Soil & Land Use Survey of India

An Apex Organization for Generating Soil & Land Resource Database





Soil and Land Use Survey of India

Natural Resources Management Division Department of Agriculture & Co-operation Ministry of Agriculture IARI Buildings New Delhi 110012 Ph: 011-25841263, 25843811, 25849486 Fax: 011-25843811 Log on http://slusi.dacnet.nic.in/ Soil and Land Use Survey of India (SLUSI), formerly known as All India Soil and Land Use Survey (AISLUS), an apex institution in the country steps into 55 years of dedicated service to the nation in conducting Soil Survey since 1958. It operates soil survey and land resource inventory in the country from it's Head Quarter at New Delhi through seven centres located at Noida, Kolkata, Bangalore, Nagpur, Ranchi, Hyderabad and Ahmedabad. To adopt modern technology in soil survey a **Remote Sensing Centre with advanced computer systems has been established with the assistance of FAO/UNDP in 1982**.

The mandate of the organization is to provide detailed scientific database on soil and land characteristic to the various State User Departments for planning and implementation of soil and water conservation in the Watershed based Programme for Natural Resources Management.

The data base generation has been conceptualized to meet the need for planning at National/State/Basin, District/Catchment and Village/Microwatershed level. The major activities of SLUSI are as under:

- i) Rapid Reconnaissance Survey (RRS)
- ii) Detailed Soil Survey (DSS)
- iii) Land Degradation Mapping (LDM)
- iv) Soil Resource Mapping (SRM)
- v) Consultancy Services

Rapid Reconnaissance Survey (RRS): The objective of rapid reconnaissance survey is to demarcate and identify priority watershed in the catchment area on 1:50K scale based on either sediment yield index or run off generation potential index.

- It provides information on physiography, slope, soil depth, surface texture, land use and land cover, erosion, surface condition and existing management practices besides priority categorization of watersheds.
- Thematic maps on various soil and land parameters could be generated out of this survey that will be helpful for macro level watershed development planning. Priority map of microwatersheds of 3C1 of Ken Catchment of M.P. and U.P. States has been shown below for an example.



Thematic Maps of Ken Catchment

Continue



Detailed Soil Survey (DSS): The objective of detailed soil survey is to generate detailed information on soil and land characteristics of the priority area using cadastral map (1:4K/8K) or large scale aerial photograph (1:10K to 1:20k) for micro level planning

- Soil survey report contains the following physical and chemical properties: Soil pH, Electrical Conductance, Organic Matter, Cation Exchange Capacity, Base Saturation, Exchangeable bases, Water Holding Capacity, Particle Density, Bulk Density, Percent Pore Space, Particle Size Distribution, Moisture Equivalent, Cole Value and N, P, K.
- □ Soils are classified and interpreted for various utility purposes such as: Land Capability Classification, Soil Irrigability, Land Irrigability, Soil Hydrological Grouping, Paddy Soil Grouping and Soil Fertility.

It provides spatial distribution with extent of various types of soils that are used as inputs for land management, soil management, crop management and nutrient management which are essential for micro level planning. A representative Detailed Soil map of RD9f Subwatershed of Rupnarayan Catchment of West Bengal is portrayed here under.







Suggestive Recommendation for Soil Conservation Measures		
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Gany enagging was service waterways Misc. (rabitation, Tarik, River & Cana)	" 🕵 "	

Land Degradation Mapping (LDM): The objective of land degradation mapping is to generate realistic and scientific information base on degraded lands using remote sensing techniques on 1:50K scale.

- The report provides the spatial extent of various kinds of degraded lands suffering from water erosion, wind erosion, salt affliction, water logging, ravines, shifting cultivation, mining, glacial movement and mud flat etc.
- The information is used for planning development of degraded lands at district level

For a reference, a representative LDM map of part of Gwalior District of M.P. presented below



Land Degradation Map of part of Gwalior District

Land Use wise distribution of Degraded Lands in Gwalior District, M.P (Area in ha):-

LAND USE	TYPE OF DEGRADATION	GWALIOR	BHITARWAR	DABARA	TOTAL AREA	PERCENTAGE (%)
AGRICULTURE	WATER EROSION	12529	2334	5413	20276	4.44
	WATERLOGGING	938	201	327	1446	0.32
	SALT AFFLICTION	1899	526	100	2525	0.56
FOREST	WATER EROSION	51361	1916	5358	58635	12.84
	WATERLOGGING	781	-	-	781	0.17
PLANTATION	WATER EROSION	122	-	-	122	0.02
OTHERS	WATER EROSION	25098	7745	17840	50683	11,11
	WATERLOGGING	542	174	-	716	0.16
TOTAL	SALT AFFLICTION	1934	4044	1190	7168	1.57
LAND	STONY/ROCKY WSATE	1152	-	555	1707	0.38
		96356	16940	30783	144079	31.57

TYPE OF DEGRADATION	SEVERITY	GWALIOR	BHITARWAR	DABARA	TOTAL AREA	PERCENTAGE (%)
WATER EROSION	SEVERE	86101	9988	16801	112890	24.73
	VERY SEVERE	2985	916	6300	10201	2.23
	SHALLOW RAVINES	24	1091	5510	6625	1.46
	SUB TOTAL	89110	11995	28611	129716	28.42
WATERLOGGING	SEASONAL	1944	375	327	2646	0.58
	PERMANENT	317	-	-	317	0.07
	SUB TOTAL	2261	375	327	2963	0.65
SALT AFFLICTION	MODERATELY SALINE ALKALI	3799	3441	1209	8499	1.85
	STRONGLY SALINE ALKALI SUBTOTAL	34	1129 45 70	81 1290	1244 9693	0.27
	CODICIAL					
STONY/ROCKY WASTE	-	1152	-	555	1707	0.38
	TOTAL	96356	16940	30783	144079	31.57

Distribution of Degraded Lands with severity in Gwalior District, M.P (Area in ha):-

Soil Resource Mapping (SRM): Soil mapping and development of digital soil database on 1:50K using remote sensing and GIS is another major task of the organization. An area of 110 m ha was covered during XI Plan. Such data base would form a national repository of soil data essential for district level planning to address multi-disciplinary issues including Agriculture. A representative SRM map of Jaunpur Districts of Uttar Pradesh is depicted below.



Mapping Symbol	Soil Series Association	Area (ha)
1	Amlawha-Pvrepur Saraiva-Alishapur	11691
2	Tikri-Gurani	3472
3	Khaaa-Jairampur-Pyrepur Saraiya	5705
4	Mariahu-Marcha-Bachhuwanpur	4494
5	Bachhuwanpur-Karanpur-Mariahu	1919
6	Jairampur-Gauria-Khaoa	8877
8	Khaaa-Naiva-Kataini	22
9	Tikri-Kunuwanpur	339
10	Jairampur-Kataini-Rawatpur	1510
11	Rukunpur-Sirthu-Bafri	59
12	Teeraaan-Rukunnur-Bafri	264
13	Kataini-Khaaa-Naiva	690
14	Kataini-Naiva-Jairampur	862
98	Habitation	166
99	Waterbodies	242
	Total	40319

Table showing Soil Series Association



Table Showing Soil Series Association and Land Capability Class of Jaunpur District

Mapping Symbol	Soil Series Association	LCC Class	Area (ha)
1	Amlawha-Pvrepur Saraiva-	II to III	116914
2	Tikri-Gurani	II	34729
3	Khaaa-Jairampur-Pvrepur Saraiva	II	57051
4	Mariahu-Marcha-Bachhuwanpur	IV	44944
5	Bachhuwanpur-Karanpur-Mariahu	IV	19191
6	Jairampur-Gauria-Khaaa	II	88774
8	Khaqa-Naiva-Kataini	IV to II	227
9	Tikri-Kunuwanpur	II to III	3399
10	Jairampur-Kataini-Rawatpur	II to III	15107
11	Rukunpur-Sirthu-Bafri	III	593
12	Teeraaon-Rukunpur-Bafri	IV to III	2649
13	Kataini-Khaoa-Naiva	II to IV	6900
14	Kataini-Naiva-Jairampur	IV to II	8629
98	Misc		1667
99	Waterbodies		2425



Soil Conservation Measures			
SCM	Description	Area (ha)	
SCM-01	Strip cropping, Crop rotation, Stubble mulching	315974	
SCM-02	Land leveling and field bunding , Contour bunding, Stubble mulching	7493	
SCM-03	Land leveling, Stone line bunding / Contour farming, Gully Plugging Stubble mulching, Agro- forestry	75640	
	Miscellaneous	4092	
	Total	403199	

Consultancy Services: Since 1994, the organization has initiated consultancy services in the field of soil and land resource mapping for watershed development planning purposes. The area of expertise is listed below.

- Development of digital soil data base using Remote Sensing and GIS techniques
- □ Watershed code reconciliation using GIS
- Development of DSS for Watershed Management using RS and GIS
- Soil fertility mapping of Delhi using RS and GIS Delhi Government
- Preparation of Perspective Watershed Development Plan for Madhya Pradesh
- Desertification Status Mapping of Uttaranchal and Himachal Pradesh and on 1:500K
- Impact Evaluation of Watershed Development Programme in Shifting Cultivation areas of North Eastern States Districts using Remote Sensing and GIS Techniques

□ Project-I : Soil Fertility Map of Delhi State (2006-2007)



Project-II : Desertification Status Mapping of Uttaranchal & Himachal Pradesh States on 1:500K (2004-2005)



UTTARANCHAL STATE		
Desertification/Land Degradation Units	Area (ha)	Process wise Area (ha)
Forest-water erosion-low (Fw1)	82473	82473
Forest-vegetal degradation-low (Fv1)	1748458	-
Forest-vegetal degradation-high (Fv2)	94368	-
Land with scrub-vegetal degradation-low (Sv1)	110642	-
Land with scrub-vegetal degradation-high (Sv1)	119581	2073049
Agriculture Unirrigated-salinization-low (Ds1)	811	811
Peril-glacial-frost shattering (in cold areas)-high (Lf2)	827279	827279
Water body / Drainage (W)	396,66	-
Settlement	19,94	-
No Apparent Degradation (NAD)	2364688	-
Total Area Under Desertification/Land Degradation		2983612
Total Geographical Area (TGA)	5348300	
Percentage of TGA	55.70	



HIMACHAL PRADESH & PUNJAB STATES				
Desertification/Land Degradation Units	Area	Process wise		
	(ha)	Area (ha)		
Forest-water erosion-low (Fw1)	52459	-		
Forest-water erosion-high (Fw2)	14347	-		
Land with scrub-water erosion-high (Sw2)	30426	97232		
Forest-vegetal degradation-low (Fv1)	284465	-		
Forest-vegetal degradation-high (Fv2)	65007	-		
Land with scrub-vegetal degradation-low (Sv1)	1248744	-		
Land with scrub-vegetal degradation-high (Sv2)	320413	1918629		
Dune / sandy area-wind erosion-low (Ee1)	259	259		
Barren-mass movement-low (Bg1)	3434	-		
Barren-mass movement-high (Bg2)	1409	4843		
Peril-glacial-frost shattering (in cold areas)-high (Lf2)	741783	741783		
Water body / drainage (W)	25937	-		
Settlement	-	-		
No Apparent Degradation (NAD)	2778617	-		
Total Area Under Desertification/Land Degradation	-	2762746		
Total Geographical Area (TGA)	5567300			
Percentage of TGA	49.62			



Water Body

Grand Total

Built-up Area

1,196

1,08,773

307

Desertification Mapping of 1A1C3 Watershed of Chamba District, Himachal Pradesh on 1:50K

□ Project-III : Preparation of Perspective Plan for Watershed Development Programme using Soil Resource Mapping in Vidisha District, M.P. (2005-2006)



Index Map



Project-IV : Impact Evaluation of Watershed Management Programme in Shifting Cultivation areas of North Eastern States Districts (2010-11)

Shifting Cultivation Mapping , Distt. - Aizwal (Mizoram)

- To evaluate the impact of watershed development on shifting cultivation areas of seven districts of North Eastern States using Remote Sensing and GIS techniques
- To monitor the change in biomass content of the district in order to appraise the overall impact of watershed development
- Shifting Cultivation mapping and development of digital soil data base on 1:50K multidate /multitemporal digital data (IRS-P6; LISS-III) of different seasons and periods using Remote Sensing and GIS is another major task of the organization.





□ Conclusion: - Negative impact of watershed development in controlling shifting cultivation area is observed from the analysis of satellite data.

Contact: SLUSI

Head Quarter Chief Soil Survey Officer I.A.R.I. Buildings, Pusa Campus New Delhi - 110 012 Ph: 011-25841263, 25843811, 25849486

Fax: 011-25843811

Email: <u>csso-slusi@nic.in</u>

<u>slusi-agri@nic.in</u>

Remote Sensing Centre Computer Programmer C-4, Sector-1, Gautam Budh Nagar Noida - 201 301 Ph: 0120-2544140 Fax: 0120-2544140 Email: prog-slusi@nic.in aislus@nic.in

Bangalore Centre Soil Survey Officer Mrida Sarvekshan Bhawan Survey No. 207 Kodigehalli, Post Vidyaranpura Bangalore - 560 097 Ph: 080-23640761, 23640751 Fax: 080-23640751 Email: <u>ssobangalore-slusi@nic.in</u> <u>soilkar@nic.in</u>

> Nagpur Centre Soil Survey Officer Bhoomi Sarvekshan Bhawan CPWD Colony, Katol Road Nagpur - 440 013 Ph: 0712-2582293, 2581831 Fax: 0712-2582293

> Email: <u>ssonagpur-slusi@nic.in</u> <u>soilnag@nic.in</u>

Hyderabad Centre Soil Survey Officer Mrida Sarvekshan Bhawan Near to G.H.M.C. Buildings, Rajendra Nagar Hyderabad - 500 030 Ph: 033-24301581 Fax: 033-24301425 Email: <u>ssohyderabad-slusi@nic.in</u> <u>soilap@nic.in</u> Regional Centre (North)

Soil Survey Officer Mrida Sarvekshan Bhawan C-4, Sector-1, Gautam Budh Nagar Noida - 201 301 Ph: 0120-2442694, 2544804 Fax: 0120-2442694 Email: <u>ssonoida-slusi@nic.in</u> <u>soilup09@nic.in</u>

Kolkata Centre Soil Survey Officer Mrida Sarvekshan Bhawan Baishnavghata, Block E, Patuli, Township Kolkata – 700 094 Ph:033-24307632,24301581 Fax: 033-24301425; Email: <u>ssokolkata-slusi@nic.in</u> <u>soilkol@nic.in</u>

Ahmedabad Centre Soil Survey Officer Mrida Sarvekshan Bhawan Opposite Godavari Flats, Vasana, PO Paldi Ahmedabad - 380 007 Ph: 079- 26621135,26603590, Fax :26610161

Email: <u>ssoaahmedabad-slusi@nic.in</u> <u>soilqj@nic.in</u>

Ranchi Centre

Soil Survey Officer Mrida Sarvekshan Bhawan Plot No. 32/456, B.A.U. Campus, Kanke **Ranchi - 834 006** Ph: 0651-2450186 Fax: 0651-2450145 Email: <u>ssoranchi-slusi@nic.in</u> <u>soiljhr@nic.in</u>