

uses. The maximum SOC percent was found in top surface layer of 0-20 cm under soils of dense forest land use (2.52%) followed by grassland (1.72%), agricultural land (1.43%), wasteland (0.98%) and least was observed in open and scrub forest land (0.86%). In the middle layer of 20-50 cm it was observed that higher carbon content was exhibited by dense forest land (1.18%) followed by grassland (0.89%), agricultural land (0.73%), open and scrub forest land (0.53%) and wasteland (0.51%). Similarly in the lower, 50-100 cm layer higher carbon content was exhibited by dense forest land (0.51%) followed by grassland (0.39%), agricultural land (0.31%), open and scrub forest land use (0.25%) and wasteland (0.22%) (Figure 4). The highest mean SOC stock found in dense forest land was 49.18, 39.24, and 29.72 (t/ha) followed by grassland having mean SOC stocks of 38.90, 32.66, and 23.98 (t/ha), agricultural land having SOC stock of 31.19, 25.66 and 18.85 (t/ha), wasteland having mean SOC stock of 23.43, 19.12, and 14.50 (t/ha) and least was observed in Open and Scrub forest land use system (18.14, 16.78, and 13.82 (t/ha) at three different soil depths of 0-20, 20-50 and 50-100 cm respectively. It shows that higher carbon stock was found at the top surface layer i.e. (0-20 cm depth) followed by decreasing trend at middle depths (20-50cm) and least SOC stock was found at lower depths (50-100 cm) among all land uses (Figure 5). The total SOC pool upto 100 cm depth of forest land (both dense and open forest) was highest (166.88 t/ha), followed by Grassland (95.54 t/ha), agricultural land (75.70 t/ha) and least was found in wasteland (57.05 t/ha) (Figure 6). Data revealed that highest SOC stock was found in upper 0-20 cm soil depth, followed by 20-50 cm soil depth and least in 50-100 cm among all land uses. This shows a general trend of decreasing SOC stock from upper to lower soil depths. Similarly, the total SOC pool in tons observed under land use systems were: Forest land, both dense and open forests (1,90,76,556.3 tons), Agricultural land (38,97,157.08), Grassland

(1,88,872.7 tons), and Wasteland (2,07,796.73 tons) (Figure 7). The findings of the analysis are given in Table 1. The overall percentage share of SOC pool exhibited under different land use systems found in Achanakmar were: forestland (81%), agricultural land (17%), grassland (1%) and wasteland (1%) (Figure 8).

The soil organic carbon stocks at three different depths under forest land use was much higher as compared to the other land uses, this is because of the highest litter fall and plant residues associated with microbial activities was observed in the forests which shows the interlinkage of forest ecosystems in storage or sequestration of SOC pools compared to other land uses. Since no such past study has been found in that area, our present study is having the relevance to some Indian studies e.g. Venkanna *et al.*, estimated SOC pools in semi-arid tropical region of southern India and found that forest land use system contain highest (87.29 Mg/ha) followed by grassland (60.03 Mg/ha), agricultural land (52.12 Mg/ha to 57.12 Mg/ha), and wasteland (44.81 Mg/ha) [21]. Choudhury *et al.*, estimated SOC pool in soils of North East India and found that forest land contains highest SOC pool followed by grassland, agriculture crop land and wasteland [22]. Thus, results of our study are similar and almost in the same trend under different land uses as estimated by these researchers.

4. Conclusion

The present study lead to the conclusion that soils of forest land use has a maximum carbon sequestration potential compared to other land use systems and provide significant mitigation options by managing the forest land use systems on priority basis for increased storage of carbon pool in forest soils.

Table 1: Status of Soil Organic Carbon pool under different land uses

Land Use	Area (ha)	Soil Depth (cm)	SOC (%)	B. D (g cm ⁻³)	SOC (ton/ha)	SOC Pool (Tons)
Dense forest	151109	0-20	2.52	0.98	49.18	74,31,540.62
		20-50	1.18	1.12	39.24	59,29,517.15
		50-100	0.51	1.24	29.72	44,90,203.94
Total		0-100			118.14	1,78,51,261.71
Open and Scrub forest	25083	0-20	0.86	1.01	18.14	4,57,880.21
		20-50	0.53	1.15	16.78	4,20,767.33
		50-100	0.25	1.25	13.82	3,46,647.06
Total		0-100			48.74	12,25,294.6
Agriculture/ Cropland	51485	0-20	1.43	1.11	31.19	16,05,817.15
		20-50	0.73	1.19	25.66	13,21,105.1
		50-100	0.31	1.28	18.85	9,70,234.83
Total		0-100			75.70	38,97,157.08
Grassland	1977	0-20	1.72	1.15	38.90	76,905.3
		20-50	0.89	1.24	32.66	64,568.82
		50-100	0.39	1.30	23.98	47,398.58
Total		0-100			95.54	1,88,872.7
Wasteland	3643	0-20	0.98	1.21	23.43	85,355.49
		20-50	0.51	1.28	19.12	69,635.95
		50-100	0.22	1.37	14.50	52,805.29
Total		0-100			57.05	2,07,796.73
Others	14381	-	-	-	-	-
Overall	2,47,678	-	-	-	-	2,33,70,382.82

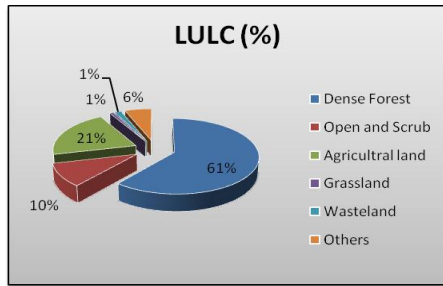


Figure 2: Land use (Study Area) in Percent

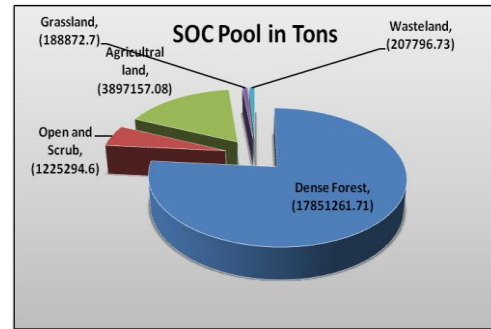


Figure 7: Total SOC Pool (tons) in land uses

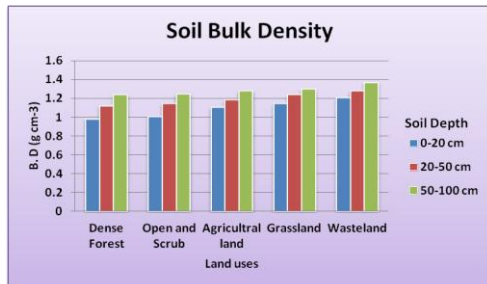


Figure 3: Values of Soil bulk density (g cm⁻³).

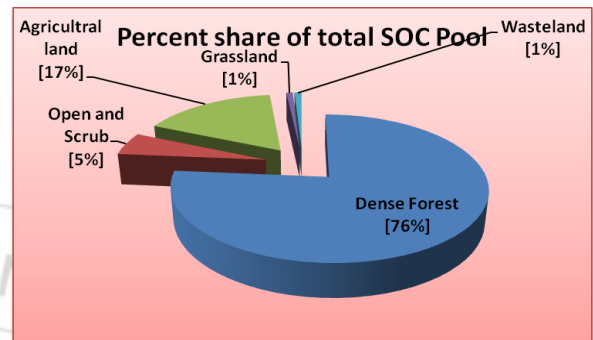


Figure 8: Percent share of total SOC Pool in land uses.

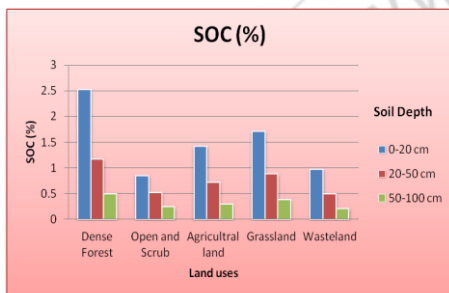


Figure 4: Values of SOC in Percent.

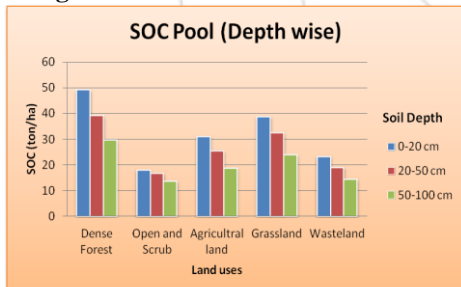


Figure 5: Depth wise SOC Pool (ton/ha)

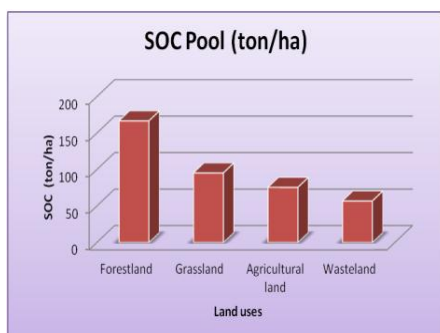


Figure 6: SOC Pool (ton/ha) in land uses.

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