

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

सारांश / ABSTRACT

1.	सर्वेक्षित क्षेत्र Survey Area	तिरुवन्तपुरम जिला, केरल राज्य, भारत Thiruvananthapuram District, Kerala State, India
2.	भौगोलिक विस्तार Geographical Extent	08° 17' एवं 08° 54' पूर्वी देशान्तर 76° 41' एवं 77° 17' उत्तरी अक्षांश 08° 17' and 08° 54' East Longitudes 76° 41' and 77° 17' North Latitudes
3.	कृषि जलवायु क्षेत्र Agro-climatic Region	कृषि जलवायु क्षेत्र- XII (पश्चिमी तटीय मैदान एवं घाट क्षेत्र) Agro-climatic Zone-XII (West Coast Plains & Ghat Region)
4.	कुल भौगोलिक क्षेत्रफल Total Geographical Area	2,19,433 हेक्टेयर 2,19,433 hectare
5.	सर्वेक्षण का प्रकार Type of Survey	सुदूर संवेदन तकनीक का उपयोग कर मृदा संसाधन मानचित्रण Soil Resource Mapping (SRM) using Remote Sensing Techniques
6.	आधार मानचित्र Base Maps	(1) भारतीय सर्वेक्षण विभाग का टोपोशीट (मापक 1:50,000) 58 डी/09, 58 डी/10, 58 डी/13, 58 डी/14, 58 डी/15 एवं 58 एच/01, 58 एच/02, 58 एच/03 एवं 58 एच/06 (2) भारतीय भूवैज्ञानिक सर्वेक्षण का भूतत्त्व मानचित्र (मापक 1:2,50,000) (3) उपग्रह चित्र (मापक 1:50,000), एल. आई. एस. एस-III (आई. आर. एस-आईडी) (i) Survey of India Toposheets (scale 1:50,000) 58 D/09, 58 D/10, 58 D/13, 58 D/14, 58 D/15 and 58H/01, 58H/02, 58H/03, 58H/06 (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.	मानचित्रण का मापन Scale of Mapping	1:50,000
8.	सर्वे की अवधि Period of Survey	नवम्बर, 2014 से दिसम्बर, 2015 November 2014 to December 2015

9. Mapping unit wise soil association and their extent:

Sl.No	Mapping Unit	Series Association	Area	% area
1	CAI2b1	Manakkad -Puthanthope series	4910	2.24
2	CKn6b1	Chullimanur - Punnakkad series	721	0.33
3	CKn6c1	Peppara - Manikettiyamala series	2545	1.16
4	CKn8b1	Murukunnimala - Bonakadu series	1523	0.69
5	CKn8c1	Bonakadu - Kallar series	22016	10.03
6	CKn8d1	Ponmudi series	1586	0.72
7	GGi4b1	Kalankavu - Vengad series	644	0.29
8	GGn6b1	Vamanapuram - Pachapaluvalli series	39823	18.15
9	GGn6c1	Pachapaluvalli - Vamanapuram series	4711	2.15
10	GGn6d1	Vengad - Kalankavu series	1602	0.73
11	GGn8b1	Pullampara - pattara series	5150	2.35
12	GGn8c1	Vithura - Pattara series	13610	6.20
13	GGp3a1	Swamykunnu - Kandala series	18815	8.57
14	GGp3b1	Chettichal -Swamykunnu series	2981	1.36
15	GGu4b1	Anad -Peringamala series	67161	30.61
16	GGu4c1	Elavupallam - Tharimoodu series	3181	1.45
17	GGv3b1	Kaliyur - Mukkola series	13854	6.31
18	e	ROC series	1007	0.46
19	f	Habitations series	10243	4.67
20	g	Waterbodies series	3350	1.53
	Total		219433	100.00

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

S.No.	Geology	Area (Ha)	Area (%)
1	Coastal Alluvium	4910	2.24
2	Charnockite	28391	12.94
3	Granite Gneiss	171532	78.17
4	ROC (e)	1007	0.46
5	Habitations (f)	10243	4.67
6	Water bodies (g)	3350	1.53
	Total	219433	100.00

11. Distribution of area under different Physiography classes:

S.No.	Physiography	Area (Ha)	Area (%)
1	Coastal Alluvial Plains	4910	2.24
2	Undifferentiated hills side slope	93287	42.51
3	Plateau plains / hill tops / mesa	644	0.29
4	Narrow hill valleys	21796	9.93
5	Pediments	70342	32.06
6	Upper pediplains	13854	6.31
7	ROC (e)	1007	0.46
8	Habitations (f)	10243	4.67
9	Water bodies (g)	3350	1.53
	Total	219433	100.00

12. Distribution of area under different Slope classes:

S.No.	Slope Classes	Area (Ha)	Area (%)
1	Nearly level to very gently (0-3%)	4910	2.24
2	Very gently to gently (1-5%)	35650	16.25
3	Gently to moderately (3-10%)	70986	32.35
4	Strongly to moderately steep (10-25%)	49402	22.51
5	Steep to very steep (25-50%)	43885	20.00
6	ROC (e)	1007	0.46
7	Habitations (f)	10243	4.67
8	Water bodies (g)	3350	1.53
	Total	219433	100.00

13. Distribution of area under different Depth classes:

S.No	Depth	Area (Ha)	Area (%)
1	Deep	114876	52.35
2	Deep to very deep	45280	20.64
3	Moderately deep	3832	1.75
4	Moderately deep to deep	2545	1.16
5	Very deep	38300	17.45
3	ROC (e)	1007	0.46
4	Habitations (f)	10243	4.67
5	Water bodies (g)	3350	1.53
	Total	219433	100.00

14. Distribution of area under different Erosion classes:

S.No	Erosion	Area (Ha)	Area (%)
1	Slight water erosion (e1)	21796	9.93
2	Slight to Moderate erosion (e1-e2)	4910	2.24
3	Moderate water erosion (e2)	84196	38.37
4	Moderate to Severe erosion (e2-e3)	90743	41.35
5	Severe water erosion (e3)	3188	1.45
6	ROC (e)	1007	0.46
7	Habitations (f)	10243	4.67
8	Water bodies (g)	3350	1.53
	Total	219433	100.00

15. Distribution of area under different Management classes:

S.No	Management	Area (Ha)	Area (%)
1	Unmanaged to Poorly managed(M1-M2)	1602	0.73
2	Poorly managed (M2)	1586	0.72
3	Poorly managed to Moderately managed (M2-M3)	86229	39.30
4	Moderately managed (M3)	88470	40.32
5	Moderately managed to Well managed (M3-M4)	8131	3.71
6	Well managed (M4)	18815	8.57
7	ROC (e)	1007	0.46
8	Habitations (f)	10243	4.67
9	Water bodies (g)	3350	1.53
	Total	219433	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	GGp3a1 , GGp3b1 , GGv3b1	35650	16.25
2.	III	GGu4b1	67161	30.61
3.	III-IV	CA12b1 , GGi4b1	5554	2.53
4.	IV	CKn6b1, GGn6b1	40544	18.48
5.	IV-VI	GGn6d1	1602	0.73
6.	VI-VII	CKn8b1 , GGn8b1	6673	3.04
7.	VIII	CKn8d1	1586	0.72
8.	Forest	CKn6c1 , CKn8c1 , GGn6c1 , GGn8c1 , GGu4c1	46063	20.99
9.	Rock Out Crop (e)		1007	0.46
10.	Habitations (f)		10243	4.67
11.	Water bodies (g)		3350	1.53
		Grand Total	219433	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 , GGp3b1	21796	9.93
2.	B-C	GGi4b1, GGu4b1, GGv3b1	81659	37.21
3.	C	CA12b1, CKn6b1, CKn8b1, GGn6b1	46977	21.41
4.	C-D	GGn8b1	5150	2.35
5.	D	CKn8d1, GGn6d1	3188	1.45
6.	Forest	CKn6c1, CKn8c1, GGn6c1, GGn8c1, GGu4c1	46063	20.99
7.	Rock Out Crop (e)		1007	0.46
8.	Habitations (f)		10243	4.67
9.	Water bodies (g)		3350	1.53
		Grand Total	219433	100.00

18. Distribution of mapping units under different Land Irrigability classes

S. No.	Land Irrigability Class	Mapping Units	Area (ha)	Area (%)
1.	2-3	GGp3a1, GGp3b1, GGv3b1	35650	16.25
2.	3	CAI2b1	4910	2.24
3.	3-4	GGi4b1, GGu4b1	67805	30.90
4.	4	CKn6b1, GGn6b1, GGn6d1	42146	19.21
5.	6	CKn8b1, CKn8d1, GGn8b1	8259	3.76
6.	Forest	CKn6c1, CKn8c1, GGn6c1, GGn8c1, GGu4c1	46063	20.99
7.	Rock Out Crop (e)		1007	0.46
8.	Habitation (f)		10243	4.67
9.	Water bodies (g)		3350	1.53
		Grand Total	219433	100.00

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

S. No.	Hydrologic Soil Grouping	Mapping Units	Area (ha)	Area (%)
1.	A-B	CAI2b1	4910	2.24
2.	B	GGp3a1	18815	8.57
3.	B-C	GGp3b1	2981	1.36
4.	C	CKn6b1, GGi4b1, GGn6b1, GGn6d1, GGu4b1, GGv3b1	123805	56.42
5.	D	CKn8b1, CKn8d1, GGn8b1	8259	3.76
6.	Forest	CKn6c1, CKn8c1, GGn6c1, GGn8c1, GGu4c1	46063	20.99
7.	Rock Out Crop (e)		1007	0.46
8.	Habitation (f)		10243	4.67
9.	Water bodies (g)		3350	1.53
		Grand Total	219433	100.00

SALIENT FEATURES:

- ❖ The interpretative grouping on land capability class (LCC) falls under eight classes. LCC class III dominated accounting to 30.61 per cent of the area followed by class IV accounting 18.48 per cent. Forest accounts 21 per cent of the surveyed area.
- ❖ Nearly 37.21 per cent comes under Soil Irrigability class B-C followed by class C which accounts for 21.41 per cent and class B and D account for 9.93 and 1.45 per cent of the total area.
- ❖ Majority of the area i.e 30.90 per cent comes under Land Irrigability class 3-4 followed by class 4 comprising an area of 19.21 percent and class 2-3 accounting 16.25 per cent of the total area. Forest accounts for 21 per cent of the surveyed area.
- ❖ Majority of the area i.e. 56.42 per cent comes under Hydrological Soil grouping C followed by B accounting 8.57 per cent of the surveyed area.
- ❖ Seventeen mapping units have been established in the survey area, of which, GGu4b1 unit occupies maximum area of 30.61 percent followed by GGn6b1 unit 18.15 percent.
- ❖ Thiruvananthapuram district falls in two major landscape/geology classes; these are Charnockite and Granite Gneiss. Among them Granite Gneiss occupied 78.17% whereas Charnockite occupied 12.94% of the total area.
- ❖ The physiography of Thiruvananthapuram district is dominated by Undifferentiated Hill side slopes (42.51%) followed by Pediments (32.06 %) while Upper pediplains and Narrow hill valleys constitutes 6.31 % and 9.93 % of surveyed area.
- ❖ An area of 70986 ha (32.35%) of Thiruvananthapuram district comes under Gently to moderately slopes followed by Strongly to moderately steep 49402 ha (22.51%) while an area of 43885 ha (20%) comes under Steep to very steep whereas Very gently to gently slope occupied 35650 ha (16.25%) and Nearly level to very gently slope occupied 4910 ha (2.24%).
- ❖ Most of the soils of the area are coming under deep (52.35%) category followed by deep to very deep soils (20.64 %).
- ❖ Major area comes under Moderate to Severe erosion (41.35 %) and Moderate erosion (38.37%). Slight water erosion occupies 9.93 % whereas Slight to Moderate erosion consist of 2.24 percent only of the total area.

HOW TO USE SOIL RESOURCE MAPPING REPORT

This report embodies the results of the Soil Resource Mapping of Thiruvananthapuram 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.

Thiruvananthapuram District which spreads over an area of **2,19,433 hectare** have its district headquarters at Thiruvananthapuram. There are six taluks in the district viz Thiruvananthapuram, Chirayinkeezhu, Neyyattinkara, Nedumangadu, Varkala and Kattakad a. 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	-	Undifferentiated hills side slope
Slope	3	-	3-10 % Slope
Land use	b	-	Plantation
Soils	1	-	Association of soil series (Kalliyur and Mukkola)

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:

<p>The Chief Soil Survey Officer Soil & Land Use Survey of India IARI Buildings, New Delhi 110 012. Phone: 011-25841263 Fax 011-25843811 Email: csso-slusi@nic.in, slusi-agri@nic.in <u>Visit us at http://slusi.dacnet.nic.in</u></p>	<p>The Soil Survey Officer Soil & Land Use Survey of India Survey No.207, Kodigehalli Vidyaranya pura post, Bangalore 560097. 080- 23640761, 23641119 Fax -080-23640751 Email: soilkar@nic.in, ssobanglore@nic.in <u>Visit us at http://slusi.dacnet.nic.in</u></p>
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