

**INVENTORY OF SOIL RESOURCES OF
IDUKKI DISTRICT, KERALA STATE USING
REMOTE SENSING TECHNIQUES**

ABSTRACT

1.	Survey Area	Idukki District, Kerala State, India
2.	Geographical Extent	76 ⁰ 37' and 77 ⁰ 25' East Longitudes 09 ⁰ 15' and 10 ⁰ 21' North Latitudes
3.	Agro-climatic Region	Agro-climatic Zone-XII (West Coast Plains & Ghat Region)
4.	Total Geographical Area	4,36,307 hectare
5.	Type of Survey	Soil Resource Mapping (SRM) using Remote Sensing Techniques
6.	Base Maps	(i) Survey of India Toposheets (scale 1:50,000) 58 B/16, 58 F/03, 58 F/04, 58 F/07, 58 F/08, 58 C/09, 58 C/13, 58 C/14, 58 C/15, 58 G/01, 58 G/02, 58 G/03, 58 G/05, 58 G/06, 58 G/07 (ii) Geology Map (scale 1:2,50,000) of Geological Survey of India (iii) Satellite Imagery (scale 1:50,000) , LISS-III (IRS-ID)
7.	Scale of Mapping	1:50,000
8.	Period of Survey	February 2015 to March, 2015

9. Mapping unit wise soil association and their extent:

Sl.No	Mapping Unit	Series Association	Area (ha)	Area (%)
1	Ckn6b1	Udumbanchola-Chathurangapara	33331	7.64
2	CKn6c1	Vallakadavu-Vagamon	3979	0.91
3	CKn6d1	Vagamon-Vallakadavu	1297	0.30
4	CKn8b1	Pambadumpara-Anavilasam	57715	13.23
5	CKn8c1	Kumili-Peermedu	71069	16.29
6	CKn8d1	Kuttikkanam-Sakkulathumedu	20162	4.62
7	CKp3a1	Purapuzha-Thudanganadu	1482	0.34
8	CKu4b1	Pudupariyaram-Manakkad	3786	0.87
9	CKv3a1	Nadukkandam-Karinkunnam	5776	1.32
10	CKv3b1	Karinkunnam-Nadukkandam	1951	0.45
11	GGn6b1	Karimannur-Kanjar	23734	5.44
12	GGn6c1	Karimban-Venmattom	12682	2.91
13	GGn8b1	Kanjikuzhi-Velliyamattom	76326	17.49
14	GGn8c1	Pambla-Arakulam	27380	6.28
15	GGn8c2	Suryanelli-Benmore	24126	5.53
16	GGn8c3	Shola-Mannavanshola	8172	1.87
17	GGn8d1	Puttadi-Minmutti	24172	5.54
18	GGp3a1	Amaiyapuram-Thodupuzha	3251	0.75
19	GGu4a1	Maraiyor-Moolamattam	750	0.17
20	GGu4b1	Moolamattam-Tenkodam	5412	1.24
21	GGu4c1	Tenkodam-Moolamattam	4261	0.98
22	GGv3b1	Kaliyar-Vannappuram	2418	0.55
23	e	ROC	10522	2.41
24	f	Habitations	2310	0.53
25	g	Water bodies	10243	2.35
	Total		436307	100.00

10. Distribution of area under different Landscape/Geology classes:

S.No.	Geology	Area (ha)	Area (%)
1	Charnockite	200548	45.96
2	Granite Gneiss	212684	48.75
3	ROC (e)	10522	2.41
4	Habitations (f)	2310	0.53
5	Water bodies (g)	10243	2.35
	Total	436307	100.00

11. Distribution of area under different Physiography classes:

S.No.	Physiography	Area (ha)	Area (%)
1	Undifferentiated hills side slope	384145	88.04
2	Pediments	14209	3.26
3	Upper pediplains	10145	2.33
4	Narrow hill valleys	4733	1.08
5	ROC (e)	10522	2.41
6	Habitations (f)	2310	0.53
7	Water bodies (g)	10243	2.35
	Total	436307	100

12. Distribution of area under different Slope classes:

S.No.	Slope Classes	Area (ha)	Area (%)
1	Very gently to gently (1-5%)	14878	3.41
2	Gently to moderately (3-10%)	14209	3.26
3	Strongly to moderately steep (10-25%)	75023	17.20
4	Steep to very steep (25-50%)	309122	70.85
5	ROC (e)	10522	2.41
6	Habitations (f)	2310	0.53
7	Water bodies (g)	10243	2.35
	Total	436307	100.00

13. Distribution of area under different Depth classes:

S.No	Depth	Area (ha)	Area (%)
1	Deep to very deep (d4-d5)	305832	70.10
2	Very deep (d5)	107400	24.62
3	ROC (e)	10522	2.41
4	Habitations (f)	2310	0.53
5	Water bodies (g)	10243	2.35
	Total	436307	100.00

14. Distribution of area under different Erosion classes:

S.No	Erosion	Area (ha)	Area (%)
1	None to slight water erosion (eo-e1)	4733	1.08
2	Slight to Moderate erosion (e1-e2)	20568	4.71
3	Moderate water erosion (e2)	73533	16.85
4	Moderate to Severe erosion (e2-e3)	270064	61.90
5	Severe water erosion (e3)	44334	10.16
6	ROC (e)	10522	2.41
7	Habitations (f)	2310	0.53
8	Water bodies (g)	10243	2.35
	Total	436307	100.00

15. Distribution of area under different Management classes:

S.No	Management	Area (ha)	Area (%)
1	Unmanaged (M1)	166909	38.25
2	Unmanaged to Poorly managed(M1-M2)	142213	32.59
3	Poorly managed (M2)	17958	4.12
4	Poorly managed to Moderately managed (M2-M3)	61326	14.06
5	Moderately managed (M3)	9198	2.11
6	Moderately managed to Well managed (M3-M4)	10895	2.50
7	Well managed (M4)	4733	1.08
8	ROC (e)	10522	2.41
9	Habitations (f)	2310	0.53
10	Water bodies (g)	10243	2.35
	Total	436307	100.00

16. Distribution of mapping units under different Land Capability Classes

S. No.	Land Capability Class	Mapping Units	Area (ha)	Area (%)
1	II-III	CKp3a1, CKv3a1, CKv3b1, GGp3a1, GGv3b1	14878	3.41
2	III	CKu4b1, GGu4a1, GGu4b1	9948	2.28
3	IV	Ckn6b1, CKn6d1, GGn6b1	58362	13.38
4	VI-VII	CKn8b1	57715	13.23
5	VII	GGn8b1	76326	17.49
6	VIII	CKn8d1, GGn8d1	44334	10.16
7	Forest	GGu4c1,CKn6c1,CKn8c1,GGn6c1, GGn8c1, GGn8c2, GGn8c3	151669	34.76
8	Rock Out Crop (e)		10522	2.41
9	Habitation (f)		2310	0.53
10	Water bodies (g)		10243	2.35
		Grand Total	436307	100.00

17. Distribution of mapping units under different Soil Irrigability classes:

S. No.	Soil Irrigability Class	Mapping Units	Area (ha)	Area (%)
1	B	GGp3a1	3251	0.75
2	B-C	CKv3b1, CKp3a1, CKv3a1, CKu4b1,	21575	4.94
3	C	CKn8b1, Ckn6b1, GGn6b1, GGn8b1	191106	43.80
4	C-D	GGn8d1	24172	5.54
5	D	CKn6d1, CKn8d1	21459	4.92
6	Forest	GGn8c3, GGn8c2, CKn6c1, GGn8c1, GGn6c1, GGu4c1, CKn8c1	151669	34.76
7	Rock Out Crop (e)		10522	2.41
8	Habitation (f)		2310	0.53
9	Water bodies (g)		10243	2.35
Grand Total			436307	100.00

18. Distribution of mapping units under different Land Irrigability classes:

S. No.	Land Irrigability Class	Mapping Units	Area (ha)	Area (%)
1	2	CKp3a1, GGp3a1	4733	1.08
2	2-3	CKv3a1, CKv3b1, GGv3b1	10145	2.33
3	3	GGu4a1	750	0.17
4	3-4	CKu4b1, GGu4b1	9198	2.11
5	4	Ckn6b1, GGn6b1, CKn6d1	58362	13.38
6	6	CKn8b1, GGn8b1, CKn8d1, GGn8d1	178375	40.88
7	Forest	GGu4c1,CKn6c1,CKn8c1,GGn6c1, GGn8c1 GGn8c2, GGn8c3	151669	34.76
8	Rock Out Crop (e)		10522	2.41
9	Habitation (f)		2310	0.53
10	Water bodies (g)		10243	2.35
Grand Total			436307	100.00

19. Distribution of mapping units under different Hydrologic Soil Groupings:

S. No.	Hydrologic Soil Grouping	Mapping Units	Area (ha)	Area (%)
1	B	GGp3a1	3251	0.75
2	B-C	CKp3a1, CKv3a1, Kv3b1, GGv3b1	11627	2.66
3	C	CKu4b1, GGu4a1, GGu4b1	9948	2.28
4	D	Ckn6b1, CKn6d1, CKn8b1, CKn8d1, Gn6b1, GGn8b1, GGn8d1	236737	54.26
5	Forest	GGu4c1,CKn6c1,CKn8c1,GGn6c1, GGn8c1 GGn8c2, GGn8c3	151669	34.76
6	Rock Out Crop (e)		10522	2.41
7	Habitation (f)		2310	0.53
8	Water bodies (g)		10243	2.35
Grand Total			436307	100.00

SALIENT FEATURES:

- ❖ The interpretative grouping on land capability class (LCC) falls under eight classes. LCC class VII dominated accounting to 17.49 per cent of the area followed by class IV accounting 13.38 per cent. Forest accounts 34.76 per cent of the surveyed area.
- ❖ Nearly 43.80 per cent comes under Soil Irrigability class C followed by class C-D which accounts for 5.54 per cent and class B-C and C-D account for 4.94 and 5.54 per cent of the total area. Forest accounts for 34.76 per cent of the surveyed area.
- ❖ Majority of the area i.e 40.88 per cent comes under Land Irrigability class 6 followed by class 4 comprising an area of 13.38 per cent and class 2-3 accounting 2.33 per cent of the total area. Forest accounts for 34.76 per cent of the surveyed area.
- ❖ Majority of the area i.e. 54.26 per cent comes under Hydrological Soil grouping D followed by C accounting 2.28 per cent and forest area accounting 34.76 per cent of the surveyed area.
- ❖ Twenty two mapping units have been established in the survey area, of which, GGn8b1 unit occupies maximum area of 17.49 per cent followed by CKn8c1 unit (16.29%).
- ❖ Idukki district falls in two major landscape/geology classes; these are Charnockite and Granite Gneiss. Among them Granite Gneiss occupied 48.75% whereas Charnockite occupied 45.96% of the total area.
- ❖ The physiography of Idukki district is dominated by Undifferentiated Hill side slopes (88.04%) followed by Pediments (3.26 %) while Upper pediplains and Narrow hill valleys constitutes 2.33 % and 1.08 % of surveyed area.
- ❖ An area of 309112 ha (70.85%) of Idukki district comes under Steep to very steep slopes followed by Strongly to moderately steep (17.20%) while an area of 14209 ha (3.26%) comes under Gently to moderately slope whereas Very gently to gently slope occupied 14878 ha (3.41%).
- ❖ Most of the soils of the area are coming under deep to very deep (70.10%) category followed by very deep soils (24.62 %).
- ❖ Major area comes under Moderate to Severe erosion (61.90 %) and Moderate erosion (16.85 %). Slight to Moderate water erosion occupies 4.71 % whereas None to slight water erosion consist of 1.08 per cent only of the total area.

HOW TO USE SOIL RESOURCE MAPPING REPORT

This report embodies the results of the Soil Resource Mapping of Idukki district of Kerala, State and furnishes information on the geographical setting of the state vis-à-vis location, extent, physiography, relief, drainage, climate, geology, natural vegetation, agriculture, land use and soils.

The report contains information on nature and kind of soil resources with its extent on landscape and interpretative grouping of soils and land resources which includes land capability classification that helps to prepare scientific land use plan for agriculture, horticulture, forestry, grassland development and providing suggestive management guidelines for crop suitability and crop recommendations. The soils of the area have also been differentiated as per soil characteristics based on Soil Taxonomy (USDA) to enable the users for scientific land use planning.

Idukki District which spreads over an area of **4,36,307 hectare** have its district headquarters at Idukki. There are five taluks in the district viz Devikulam, Udumbanchola, Peermedu, Thodupuzha and Idukki. Survey of India Toposheets on 1:50,000 scale and the same have been used as reference maps for the survey. Satellite data (NRSC Imagery) has been used for image interpretation and soil mapping. In the report each soil mapping unit is marked by a symbol which represent the five levels of generalization as features within mapping units *viz.*

Geology (parent material)	GG	-	Granite Gneiss
Physiography	v	-	Upper pediplains
Slope	3	-	1-5 % Slope
Land use	b	-	Plantation
Soils	1	-	Association of soil series

Each soil association is restricted to a maximum of three soil series found within concerned soil mapping unit.

For the use of the soil resource report, first user needs to locate the area of interest on the map and note down the soil mapping units. Permanent features such as road, stream, lakes and village habitation etc. shown on the map will help user to locate the area of interest on the map. For the detailed information on soil mapping unit in respect of soil series in the area of interest, its extent, present and proposed land uses reference may be made to chapter 3.7, 4 and **Appendix-I and II**.

Any comments and/or suggestions on the report are welcome. For any additional information and clarification, further correspondence or personal contact may be established with:

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