

Inventory of Soil Resources of Purulia District, West Bengal State Using Remote Sensing and GIS Techniques

ABSTRACT

1.	Survey Area	:	Purulia District, West Bengal
2.	Geographical Extent	:	Between 22° 42' 22" and 23° 41' 53" North Latitude and 86° 49' 16" and 86° 54' 22" East Longitude
3.	Agro Climatic Region	:	Part of Eastern plateau and Hill region (VII) and part of Lower Gangetic Plain Region (III)
4.	Total area of the district	:	625,899 ha.
5.	Kind of Survey	:	Soil Resources Mapping using Remote Sensing Techniques.
6.	Base map	:	a) IRS – ID Geocoded Satellite Imagery (1: 50000 scale) b) SOI – Toposheet (1:50,000 scale)
7.	Scale of Mapping	:	1 : 50,000
8.	Period of Survey	:	May, 2012 – March,2013

9. Soil Series association mapped and their respective area

Sl. No.	Mapping symbol	Mapping Unit	Soil Series Association	Total Area (ha)	Area (%)
1	1	GGn8c1	Khudadihi-Lohardangi-Darasingh	13650	2.18
2	1.1	GGn8d1	Amra-Lohardangi	464	0.07
3	2	GGn6c1	Lohardangi-Balarampur-Khudadihi	13758	2.20
4	2.1	GGn6d1	Balarampur-Amra	934	0.15
5	3	GGr4c1	Ajodhya-Balarampur	1973	0.32
6	3.2	GGr4d1	Balarampur-Ajodhya	1223	0.20
7	3.1	GGz4a1	Dumkadih- Dumka- Hatimara	2046	0.33
8	6	GGz4c1	Dumka -Matha-Bagmundi	193	0.03
9	15	GGz4d1	Dumkadih-Dumka-Bagmundi	2768	0.44
10	7	GGv3a1	Hatimara-Darikata	36206	5.78

Sl. No.	Mapping symbol	Mapping Unit	Soil Series Association	Total Area (ha)	Area (%)
11	11	GGv3a2	Hatimara- Dumkadih	35578	5.68
12	5	GGv3b1	Gharakuli-Joynagar-Bagmundi	18398	2.94
13	14	GGv3c1	Barabhum-Pura	15066	2.41
14	14.1	GGv3c2	Matha - Barabhum - Bagmundi	10484	1.68
15	12	GGv3d1	Darikata-Matha	13356	2.13
16	8	GGv3(1)a1	Hatimara-Shyamnagar-Phuphundi	46584	7.44
17	9	GGv2(1)a1	Dhanara-Bispuria-Parsa	110107	17.59
18	10	GGw2(1)a1	Damda-Pathadih-Chirudih	115325	18.43
19	13	GGw2(1)a2	Nischintapur-Morandih-Pratappur	23042	3.68
20	41	SCn7c1	Keshidanga-Thakurdanga	11007	1.76
21	41.1	SCn7d1	Thakurdanga-Keshidanga	794	0.13
22	49	SCn6c1	Keshidanga-Thakurdanga-Lalpur	4171	0.67
23	46	SCr4c1	Keshidanga-Lalpur	5954	0.95
24	46.1	SCr4d1	Lalpur-Keshidanga	633	0.10
25	48	SCv3a1	Holdupur-Tilgora	6159	0.98
26	47	SCv3b1	Raghunathpur-Sidpur-Holdupur	7309	1.17
27	45	SCv3c1	Sidpur-Raghunathpur-Sibpur	2534	0.40
28	42	SCv3d1	Sibpur-Sidpur-Raghunathpur	1057	0.17
29	43	SCv2(1)a1	Boro-Ladda-Chinturi	27206	4.35
30	44	SCw2(1)a1	Chandro- Gopinathpur- Boro	24998	3.99
31	31	SDn8c1	Rangapada-Brindinath	2131	0.34
32	32	SDn6c1	Brindinath -Ituri-Rangapada	400	0.06
33	33	SDr4c1	Brindinath-Ituri	374	0.06
34	36	SDv3a1	Paharpur-Dhanganger	2427	0.39
35	37	SDv3b1	Dhanganger-Paharpur	978	0.16
36	34	SDv3c1	Dhanganger-Paharpur	436	0.07
37	34.1	SDv3d1	Dhanganger-Bhurkudbari	1594	0.25
38	38	SDv2(1)a1	Gopalpur-Banara-Jarukha	10537	1.68
39	39	SDw2(1)a1	Jobacob-Hadmedhaura-Laikdanga	4891	0.78
40		Brick Kiln		39	0.01
41		Homestead		33208	5.31
42		Mines		120	0.02
43		Reservoir		3023	0.48

Sl. No.	Mapping symbol	Mapping Unit	Soil Series Association	Total Area (ha)	Area (%)
44		River		5871	0.94
45		ROC		44	0.01
46		Tank		712	0.11
47		Waterbody		6137	0.98
			TOTAL	6,25,899	100.0

10. Area under different erosion classes

Sl. No.	Erosion	Area (ha)	Area (%)
1.	None to slight erosion	362690	57.95
2.	Moderate erosion	133585	21.34
3.	Moderate to severe erosion	78278	12.51
4.	Severe erosion	2192	0.35
5.	Misc.	49154	7.85
	TOTAL	625,899	100.0

11. Area under different slope classes

Sl. No.	Slope Classes	Area (ha)	Area (%)
1.	Nearly level to very gently slope	316106	50.50
2.	Very gently to gently slope	198166	31.66
3.	Gently to moderately slope	11968	1.91
4.	Moderately slope	3196	0.51
5.	Strongly to moderately steep slope	19263	3.08
6.	Moderately steep to steep slope	11801	1.89
7.	Steep to very steep slope	16245	2.60
8.	Misc.	49154	7.85
	TOTAL	625,899	100.0

12. Area under different landscape and physiography classes

Sl. No.	Landscape	Physiography	Area (ha)	Area (%)
1.	Granite gneiss	Undifferentiated Hills side slope	28806	4.60
2.		Hillocks/hummocks/ subdued hill	3196	0.51
3.		Undulating upland	5007	0.80
4.		Upper pediplains	285779	45.66
5.		Lower pediplains	138367	22.11
6.	Sandstone	Undifferentiated hills side slope	2531	0.40
7.		Hillocks/hummocks/ subdued hill	374	0.06
8.		Upper pediplains	15972	2.55
9.		Lower pediplains	4891	0.78
10.	Schist	Undifferentiated hills side slope	15972	2.55
11.		Hillocks/hummocks/ subdued hill	6587	1.05
12.		Upper pediplains	44265	7.07
13.		Lower pediplains	24998	3.99
Misc.			49154	7.85
TOTAL			625,899	100.0

13. Area under different depth classes

Sl. No.	Depth classes	Area (ha)	Area (%)
1.	Shallow	37605	6.01
2.	Moderately deep	177869	28.42
3.	Deep	45165	7.22
4.	Very deep	316106	50.50
5.	Misc.	49154	7.85
TOTAL		625,899	100.0

14. Area under different Land use / Land cover classes

Landuse	Area(ha)	Area (%)
Degraded foest	10484	1.68
Open scrub	22823	3.65
Plantation	26685	4.26
Rainfed Single crop cultivation	445106	71.11
Forest (20 - 40 %)	71647	11.45
Misc,	49154	7.85
TOTAL	625,899	100.0

15. Salient Features:

- ❖ Granite gneiss, sandstone and schist are three major landscapes found in purulia district.
- ❖ Total 52 nos. soil series have been mapped in Purulia district.
- ❖ About 71.11% of the area falls under rainfed single crop cultivation.
- ❖ Soils of the district fall under five physiographic classes of which majority of the area falls under upper pediplains (55.28%)
- ❖ Soils of the district come under seven slope classes. About 316106 ha (50.50%) of survey area having nearly level to very gently slope range followed by very gently to gently slope range (31.66%).
- ❖ Soils of the district comes under four depth classes in which very deep soils (50.50%) and moderately deep soils (28.42%) are major slope classes in the survey area.
- ❖ Majority of the area suffers from none to slight erosion (57.95%) and moderate erosion (21.34%) hazard followed by moderate to severe (12.51%) and severe erosion (0.35%).
- ❖ About 3,16,106 ha (50.50%) of total surveyed area comes under Land Capability Class II which are good land and suitable for cultivation followed by Land Capability Class III-IV covering an area 11.64%, which are moderately good land to fairly good land with occasional cultivation, Land Capability Class II-III Land suitable for cultivation, moderately good land to good land with limitations and III (4.91%) suitable for cultivation, moderately good land with major limitations in cultivated lands, Land Capability Class VI (0.57%)

not suitable for cultivation, suitable for pasture and forestry with minor limitations whereas VII (0.54%) land not suitable for cultivation, suitable for pasture and forestry with major limitations.

- ❖ About 79226 ha. (12.66%) of total surveyed area comes under forest land.
- ❖ Valley fills/Depression lands and lower pediplains can be used for intensive agriculture with taking effective agronomic practices in addition to proper soil and water conservation measures.
- ❖ Assured irrigation in addition to application of balanced fertilizer as per soil test data is needed for increase in agriculture production.
- ❖ Soils of the area are taxonomically classified into four orders i.e. Alfisols, Entisols, Inceptisols and Ultisols.

HOW TO USE SOIL RESOURCE MAPPING REPORT

This report embodies the results of the Soil Resources Mapping of Purulia district, West Bengal, providing information on the geographical setting of the district, such as location, extent, physiography, relief, drainage, climate, geology, natural vegetation, agriculture, land use and soils.

The report contains other information on Interpretative grouping of soils (Chapter 7) such as land capability classes; land irrigability classes, soil suitability grouping and hydrological grouping, the crops suitability, horticulture development, forest, forage and grassland development; water harvesting, water storage and water management are also essential for soil and land resource management. The genesis and classification of the soils are also discussed in **Chapter 5**.

Purulia district of West Bengal state is spread over an area of 625,899 ha. The district is covered by 19 SOI topographical sheets on the scale of 1: 50,000 which are used as base material along with satellite imageries.

Each soil mapping unit is marked by mapping unit i.e. GGn8c1 (Granite Gneiss; Undifferentiated hill side slope; 25-50 % slope; forest land use; Soil Series Association, describing - Khudadihi as dominant series in association with Lohardangi and Darasingh series). Each soil association is restricted to a maximum of three soil series.

For the use of the soil resource report, first locate the area of your 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 help to locate the area of interest on the map. For the detailed information on soil mapping unit in respect of soil series of the area of interest, its extent, present land uses, proposed land uses and reference may be made to **Chapter 4, Appendix I and II**.

The mapping unit used in soil mapping represents the five levels of mapping i.e. GGn8c1 may be referred as follows:

GG	-	Granite Gneiss	-	Landscape
n	-	Undifferentiated hill side slope	-	Physiography
8	-	25-50 %	-	Slope class
c	-	Forest land	-	Land use
1	-	Association of Soil series with erosion and management soil unit.		

Any comment and suggestion on the report would be welcome. For any further enquiry / or clarification, correspondence or personal contact may be established, with

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