	32.37	95.59	1.07	4.44	0.42	11.66
Bw	17-54	8.37	0.14	5.37	5.78	35.31	93.91	1.04	4.32	0.39	9.57
Bss1	54-85	8.8	0.18	4.98	7.82	37.46	93.55	1.02	3.85	0.44	8.40
Bss2	85-120	8.94	0.3	4.58	11.26	39.63	93.02	0.97	3.66	0.40	7.06
Bss3	120-150	9.01	0.7	4.45	14.84	42.47	89.99	0.92	3.08	0.45	6.49

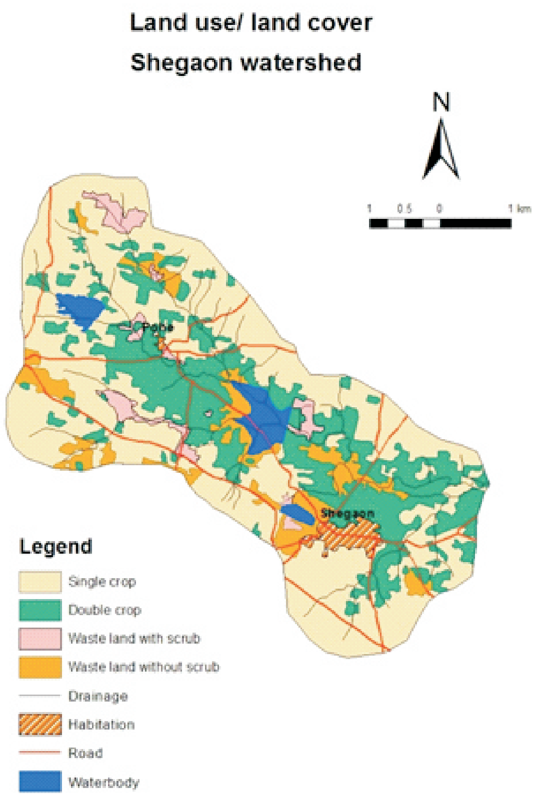

Fig. 1(a)

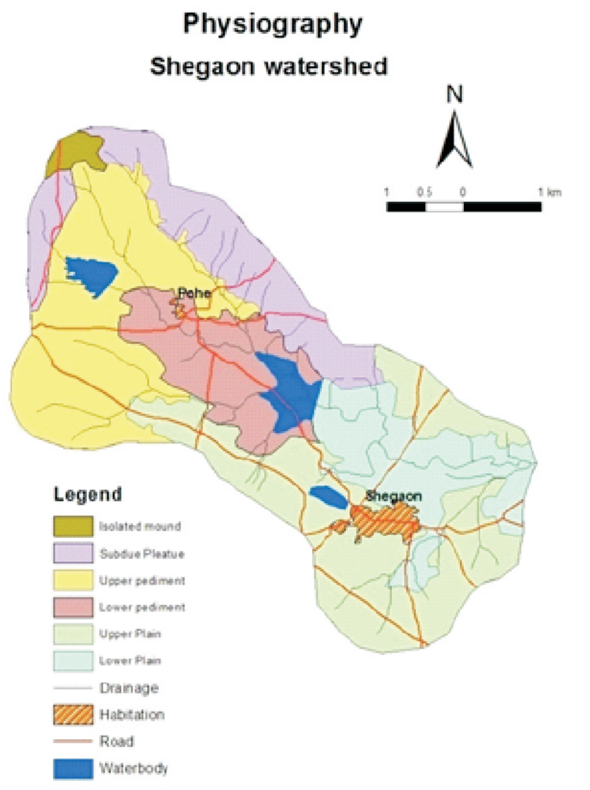

Fig. 1(b)

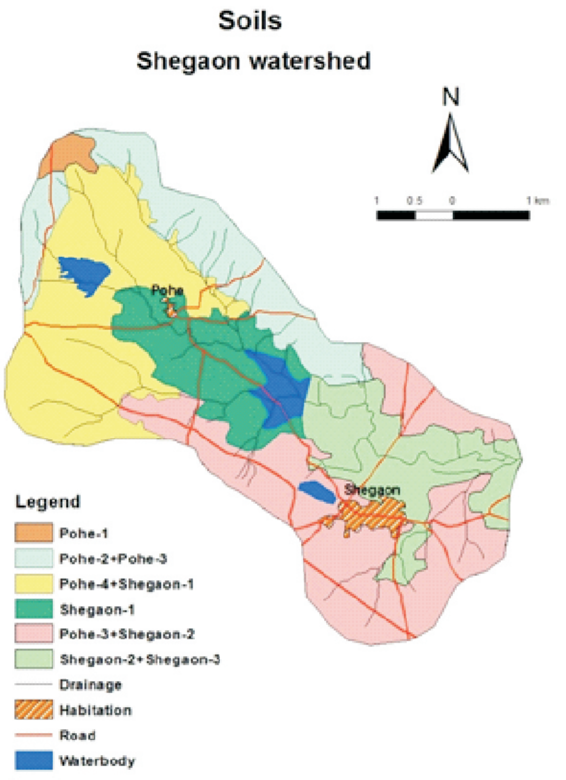

Fig. 1(c)

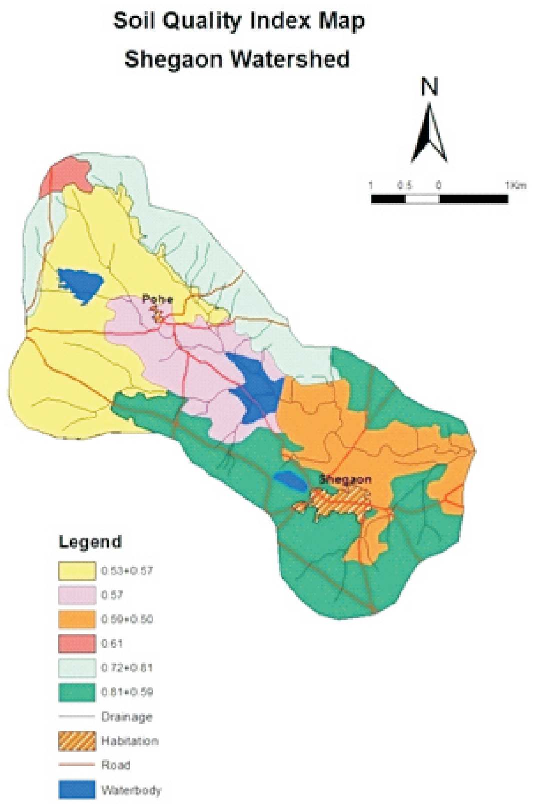

Fig. 1(d)

Table 4. Calculation of SQI using the weight factor from the eigen values of PCA for the different soil series of Shegaon watershed

Soil series	PC-1 HC	PC-2 ESP	PC-3 CO_2	PC-4 Clay	PC-5 O C	PC-6 Fe	SQI	RSQI
Weightage (Wi)	0.33	0.20	0.18	0.11	0.11	0.08	-	-
Pohe-1	1.00	0.55	0.28	0.73	0.57	0.56	0.61	76.39
Pohe-2	0.97	0.77	0.40	0.82	1.00	0.40	0.72	89.28
Pohe-3	0.77	1.00	0.68	0.80	0.69	0.15	0.81	100
Pohe-4	0.62	0.35	0.50	1.00	0.44	0.2	0.53	65.49
Shegaon-1	0.72	0.28	1.00	0.85	0.44	0.54	0.57	70.63
Shegaon-2	0.49	0.55	0.46	0.81	0.44	1.00	0.59	73.74
Shegaon-3	0.56	0.06	0.32	0.95	0.65	0.15	0.50	61.78

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