



5.1 Introduction

5.1.1 In India, on the basis of nine-fold land-use classification, the land use statistics is available for roughly 306 million hectares (mha) of land out of the 329 million hectares of the total geographic area which accounts for 93% of the total land. **The land use classification of India over the years is presented in table 5.1.1.**

5.1.2 The data shows that land use in the country, over the last five decades, has undergone drastic change. Land under agriculture has almost doubled, forest cover has dwindled to less than half, large tracts of fertile agriculture and forest land have been diverted for urbanization and settlements. Deforestation contributes to loss of precious top soil which amounts to about 35 percent of the global sediment load going to oceans even though water flowing through our rivers is only about five percent of the flow of rivers in the world.

5.1.3 The area under barren and uncultivable land is generally unsuitable for agriculture either because of topography or its inaccessibility. Instances are the desert areas in Rajasthan, the saline land in part of the Rann of Kutch in Gujarat, and the weed infested and ravine land in Madhya Pradesh. Recently, the area under non-agricultural land has increased due to increase in developmental activities; e.g. housing, transport system, irrigation, etc. About 24 mha are occupied by the housing, the industry and for other non-agricultural uses, 19.2 mha are snowbound and remote, leaving only 263 million hectare for agriculture, forestry, pasture and other biomass production. The net sown area increased from 119 mha in 1950-51 to 140 mha in 1970-71, mostly through reclamation of old fallow and cultivable wastelands and diversion of groves. Since 1970-71, the net area sown has remained almost the same at around 141 mha levels. However, there is an increase of 48.48% in the gross sown area, which indicates areas sown more than once have increased considerably. The net irrigated area showed a three fold increase.

Table 5.1.2 depicts the selected categories of land use classification.

5.1.4 The **table 5.1.3 gives the details of waste lands** in India in 2005-06 and 2008-09. Percentage of wasteland to total geographic area has reduced from 14.91% in 2005-06 to 14.75% in 2008-09.

5.2 Soil Survey

5.2.1 Soil survey constitutes a valuable resource inventory linked with the survival of life on the earth. The technological advancements in the field of remote sensing and Geographical Information System have been a boon for such surveys. **The State wise coverage of detailed soil survey in India is in table 5.2.1, the State wise coverage of soil resource mapping is in table 5.2.2, the reporting under Rapid Reconnaissance Survey in table 5.2.3.**

5.2.2 Alkali, or alkaline, soils are clay soils with high pH (> 9), a poor soil structure and a low infiltration capacity. Often they have a hard calcareous layer at 0.5 to 1 meter depth. Alkali soils owe their unfavorable physico-chemical properties mainly to the dominating presence of sodium carbonate which causes the soil to *swell*. Alkaline soils are difficult to take into agricultural production. Alkaline soils are difficult to take into agricultural production. State wise extent of alkali once in India and physical progress in its reclamation are depicted in table 5.2.4

Table 5.1.1 : Land use classification in India.... (Cont.../)

(Million Hectare)

Classification	1950-51	1960-61	1970-71	1980-81	1990-91	2000-01	2001-02
1	2	3	4	5	6	7	8
I. Geographical Area	328.73	328.73	328.73	328.73	328.73	328.73	328.73
II. Reporting Area for Land Utilisation Statistics (1 to 5)	284.32	298.46	303.76	304.16	304.86	305.18	305.12
1. Forests	40.48	54.05	63.92	67.47	67.81	69.53	69.57
2. Not Available for Cultivation (a+b)	47.52	50.75	44.64	39.62	40.48	41.62	41.78
(a) Non Agricultural Uses	9.36	14.84	16.48	19.66	21.09	23.86	24.06
(b) Barren and Unculturable Land	38.16	35.91	28.16	19.96	19.39	17.76	17.72
3. Other Uncultivated Land excluding fallow land (a+b+c)	49.45	37.64	35.06	32.32	30.22	27.70	27.36
(a) Permanent Pastures and Other Grazing Land	6.68	13.97	13.26	11.97	11.40	10.66	10.58
(b) Land Under Miscellaneous Tree Crops and Groves not Included in Net Area Sown	19.83	4.46	4.30	3.61	3.82	3.43	3.38
(c) Culturable Wasteland	22.94	19.21	17.50	16.74	15.00	13.61	13.40
4. Fallow Land (a+b)	28.13	22.82	19.88	24.75	23.36	25.08	24.96
(a) Fallow Lands Other Than Current Fallows	17.45	11.18	8.76	9.92	9.66	10.31	10.32
(b) Current Fallows	10.68	11.64	11.12	14.83	13.70	14.77	14.64
5. Net Area Sown (6-7)	118.75	133.20	140.27	140.00	143.00	141.40	141.45
6. Gross Cropped Area	131.89	152.77	165.79	172.63	185.74	185.37	189.71
7. Area Sown More Than Once	13.15	19.57	25.52	32.63	42.74	43.97	48.26
8. Cropping Intensity*	111.10	114.70	118.20	123.30	129.90	131.10	134.10
III. Net Irrigated Area	20.85	24.66	31.10	38.72	48.02	55.08	56.67
IV. Gross Irrigated Area	22.56	27.98	38.20	49.78	63.20	75.97	78.73

Table 5.1.1 : Land use classification in India.... (Concluded)

Classification	2002-03	2003-04	2004-05	2005-06 (P)	2006-07 (P)	2007-08 (P)	2008-09 (P)	2009-10 (P)&	2010-11(P)
1	9	10	11	12	13	14	15	16	17
I. Geographical Area	328.73	328.73	328.73	328.73	328.73	328.73	328.73	328.73	328.73
II. Reporting Area for Land Utilisation Statistics (1 to 5)	305.34	305.56	305.58	305.43	305.64	305.67	305.69	305.61	305.90
1. Forests	69.70	69.73	69.72	69.79	69.81	69.63	69.63	70.00	70.00
2. Not Available for Cultivation (a+b)	42.08	42.24	42.34	42.51	42.63	43.19	43.32	42.95	43.56
(a) Non Agricultural Uses	24.27	24.66	24.76	25.03	25.19	26.01	26.31	26.17	26.51
(b) Barren and Unculturable Land	17.81	17.58	17.58	17.48	17.44	17.18	17.02	16.78	17.05
3. Other Uncultivated Land excluding fallow land (a+b+c)	27.40	26.97	26.96	26.92	27.05	26.85	26.51	26.34	26.28
(a) Permanent Pastures and Other Grazing Land	10.50	10.44	10.42	10.42	10.36	10.36	10.34	10.14	10.30
(b) Land Under Miscellaneous Tree Crops and Groves not Included in Net Area Sown	3.37	3.40	3.38	3.38	3.45	3.12	3.40	3.35	3.32
(c) Culturable Wasteland	13.53	13.13	13.16	13.12	13.24	13.07	12.76	12.85	12.66
4. Fallow Land (a+b)	33.47	25.49	25.14	24.17	25.72	25.11	24.86	26.23	24.59
(a) Fallow Land Other Than Current Fallows	11.78	11.21	10.71	10.50	10.48	10.35	10.32	10.48	10.32
(b) Current Fallows	21.69	14.28	14.43	13.67	15.24	14.76	14.54	15.75	14.27
5. Net Area Sown (6-7)	132.69	140.97	141.14	141.89	140.30	140.90	141.36	139.18	141.58
6. Gross Cropped Area	175.62	190.20	190.42	192.80	193.72	195.16	195.10	188.99	198.97
7. Area Sown More Than Once	42.93	49.23	49.28	50.90	53.72	54.25	53.74	49.81	57.39
8. Cropping Intensity*	132.40	134.90	134.90	135.90	138.10	138.50	138.00	135.79	140.54
III. Net Irrigated Area	53.78	56.62	58.87	60.20	60.86	63.10	63.20	61.93	63.60
IV. Gross Irrigated Area	72.55	78.00	80.00	82.63	85.78	87.92	88.42	85.09	89.36

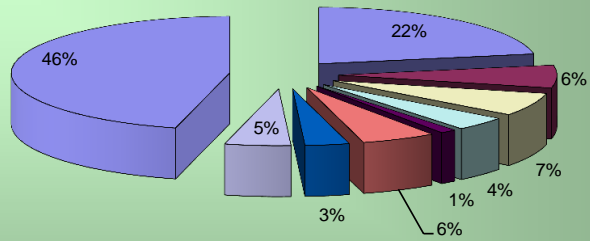
Source : State of Indian Agriculture 2011-12 Dept of Agr.& Cooperation, Ministry of Agriculture.

P : Provisional (except geographical area)

* : Cropping Intensity is obtained by dividing the gross cropped area by the net area sown expressed in percentage.

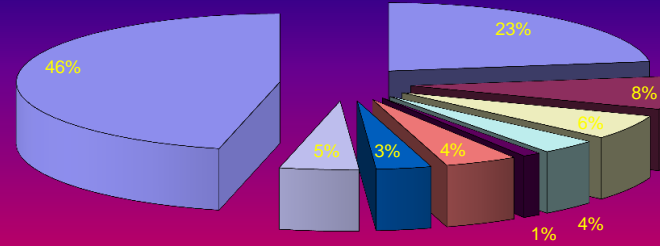
& In 2009-10 there is significant decline in total cropped area and net area sown due to decline in net area sown in the states of Andhra pradesh, Bihar, Jharkhand, Rajasthan, Tamil Nadu, Uttar Pradesh, West Bengal. This was mainly due to deficient rainfall

Chart 5.1 : Land use in India -1980-81



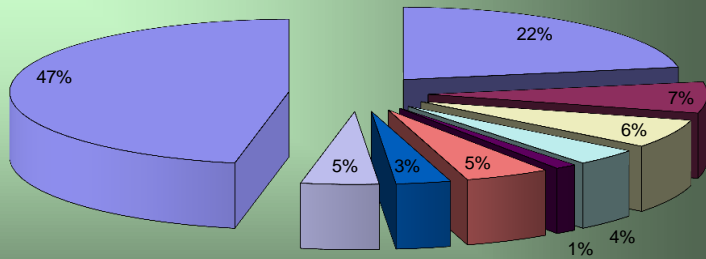
- | | | |
|---|---------------------------------------|--------------------------------|
| ■ Forests | ■ Non Agricultural Uses | ■ Barren and unculturable land |
| ■ Permanent Pastures and other grazing land | ■ Miscellaneous tree crops and groves | ■ Culturable Wasteland |
| ■ Fallow Land | ■ Net area sown | ■ |

Land Use in India-2000-01



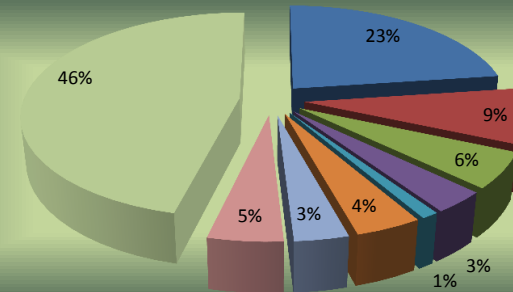
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|---|---------------------------------------|--------------------------------|
| ■ Forests | ■ Non Agricultural Uses | ■ Barren and unculturable land |
| ■ Permanent Pastures and other grazing land | ■ Miscellaneous tree crops and groves | ■ Culturable Wasteland |
| ■ Fallow Land | ■ Net area sown | ■ |

Land use in India-1990-91



- | | | |
|---|---------------------------------------|--------------------------------|
| ■ Forests | ■ Non Agricultural Uses | ■ Barren and unculturable land |
| ■ Permanent Pastures and other grazing land | ■ Miscellaneous tree crops and groves | ■ Culturable Wasteland |
| ■ Fallow Land | ■ Net area sown | ■ |

Land Use in India 2010-11



- | | | |
|---|---|--------------------------------|
| ■ Forests | ■ Non Agricultural Uses | ■ Barren and Unculturable Land |
| ■ Permanent Pastures and Other Grazing Land | ■ Land Under Miscellaneous Tree Crops and | ■ Culturable Wasteland |
| ■ Fallow Lands Other Than Current Fallows | ■ Current Fallows | ■ Net Area Sown |

Table 5.1.2: Selected categories of land use in India**(Million Hectares)**

Year	Net area sown	Total cropped area	Area sown more than once (3-2)	Net Irrigated Area	Gross Irrigated Area	Area Irrigated more than once (6-5)
1	2	3	4	5	6	7
1950-51	118.75	131.89	13.15	20.85	22.56	1.71
1951-52	119.40	133.23	13.83	21.05	23.18	2.13
1952-53	123.44	137.68	14.23	21.12	23.31	2.18
1953-54	126.81	142.48	15.67	21.87	24.36	2.49
1954-55	127.85	144.09	16.24	22.09	24.95	2.86
1955-56	129.16	147.31	18.16	22.76	25.64	2.88
1956-57	130.85	149.49	18.64	22.53	25.71	3.17
1957-58	129.08	145.83	16.75	23.16	26.63	3.47
1958-59	131.83	151.63	19.80	23.40	26.95	3.55
1959-60	132.94	152.82	19.89	24.04	27.45	3.42
1960-61	133.20	152.77	19.57	24.66	27.98	3.32
1961-62	135.40	156.21	20.81	24.88	28.46	3.58
1962-63	136.34	156.76	20.42	25.67	29.45	3.79
1963-64	136.48	156.96	20.48	25.89	29.71	3.82
1964-65	138.12	159.23	21.11	26.60	30.71	4.11
1965-66	136.20	155.28	19.08	26.34	30.90	4.56
1966-67	137.23	157.36	20.12	26.91	32.68	5.78
1967-68	139.88	163.74	23.86	27.19	33.21	6.01
1968-69	137.31	159.53	22.22	29.01	35.48	6.47
1969-70	138.70	162.27	23.57	30.20	36.97	6.78
1970-71	140.86	165.79	24.93	31.10	38.20	7.09
1971-72	139.72	165.19	25.47	31.55	38.43	6.88
1972-73	137.14	162.15	25.01	31.83	39.06	7.22
1973-74	142.42	169.87	27.46	32.55	40.28	7.74
1974-75	137.79	164.19	26.40	33.71	41.74	8.03
1975-76	141.65	171.30	29.64	34.59	43.36	8.77
1976-77	139.48	167.33	27.86	35.15	43.55	8.40
1977-78	141.95	172.23	30.28	36.55	46.08	9.53
1978-79	142.98	174.80	31.82	38.06	48.31	10.25
1979-80	138.90	169.59	30.69	38.52	49.21	10.69
1980-81	140.29	172.63	32.34	38.72	49.78	11.06
1981-82	142.12	176.75	34.63	40.50	51.41	10.91
1982-83	140.81	172.75	31.94	40.69	51.83	11.14
1983-84	143.21	179.56	36.35	41.95	53.82	11.88
1984-85	140.90	176.33	35.43	42.15	54.53	12.38
1985-86	140.90	178.46	37.56	41.87	54.28	12.42
1986-87	139.58	176.41	36.83	42.57	55.76	13.19
1987-88	134.09	170.74	36.65	42.89	56.04	13.14
1988-89	141.89	182.28	40.39	46.15	61.13	14.98
1989-90	142.34	182.27	39.93	46.70	61.85	15.15
1990-91	143.00	185.74	42.74	48.02	63.20	15.18

Cont..

Table 5.1.2: Selected categories of land use in India (Concluded)**(Million Hectares)**

Year	Net area sown	Total cropped area	Area sown more than once (3-2)	Net Irrigated Area	Gross Irrigated Area	Area Irrigated more than once (6-5)
1	2	3	4	5	6	7
1991-92	141.63	182.24	40.61	49.87	65.68	15.81
1992-93	142.72	185.70	42.98	50.29	66.76	16.47
1993-94	142.34	186.58	44.25	51.34	68.26	16.92
1994-95	142.96	188.05	45.09	53.00	70.65	17.65
1995-96	142.20	187.47	45.27	53.40	71.35	17.95
1996-97	142.93	189.50	46.57	55.11	76.03	20.91
1997-98	141.95	189.99	48.04	55.21	75.67	20.46
1998-99	142.75	191.65	48.90	57.44	78.67	21.23
1999-00	141.06	188.40	47.33	57.53	79.22	21.69
2000-01	141.36	185.34	44.00	55.13	76.19	21.05
2001-02	140.73	188.01	47.28	56.92	78.42	21.50
2002-03#	132.47	173.89	41.94	53.87	73.41	19.54
2003-04	140.76	189.66	48.95	56.96	78.15	21.19
2004-05(p)	141.17	191.10	50.46	59.21	81.18	21.98
2005-06(p)	141.46	192.73	51.76	60.79	84.26	23.47
2006-07(p)	140.00	192.38	52.56	62.70	86.77	24.06
2007-08(p)	140.90	195.23	54.20	63.10	87.92	24.82
2008-09(p)	141.36	195.31	53.41	63.20	88.42	25.22
2009-10(p)@	139.17	188.99	49.84	61.93	85.09	23.15
2010-11(p)	141.58	198.97	57.39	63.60	89.36	25.76

Source: Directorate of Economics & Statistics, Department of Agriculture & Cooperation.

(p): Provisional

: In 2002-03 there is significant decline in Total Cropped Area and Net Area Sown due to decline in net area sown in the States of Andhra Pradesh, Karnataka, Kerala, Madhya Pradesh, Maharashtra, Odisha, Rajasthan, Tamil Nadu, West Bengal and Haryana. This was mainly due to deficient rainfall.

@ : : In 2009-10 there is significant decline in Total Cropped Area and Net Area Sown due to decline in net area sown in the States of Andhra Pradesh, Bihar, Jharkhand, Rajasthan, Tamil Nadu, Uttar Pradesh and West Bengal. This was mainly due to deficient rainfall.

Table 5.1.3: State Category wise total area under wastelands (sq.km) during 2008-09 vis-a-vis 2005-06 and change in Wasteland during the period.

State	No of Disticts	Total Geographic Area (TGA)	Total Waste Land(WL)		Change	Total Reduction	Total Increase	% of WL to TGA		% Change over 2005-06
			2005-06	2008-09				2005-06	2008-09	
Andhra Pradesh	23	275068	38788.22	37296.62	-1491.60	1682.10	190.46	14.10	13.56	-0.54
Arunachal Pradesh	16	83743	5743.83	14895.24	9151.41	108.48	9259.89	6.86	17.79	10.93
Assam	23	78438	8778.02	8453.86	-324.16	862.56	538.04	11.19	10.78	-0.41
Bihar	37	94171	6841.09	9601.01	2759.92	1895.09	4654.41	7.26	10.20	2.93
Chattisgarh	16	135194	11817.82	11482.18	-335.64	379.06	43.15	8.74	8.49	-0.25
Delhi	1	1483	83.34	90.21	6.87	3.62	10.27	5.62	6.08	0.46
Goa	2	3702	496.27	489.08	-7.19	11.48	3.99	13.41	13.21	-0.19
Gujarat	25	196024	21350.38	20108.06	-1242.32	2858.99	1616.67	10.89	10.26	-0.63
Haryana	21	44212	2347.05	2145.98	-201.07	232.20	31.92	5.31	4.85	-0.45
Himachal Pradesh	12	55673	22470.05	22347.88	-122.17	197.25	75.57	40.36	40.14	-0.22
Jammu & Kashmir	14	101387	73754.38	75435.77	1681.39	1191.48	2872.78	72.75	74.40	1.66
Jharkhand	24	79706	11670.14	11017.38	-652.76	1183.50	531.16	14.64	13.82	-0.82
Karnataka	27	191791	14438.12	13030.62	-1407.50	1477.98	70.82	7.53	6.79	-0.73
Kerala	14	38863	2458.69	2445.62	-13.07	247.55	234.44	6.33	6.29	-0.03
Madhya Pradesh	48	308252	40042.98	40113.27	70.29	258.95	329.25	12.99	13.01	0.02
Maharashtra	35	307690	38262.81	37830.82	-431.99	469.93	38.22	12.44	12.30	-0.14
Manipur	9	22327	7027.47	5648.53	-1378.94	2391.10	1012.14	31.48	25.30	-6.18
Meghalaya	7	22429	3865.76	4127.43	261.67	93.86	355.13	17.24	18.40	1.17
Mizoram	8	21081	6021.14	4958.64	-1062.50	2669.27	1606.71	28.56	23.52	-5.04
Nagaland	7	16579	4815.18	5266.72	451.54	721.75	1172.60	29.04	31.77	2.72
Orissa	30	155707	16648.27	16425.76	-222.51	271.75	48.69	10.69	10.55	-0.14
Punjab	20	50362	1019.50	936.83	-82.67	112.70	30.56	2.02	1.86	-0.16
Rajasthan	32	342239	93689.47	84929.10	-8760.37	10264.60	1503.37	27.38	24.82	-2.56
Sikkim	4	7096	3280.88	3273.15	-7.73	11.83	4.29	46.24	46.13	-0.11
Tamilnadu	30	130058	9125.56	8721.79	-403.77	426.78	22.74	7.02	6.71	-0.31
Tripura	4	10486	1315.17	964.64	-350.53	486.15	135.07	12.54	9.20	-3.34
Uttarakhand	13	53483	12790.06	12859.53	69.47	440.35	509.86	23.91	24.04	0.13
UttarPradesh	70	240928	10988.59	9881.24	-1107.35	1269.71	163.08	4.56	4.10	-0.46
West Bengal	19	88752	1994.41	1929.20	-65.21	92.98	28.46	2.25	2.17	-0.07
Union Territory	8	9490	337.30	315.00	-22.30	27.33	4.68	3.55	3.32	-0.23
Total	599	3166414	472261.95	467021.16	-5240.79	32340.38	27098.42	14.91	14.75	-0.17

Source: Wastelands Atlas of India 2011, Ministry of Rural Development Department of Land resource.

**Table 5.2.1(a) :State wise coverage under rapid reconnaissance survey
(upto March 2013)**

(Area in ha)

Sl. No.	State	RVP	FPR	Non-RVP/FPR	Consultancy	Total
1	Andaman & Nicobar Islands					
2	Andhra Pradesh	7766404		7229156		14995560
3	Arunachal Pradesh		855350	1952958		2808308
4	Assam	58888	740890	1264090		2063868
5	Bihar		3635126	4223168		7858294
6	Chandigarh		10437			10437
7	Chhattisgarh	9296983	1692471	86285	5000	11080739
8	Dadra & Nagar Haveli	12810				12810
9	Daman & Diu			3806		3806
10	Delhi		106025			106025
11	Goa			356108		356108
12	Gujarat	576773	108870	9574453		10260096
13	Haryana		1812850			1812850
14	Himachal Pradesh	3216445	644667			3861112
15	Jammu & Kashmir	1095602				1095602
16	Jharkhand	3400122	1308249	2724591	540715	7973677
17	Karnataka	11106666		4980702	8000	16095368
18	Kerala	399552		2631720		3031272
19	Lakshadweep					0
20	Madhya Pradesh	14681209	5230356	6833576	2289713	29034854
21	Maharashtra	21861441	77071	7924682	1721440	31584634
22	Manipur			755909		755909
23	Meghalaya		341260			341260
24	Mizoram		4735	1220508		1225243
25	Nagaland			619495		619495
26	Odisha	2739206		4528771		7267977
27	Pondicherry	7868		38621		46489
28	Punjab	8275	1024279			1032554
29	Rajasthan	2198442	4625839	3209825		10034106
30	Sikkim	1119806				1119806
31	Tamil Nadu	1795980		11100248		12896228
32	Tripura	58056		990453		1048509
33	Uttar Pradesh	1049373	6650251	5704660	288260	13692544
34	Uttarakhand	312821	3394513		53513	3760847
35	West Bengal	862938	1191921	6629635		8684494
	G.Total	83625660	33455160	84583420	4906641	206570881

Source: Soil and Land Use Survey of India, Department of Agriculture & Coopn., Ministry of Agriculture
RVP : River Valley Project
FPR : Flood Prone Rivers

Table 5.2.1 (b) :State wise coverage under detailed soil survey

(area in ha)

SI. No.	State/UT	RVP	FPR	Non-RVP/FPR	Consultancy	Refuge Rehabilitation	Coal Mine Rehabilitation	Total
1	2	3	4	5	6	7	8	9
1	Andaman & Nicobar Islands				4400			4400
2	Andhra Pradesh	733995		354564	10115			1098674
3	Arunachal Pradesh			24990	10591			35581
4	Assam	24241			7834			32075
5	Bihar		111422	41	7623			119086
6	Bihar & Jharkhand			318				318
7	Chandigarh				18750	8502		27252
8	Chhattisgarh	1103886	21574	10471				1135931
9	Dadra & Nagar Haveli	9933		21613				31546
10	Delhi			164302			5	164307
11	Goa			7495				7495
12	Gujarat	242495						242495
13	Haryana		22352	490				22842
14	Himachal Pradesh	420480	64550		456			485486
15	Jammu & Kashmir	16007		92395	595	2922		111919
16	Jharkhand	787050	327804	82843	2031		289	1200017
17	Karnataka	1730059		15277				1745336
18	Kerala	88078		68687	9979	13179		179923
19	Madhya Pradesh	1832003	149807	33351		13535		2028696
20	Maharashtra	1640487		166				1640653
21	Mizoram			112109	21006			133115
22	Odisha	1129263		2490				1131753
23	Punjab	1350		23860				25210
24	Rajasthan	380138	316502					696640
25	Sikkim	110046		23232				133278
26	Tamil Nadu	118856						118856
27	Tripura	3970						3970
28	Uttar Pradesh	45481	333843	27299	6199			412822
29	Uttarakhand	30210	30957	4391			15006	80564
30	West Bengal	433537	279430	4905	9842	1430		729144
Total		10881565	1658241	1075289	109421	39568	15300	1239578

Source: Soil and Land Use Survey of India, Ministry of Agriculture (data up to March 2013)

RVP : Rivers valley Project , FPR Flood Prome Rivers

Table 5.2.1(c) : State wise coverage under RRS,DSS,LDM AND SRM

(as on March 2013)

(Area in ha)

Sl. No.	State	RRS	DSS	LDM	SRM
1	Andhra Pradesh	14995560	1098674	4561637	20025524
2	Andaman & Nicobar Islands		4400		
3	Arunachal Pradesh	2808308	35581		
4	Assam	2063868	32075		4873134
5	Bihar	7858294	119086	1864743	2295700
6	Bihar & Jharkhand				11400
7	Chandigarh	10437	318		
8	Chhattisgarh	11080739	1152716		
9	Dadra & Nagar Haveli	12810	20404		
10	Daman & Diu	3806			146600
11	Delhi	106025	21613		370200
12	Goa	356108	164307	370200	14215818
13	Gujarat	10260096	249990	2668091	1242685
14	Haryana	1812850	22352		2829136
15	Himachal Pradesh	3861112	485520	1238104	
16	Jammu & Kashmir	1095602	16463		504380
17	Jharkhand	7973677	1210766	1940807	1783191
18	Karnataka	16095368	1815222	5099718	1264683
19	Kerala	3031272	103355	448000	28575708
20	Madhya Pradesh	29034854	2073655	6194392	
21	Maharashtra	31584634	1687373	3093380	196206
22	Manipur	755909		109700	1615700
23	Meghalaya	341260		1198600	593081
24	Mizoram	1225243	166	2108700	
25	Nagaland	619495		1657900	
26	Odisha	7267977	1262378		
27	Puducherry	46489			
28	Punjab	1032554	3840		
29	Rajasthan	10034106	720500	3653666	
30	Sikkim	1119806	110046	709600	710600
31	Tamil Nadu	12896228	142088	3675734	
32	Tripura	1048509	3970	1048600	
33	Uttar Pradesh	13692544	412822	2305640	7876026
34	Uttarakhand	3760847	80564		5208480
35	West Bengal	8684494	729144	1969361	7436800
	G.Total	206570881	13779388	45916573	101775052

Source: Soil and Land Use Survey of India, Department of Agriculture & Coopn., Ministry of Agriculture

RRS: Rapid Reconnaissance Survey

LDM : Land Degradation Mapping

DSS: Detailed Soil Survey

SRM : Soil Resource Mapping

Table 5.2.2 :State wise coverage under soil resource mapping

State/UT	District	Total Area (ha)
Andhra Pradesh	Adilabad	1610500
	Anantpur	1913000
	Chittoor	1515200
	Cuddapah	1535900
	East Godavari	1080700
	Krishna	872700
	Mahboob Nagar	1843200
	Nalgonda	1422324
	Nellore	1307600
	Prakasham	1762600
	Ranga Reddy	749300
	Srikakulam	583700
	Visakhapatnam	1116100
	Vizianagaram	653900
Warangal	1284600	
West Godavari	774200	
Total		20025524
Assam	Barpeta	324500
	Cachar	378600
	Darrang	348100
	Dhemaji	323700
	Dhurbi	283800
	Dibrugarh	338100
	Haikakandi	132610
	Karimgunj	180900
	Kokrajhar	316922
	Lakhimpur	297700
	Marigaon	145002
	Nagaon	399300
	Nalbari	225700
	Sibsagar	266800
Sonitpur	532400	
Tinsukia	379000	
		4873134
Bihar	Banka	301900
	Bhagalpur	257000
	Bhojpur	347400
	Buxar	162400
	Muzaffapur	317200
	Patna	320200
	Saran	264100
	Siwan	221900
	Vaishali (Hajipur)	203600
		2395700
Chandigarh	Chandigarh	11400
Delhi	Central Delhi	2300
	East Delhi	4900
	New Delhi	3500
	North Delhi	5900
	North East Delhi	5600
	North West Delhi	44300
	South Delhi	24900
	South West Delhi	42100
West Delhi	13100	
		146600
Goa	North Goa	173600
	South Goa	196600
		370200

Table 5.2.2 :State wise coverage under soil resource mapping

(upto March 2013)

State/UT	District	Total Area (ha)
Gujarat	Ahmedabad	808681
	Amreli	738117
	Anand	307588
	Banaskantha	1030015
	Bhavnagar	998100
	Bhrauch	625824
	Dahod	373300
	Dangs	176400
	Gandhinagar	216300
	Jamnagar	1366325
	Junagarh	884600
	Kheda	382931
	Mehsana	438400
	Narmada	270583
	Navsari	221100
	Panchmahal	508300
	Patan	553724
	Rajkot	1080186
	Sabarkantha	739000
Surat	740994	
Suredernagar	999848	
Vadodara	755500	
	14215816	
Haryana	Fatehabad	246165
	Hissar	394742
	Jhhajjar	186768
	Sirasa	415010
	1242685	
Himachal Pradesh	Bilaspur	114143
	Hamirpur	109503
	Kangra	564164
	Kullu	538346
	Mandi	386529
	Shimla	501571
	Sirmour	275893
	Solan	188048
	Una	150939
	2829136	
Jharkhand	Palamau	504380
Karnataka	Chickmangalur	723391
	Tumkur	1059800
	1783191	
Kerala	Ernakulam	307331
	Palakkad	447652
	Kannur	296600
	Wayanad	213100
	1264683	

Table 5.2.2 :State wise coverage under soil resource mapping

(upto March 2013)

State/UT	District	Total Area (ha)
Madhya Pradesh	Balaghat	890059
	Barwani	522698
	Betul	967598
	Bhind	429702
	Bhopal	265975
	Chhatarpur	838891
	Chhindwara	1136866
	Damoh	702397
	Datia	243156
	Dewas	674032
	Dhar	784346
	Dindori	581146
	Guna	613666
	Gwalior	438782
	Harda	320886
	Hoshangabad	643234
	Indore	376276
	Jabalpur	384328
Jhabua	651670	
Kanti	592821	
Mandla	693930	
	Mandsaur	533825
	Morena	474026
	Narshimhapur	493807
	Neemuch	412351
	Nimar East	718366
	Panna	713500
	Raisen	814618
	Rajgarh	592763
	Ratlam	466829
	Rewa	616469
	Sagar	985511
	Satna	713888
	Sehore	632025
	Seoni	842843
	Shahdol	538744
	Shajapur	596229
	Sheopur	643566
	Shivpuri	1005608
	Sidhi	1012105
	Tikamgarh	485006
Ujjain	609100	
Umari	446642	
Vidisha	702875	
	27803155	
Manipur	East Imphal	109700
	West Imphal	86506
		196206
Meghalaya	East Garo Hills	149000
	Jayantia Hills	381900
	South Garo Hills	188700
	West Khasi Hills	524700
	West Garo Hills	371400
		1615700
Mizoram	Kolasib	138251
	Lunglei	454830
		593081
Sikkim	East Sikkim	96400
	North Sikkim	422600
	South Sikkim	75000
	West Sikkim	116600
		710600

Table 5.2.2 : State wise coverage under soil resource mapping

(upto March 2013)

State/UT	District	Total Area (ha)
Uttar Pradesh	Agra	388421
	Ambedkar Nagar	225611
	Azamgarh	415029
	Baghpat	128997
	Barabanki	424762
	Bareilly	398678
	Basti	267754
	Bijnor	438931
	Fatehpur	399090
	Gautam Budha Nagar	134483
	Gazipur	325078
	Ghaziabad	197345
	Gonda	385552
	JP Nagar	388351
	Jaunpur	212214
	Kanpur Dehat	306514
	Kanpur Nagar	288439
	Kausambi	193513
	Kushinagar	277859
	Lakhimpur Kheri	274529
Maharajanj	283713	
Meerut	249500	
Rai Bareilly	443832	
Saharanpur	360831	
	7876026	
Uttarakhand	Dehradun	296486
	Almora	301487
	Bageshwar	221138
	Chamoli	763296
	Champawat	172646
	Pauri Garhwal	513309
	Hardwar	230037
	Nainital	399683
	Pithoragarh	704442
	Rudraprayag	194321
	Tehri Garhwal	379742
	Udham Singh Nagar	246305
	Uttarkashi	785590
	5208480	
West Bengal	Bankura	688200
	Bardhaman	702400
	Birbhum	454500
	Dakshin Dinajpur	221900
	Darjeeling	314900
	Hooghly	314900
	Jalpaiguri	622700
	Malda	373300
	East Midnapur	473600
	Murshidabad	532400
	Nadia	392700
	Purulia	625900
	North 24 Parganas	409400
South 24 Parganas	996000	
Uttar Dinajpur	314000	
	7436800	

(Concluded)

Source: Soil and Land use survey of India, Department of Agriculture & Coop.

**Table 5.2.3 : State wise information on rapid reconnaissance survey
(up to March 2013)**

(Area in lakh hectares)

Sr. No	State/UT	Surveyed Area	Priority Area	No. of SWS/MWS
1	Andaman & Nicobar Islands			
2	Andhra Pradesh	149.96	21.12	1144
3	Arunachal Pradesh	28.08	9.47	482
4	Assam	20.64	3.27	321
5	Bihar	78.58	7.79	404
6	Chandigarh	0.10	0.04	6
7	Chhattisgarh	110.81	18.58	779
8	Dadara & Nagar Haveli	0.13	0.06	2
9	Daman -Diu	0.04	0.00	-
10	Delhi	1.06	0.17	12
11	Goa	3.56	0.91	61
11	Gujarat	102.60	11.69	2507
12	Haryana	18.13	8.14	1126
13	Himachal Pradesh	38.61	4.52	240
14	Jammu & Kashmir	10.96	6.21	821
15	Jharkhand	79.74	32.44	1199
16	Karnataka	160.95	35.44	1773
17	Kerala	30.31	10.84	681
18	Madhya Pradesh	290.35	86.93	7134
19	Maharashtra	315.85	81.83	3648
20	Manipur	7.56	4.75	145
21	Meghalaya	3.41	2.74	571
22	Mizoram	12.25	9.16	1642
23	Nagaland	6.19	3.51	77
24	Odisha	72.68	20.11	902
25	Puducherry	0.46	0.03	1
26	Punjab	10.33	0.58	29
27	Rajasthan	100.34	22.52	1012
28	Sikkim	11.20	4.57	224
29	Tamil Nadu	128.96	19.23	1830
30	Tripura	10.49	2.45	286
31	Uttar Pradesh	136.93	23.01	1538
32	Uttarakhand	37.61	17.47	1376
33	West Bengal	86.84	8.41	378
	Total	2065.71	50.69	34384

Source : Soil & Land Use Survey of India, Ministry of Agriculture
SWS- Sub-Watershed

MWS- Micro -Watershed.

Table 5.2.4 : State wise extent of alkali area, physical progress of reclamation

(Phy. In thousand ha.)					
S.No	Name of State	Alkali Area	Reclamation up to IX Plan	Progress during 3 years of X Plan (2002-05)	Reclamation upto (2004-05)
1	2	3	4	5	6
1	Andhra Pradesh	64.00	0.00	0.00	0.00
2	Bihar	4.00	0.00	0.00	0.00
3	Gujarat	610.00	4.72	25.00	29.80
4	Haryana	450.00	166.95	32.00	198.90
5	Karnataka	76.00	0.00	2.34	2.30
6	Madhya Pradesh	164.00	0.09	0.00	0.10
7	Maharashtra	59.00	0.00	0.00	0.00
8	Punjab	718.00	275.20	1.33	276.50
9	Rajasthan	332.00	5.87	13.40	19.30
10	Tamilnadu	4.00	0.00	2.10	2.10
11	Uttar Pradesh	1100.00	128.23	1.54	129.70
	Total	3581.00	581.06	77.71	658.70

Source: Ministry of Agriculture

5.3 Land Degradation

5.3.1

Land is degraded when it suffers a loss of intrinsic qualities, decline in its capabilities or loss in its productive capacity. Land degradation may be due to natural causes or human causes or it may be due to combination of both. **The State wise information of degraded land of the Districts is in table 5.3.1. The table 5.3.2 at exhibits the trends in usage of agricultural inputs in India.**

5.3.2

Land degradation is a global problem, largely related to agricultural use. The major causes include:

- ▬ Land clearance, such as deforestation
- ▬ Agricultural depletion of soil nutrients through poor farming practices
- ▬ Livestock including overgrazing
- ▬ Inappropriate Irrigation
- ▬ Urban sprawl and commercial development
- ▬ Land pollution including industrial waste
- ▬ Vehicle off-roading
- ▬ Quarrying of stone, sand, ore and minerals



5.4 Soil Erosion

- 5.4.1 Soil is the non-renewable natural resource which supports life on earth. It is estimated that one-sixth of the world's soils have already been degraded by water and wind erosion. This has two important consequences: the reduced ability of society to produce sufficient food due to loss of quality and depth of soils; and resulted in off-site pollution associated with erosion. These include siltation of dams, pollution of water-courses by agricultural chemicals and damage to property by soil-laden runoff. On-site issues of declining soil quality tend to be spatially dispersed occurring on many different soil types whereas off-site pollution issues tend to be locally concentrated.
- 5.4.2 Soil erosion problems are not confined to the Developing World. In the last two decades, there has been a growing appreciation of the threat to European soils as a result of intensification of agriculture, overgrazing and climate change. The threat is most apparent in the Mediterranean Region where the term "desertification" has been used to describe a series of inter-related changes which include soil erosion. The EU-funded Mediterranean Desertification and Land Use (MEDALUS) project is currently addressing these latter issues for much of Southern Europe.
- 5.4.3 In India, about 130 million hectares of land (45% of total geographical area) is affected by serious soil erosion through ravine and gully, shifting cultivation, cultivated wastelands, sandy areas, deserts and water logging (Govt. of India, 1989).
- 5.4.4 Soil erosion by rain and river that takes place in hilly areas causes landslides and floods, while cutting trees for firewood, agricultural implements and timber, grazing by a large number of livestock, over and above, the carrying capacity of grass lands, traditional agricultural practices, construction of roads, indiscriminate (limestone) quarrying and other activities, have all led to the opening of hill-faces to heavy soil erosion. Wind erosion causes expansion of deserts, dust, storms, whirlwinds and destruction of crops, while moving sand covers the land and makes it sterile. Excessive soil erosion with consequent high rate of sedimentation in the reservoirs and decreased fertility has become serious environmental problems with disastrous economic consequences. Of the 16 rivers of world, which experience severe erosion and carry heavy sediment load, 3 rivers, namely; Ganges, Brahmaputra and Kosi occupy the 2nd, 3rd and 12th position, respectively.
- 5.4.5 Soil erosion results in huge loss of nutrients in suspension or solution, which are removed away from one place to another, thus causing depletion or enrichment of nutrients. Besides the loss of nutrients from the topsoil, there is also degradation through the creation of gullies and ravines, which makes the land unsuitable for agricultural production. Subsidence of the land in some areas and landslides in the hilly tracts are problems affecting highways, habitations and irrigation dams.



Table 5.3.1 : State wise information on degraded land in the districts

Sl. No.	State/UT	District	Total Area	Upto March 2013 (hectare)	
				Total Degraded Land area	% Degraded Land Area
1	2	3	4	5	6
1	Andhra Pradesh	1 Chittoor	1492644	127725	8.56
		2 Kurnool	1761393	309412	17.57
		3 Nellore	1307600	169808	12.99
2	Bihar	1 Banka	278768	29294	10.51
		2 Bhagalpur	255822	32589	12.74
		3 Gaya	473659	7727	1.63
		4 Munger	634594	144617	22.79
		5 Siwan	221900	22611	10.19
3	Goa	1 North Goa	175592	24634	14.03
		2 South Goa	194608	19639	10.09
4	Gujarat	1 Bharuch	776430	192841	24.84
		2 Bhavnagar	1115500	271337	24.32
		3 Surat	776161	85469	11.01
5	Himachal Pradesh	1 Chamba	671500	74238	11.06
		2 Kullu	566604	259127	45.73
6	Jharkhand	1 East Singhbhum	337155	27783	8.24
		2 Palamau	802291	50363	6.28
		3 Sarailela- Kharsawan	272340	37050	13.60
		4 West Singhbhum	529021	58539	11.07
7	Karnataka	1 Bagalkot	658877	135145	20.51
		2 Bijapur	1053471	256010	24.30
		3 Chickmagalur	722072	16038	2.22
		4 Gulbarga	1610208	313347	19.46
		5 Tumkur	1055090	58808	5.57
8	Kerala	1 Palghat	448000	16204	3.62
9	Madhya Pradesh	1 Balaghat	924500	112941	12.22
		2 Chattarpur	863120	191511	22.19
		3 Gwalior	456449	144079	31.57
		4 Jhabua	646912	322601	49.87
		5 Morena	1168336	373553	31.97
		6 Ratlam	486007	160244	32.97
		7 Sidhi	1039194	228736	22.01
		8 Ujjain	609874	129700	21.27
10	Maharashtra	1 Bhandara	934716	49933	5.34
		2 Nasik	1527764	647462	42.38
		3 Wardha	630900	69308	10.99
11	Manipur	1 East Impal	57800	10238	17.71
		2 West Impal	51900	15098	29.09
12	Meghalaya	1 East Garohills	260300	34201	13.14
		2 Jaintia Hills	381900	178666	46.78
		3 South Garohills	185700	8003	4.31
		4 West Garohills	370700	42516	11.47

Table 5.3.1 : State wise information on degraded land of the districts

Sl. No.	State/UT	District	Total Area	Total Degraded	% Degraded Area
1	2	3	4	5	6
13	Mizoram	1 Aizawl	357631	109184	30.53
		2 Champhai	318583	184795	58.01
		3 Kolasib	138251	16865	12.20
		4 Lawngtlai	199119	95965	48.19
		5 Lunglei	453800	59913	13.20
		6 Mamit	302575	50986	16.85
		7 Saiha	196581	29416	14.96
		8 Serchhip	142160	70702	49.73
14	Nagaland	1 Kohima, Phek, Wokha, Zunheboto, Tuensang, Mokokchung, Mon	1657900	441339	26.62
15	Rajasthan	1 Ajmer	842388	398913	47.36
		2 Jhunjhunu	591681	81478	13.77
		3 Nagaur	1764504	361120	20.47
		Rajsamand	455093	136908	30.08
16	Sikkim	East	95400	5922	6.21
		West	116600	17274	14.81
		North	422600	94963	22.47
		South	75000	5323	7.10
17	Tamilnadu	1 Coimbatore	746128	19566	2.62
		2 Dharmapuri	962247	194532	20.22
		3 Erode	825997	5579	0.68
		4 Thirunelveli	682308	36240	5.31
		5 Tuticorin	459054	78213	17.04
18	Tripura	1 West	303300	21385	7.05
		2 South	314000	33396	10.64
		3 North	210070	60732	28.91
		4 Dhalai	221230	47323	21.39
19	Uttar Pradesh	1 Agra	400369	92650	23.14
		2 Bijnor	454057	37732	8.31
		3 Lalitpur	504149	95450	18.93
		4 Mathura	376432	22975	6.10
		5 Sitapur	570633	88717	15.55
20	West Bengal	1 North 24 Pargana	378090	64062	16.94
		2 Puruliya	625100	198619	31.77
		3 South 24 Paragna	966171	263635	27.29
GRAND TOTAL			45916573	8980987	19.56

Source: Soil and Land Use Survey of India, Ministry of Agriculture & Coop.

Table 5.3.2 : Use of agricultural inputs

..Cntd

Sl. No.	Programme	Unit	1991-92	1992-93	1993-94	1994-95	1995-96	1996-97	1997-98	1998-99	1999-2000	2000-2001
1	2	3	4	5	6	7	8	9	10	11	12	13
1.	Seeds											
	I. Production of Breeder Seeds	Thousand Quintals	34.90	36.00	37.00	40.11	43.36	46.03	46.13	38.99	51.13	42.69
	II. Production of Foundation Seeds	Lakh Quintals	3.75	3.93	4.06	4.73	4.76	5.76	6.84	6.75	4.66	5.91
	III. Distribution of Certified/Quality Seeds	Lakh Quintals	57.50	60.33	62.20	65.86	69.90	73.27	78.79	84.97	87.98	86.27
2.	Consumption of Chemical Fertilizers (I+II+III)											
	I. Nitrogenous(N)	Lakh Tonnes	80.46	84.26	87.88	95.07	98.23	103.02	109.02	113.54	115.92	109.20
	II. Phosphatic(P)	Lakh Tonnes	33.21	28.43	26.69	29.32	28.98	29.77	39.14	41.12	47.99	42.15
	III. Potassic(K)	Lakh Tonnes	13.61	8.84	9.09	11.25	11.56	10.29	13.72	13.32	16.78	15.67
	Total (N+P+K)	Lakh Tonnes	127.28	121.53	123.66	135.64	138.77	143.08	161.88	167.98	180.69	167.02
	Per Hectare**	Kg	69.84	65.48	66.27	72.13	74.02	75.47	84.94	87.02	94.94	89.63
3.	Consumption of Tonnes Pesticides(Technical Grade)	Thousand Tonnes	72.13	70.79	63.65	61.36	61.26	56.11	52.24	49.16	46.20	43.58
4	Area covered under Soil Conservation	Lakh ha	-	-	-	-	-	-	-	-	-	4.36

Source : Agricultural Statistics at a Glance 2012

2. Department of Agriculture & Cooperation, New Delhi

3. States/UTs Zonal Conference, Kharif & Rabi

**Based on 2009-10 Provisional Gross Cropped Area.

Table 5.3.2 : Use of agricultural inputs

											Concluded	
Sl. No.	Programme	2001-02	2002-03	2003-04	2004-05	2005-06	2006-07	2007-08	2008-09	2009-10	2010-11	2011-12
1	2	14	15	16	17	18	19	20	21	22	23	24
1.	Seeds											
	I. Production of Breeder Seeds	45.54	48.42	61.82	66.46	66.88	73.83	91.96	94.41	105	119.21	119.21
	II. Production of Foundation Seeds	5.44	6.14	6.50	6.90	7.40	7.96	8.22	9.69	10.5	17.53	21.86
	III. Distribution of Certified/Quality Seeds	91.80	98.03	108.59	120.26	126.75	155.01	179.05	215.81	257.11	277.34	283.85
2.	Consumption of Chemical Fertilizers (I+II+III)											
	I. Nitrogenous(N)	113.10	104.74	110.77	117.13	127.23	137.73	144.19	150.91	155.8	165.58	173
	II. Phosphatic(P)	43.82	40.19	41.24	46.24	52.04	55.43	55.15	65.06	72.74	80.5	79.14
	III. Potassic(K)	16.67	16.01	15.98	20.60	24.13	23.35	26.36	33.13	36.32	35.14	25.26
	Total (N+P+K)	173.59	160.94	167.99	183.97	203.40	216.51	225.70	249.10	264.86	281.22	277.40
	Per Hectare**	91.13	91.45	88.05	94.52	105.50	111.76	115.27	127.67	137.81	146.32	144.33
3.	Consumption of Tonnes Pesticides(Technical Grade)	47.02	48.30	41.00	40.67	39.77	41.51	44.77	43.86	41.82	55.54	50.58
4	Area covered under Soil Conservation	4.70	4.30	5.55	7.37	8.67	11.41	7.34	6.90	5.32	7.49	4.72

Source : Agricultural Statistics at a Glance 2012

2. Department of Agriculture & Cooperation, New Delhi

3. States/UTs Zonal Conference, Kharif & Rabi

**Based on 2009-10 Provisional Gross Cropped Area.



Table 5.3.3 : Performance of crop production

Sl. No.	Crops	Year						
		2004-05	2005-06	2006-07	2007-08	2008-09	2009-10	2010-11
1	2	3	4	5	6	7	8	9
1	Rice	83.13	91.79	93.35	96.69	99.18	89.09	95.98
2	Wheat	68.64	69.35	75.81	78.57	80.68	80.80	86.87
3	Coarse Cereals	33.47	34.07	33.92	40.76	40.03	33.55	43.40
4	Total Cereals	185.24	195.21	203.08	216.02	219.89	203.44	226.25
5	Total Pulses	13.13	13.39	14.23	14.76	14.57	14.66	18.24
6	Total Foodgrains	198.37	208.60	217.31	230.78	234.46	218.10	244.49
7	Sugarcane	237.08	281.17	355.52	348.19	285.03	292.30	342.38
8	Total Oilseeds	24.35	27.98	24.29	29.76	27.72	24.88	32.48
9	Cotton \$	16.43	18.50	22.63	25.88	22.28	24.02	33.00
10	Jute & Mesta #	10.27	10.84	11.27	11.21	10.37	11.82	10.62

Source : Directorate of Economics & Statistics

: Production in million bales of 180 kg. each

\$: Production in million bales of 170 kg. each

5.3.4 The crop yields have increased greatly in India over the past 20-25 years. Most of these increases have been due to the development of crop varieties which respond to fertilizers. The different types of cropping systems practised in traditional agriculture have given way to systems involving only a few crops which are highly nutrient depleting but high yielding. The legumes, grasses, and millets which were regular components of cropping systems in Indian agriculture have largely been phased out in highly productive areas due to poor economic returns and replaced by high yielding rice, wheat, sugarcane, etc. As a result, the water level is receding at an alarming rate. This has created the problems of soil erosion and the destruction and disturbances to wild life habitats. **Tables 5.3.3 & 5.3.4 at depicts the changing pattern of crop production in India.**

Table 5.3.4 :Area under crops - All India

(Thousand Hectares)

Year	FOOD GRAINS													
	Rice	Jowar	Bajra	Maize	Ragi/ Marua	Wheat	Barley	Other Cereals & Millets	Total Cereals & Millets (col.2 to 9)	Gram	Tur or Arhar	Other pulses (Excl. Gram & Tur or Arhar)	Total Pulses (col.11 to 13)	Total Foodgrains (col.10+14)
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
1950-51	31056	15554	9744	3250	2254	10010	3198	5576	80642	7803	2228	10523	20554	101196
1951-52	30434	15960	10083	3435	2229	9624	3384	5396	80545	6963	2521	10824	20308	100853
1952-53	29991	18023	11489	3721	2315	9938	3346	5597	84420	7392	2499	10901	20792	105212
1953-54	31186	17876	12727	3877	2423	10745	3547	6057	88438	8097	2476	11426	21999	110437
1954-55	30660	17273	11436	3928	2407	11344	3401	5899	86348	9295	2474	11238	23007	109355
1955-56	31633	17447	10972	3811	2333	12704	3405	5412	87717	9844	2336	11428	23608	111325
1956-57	32365	16663	11301	3834	2292	13625	3518	5200	88798	9694	2333	11837	23864	112662
1957-58	32292	17298	11185	4146	2355	11758	3072	5033	87139	9087	2357	11185	22629	109768
1958-59	33195	17935	11405	4259	2454	12616	3314	5225	90403	10038	2466	11938	24442	114845
1959-60	33888	17715	10852	4348	2472	13384	3379	5200	91238	10348	2433	12338	25119	116357
1960-61	34056	18426	11470	4401	2478	12931	3140	4997	91899	9274	2429	11962	23665	115564
1961-62	34656	18220	11275	4501	2459	13565	3309	4908	92893	9562	2439	12387	24388	117281
1962-63	35734	18402	10961	4646	2426	13589	3021	5000	93779	9192	2447	12739	24378	118157
1963-64	35745	18370	11103	4586	2420	13519	2774	4855	93372	9353	2513	12458	24324	117696
1964-65	36359	18023	11916	4617	2410	13453	2675	4803	94256	8875	2560	12728	24163	118419
1965-66	35338	17623	11959	4794	2408	12539	2638	4807	92106	8004	2533	12244	22781	114887
1966-67	35060	18117	12787	5119	2419	12775	2859	4804	93940	7975	2621	11462	22058	115998
1967-68	36108	17900	12798	5612	2417	14926	3377	5099	98237	8012	2653	12352	23017	121254
1968-69	35864	17633	12447	5590	2411	15612	2828	5059	97444	6718	2610	12537	21865	119309
1969-70	37141	16985	12570	5717	2545	16782	2780	5185	99705	7631	2639	12739	23009	122714
1970-71	37381	16871	13391	5856	2474	18293	2556	4962	101784	7820	2639	12667	23126	124910
1971-72	37843	16489	11961	5588	2452	19095	2456	4428	100312	7944	2347	12243	22534	122846
1972-73	36894	16705	12287	5807	2385	18684	2453	4486	99701	6985	2455	12202	21642	121343
1973-74	38215	17059	14132	6011	2344	18641	2656	4658	103716	7726	2643	13298	23667	127383
1974-75	37804	16238	11468	5815	2428	17940	2889	4723	99305	7036	2566	12889	22991	121796
1975-76	39372	16062	11598	5912	2632	20339	2810	4994	103719	8303	2728	13788	24819	128538
1976-77	38477	15740	10806	5978	2502	20876	2244	4800	101423	7975	2578	13101	23654	125077
1977-78	40280	16100	11006	5712	2682	21277	2003	4747	103807	7928	2634	13356	23918	127725
1978-79	40511	16052	11400	5784	2682	22540	1837	4504	105310	7671	2679	13606	23956	129266
1979-80	39542	16618	10798	5754	2603	22098	1771	4067	103251	6952	2825	12570	22347	125598
1980-81	40237	16412	11658	6032	2504	22225	1799	4033	104900	6547	2877	13284	22708	127608
1981-82	40778	16817	11826	5916	2555	21992	1728	3905	105517	7839	2989	13352	24180	129697
1982-83	38424	16343	11155	5720	2345	23523	1493	3585	102588	7339	2909	12726	22974	125562
1983-84	41485	16608	11796	5837	2561	25545	1383	3681	108896	7041	3135	13351	23527	132423
1984-85	41167	16179	10659	5821	2379	23488	1247	3306	104246	6769	3156	12877	22802	127048
1985-86	41220	16338	10854	5797	2372	23179	1361	3198	104319	7746	3247	13444	24437	128756
1986-87	41154	16184	11497	5955	2394	23196	1224	3003	104607	7003	3186	13196	23385	127992
1987-88	38866	16116	9171	5645	2242	23213	1139	2929	99321	5794	3346	12415	21555	120876
1988-89	41756	14499	12156	5894	2275	24065	1087	2722	104454	6798	3514	12807	23119	127573
1989-90	42178	14602	11056	5946	2299	23461	1001	2574	103117	6446	3600	13363	23409	126526
1990-91	42744	14158	10735	5893	2145	24046	972	2372	103065	7471	3609	13803	24883	127948
1991-92	42661	12481	10268	5878	2109	23378	964	2102	99841	5591	3639	13449	22679	122520
1992-93	41860	13222	10854	6087	2039	24644	925	2015	101646	6434	3596	13539	23569	125215
1993-94	42687	12942	9738	6102	2017	25202	809	1917	101414	6326	3454	13631	23411	124825
1994-95	42894	11843	10333	6104	1897	25887	897	1811	101666	7500	3283	13500	24283	125949
1995-96	43016	11477	9558	6117	1929	25105	838	1786	99826	7121	3470	13046	23637	123463
1996-97	43529	11435	10297	6270	1864	25991	765	1634	101785	7040	3517	12760	23317	125102
1997-98	43581	10798	9940	6376	1757	26741	871	1653	101717	7456	3341	13201	23998	125715
1998-99	44898	9905	9527	6338	1862	27466	806	1563	102365	8535	3404	12576	24515	126880
1999-00	45456	9882	9103	6574	1736	27671	746	1432	102600	6295	3454	12369	22118	124718
2000-01	44761	9915	10022	6805	1816	25797	789	1449	101354	5318	3665	12343	21326	122680
2001-02	44677	9807	9744	6683	1732	26318	682	1321	100964	6424	3340	13494	23258	124222
2002-03	41209	9278	7936	6742	1512	25271	689	1221	93858	5898	3339	12160	21397	115255
2003-04	42293	9403	10961	7275	1779	26964	675	1164	100514	7084	3451	13923	24458	124972
2004-05	42637	9048	9432	7434	1669	26885	620	1097	98822	6688	3432	13768	23888	122710
2005-06	43920	8682	9745	7628	1648	26687	630	1000	99940	6790	3537	13345	23672	123612
2006-07(p)	43535	8459	9577	7775	1329	28325	654	963	100617	7375	3342	13527	24244	124861
2007-08(p)	43684	7827	9700	8101	1521	28575	660	924	100992	7743	3598	13527	24868	125860
2008-09(p)	45211	7543	8858	8128	1505	28022	717	889	100873	7920	3274	12570	23764	124637
2009-10(p)	42569	7809	9065	8164	1233	28547	622	900	98909	7997	3273	11303	22573	121482
2010-11(p)	43870	7363	9680	8392	1258	29835	707	847	101952	8865	4291	12593	25749	127701

Source : Department of Agriculture and Cooperation, Directorate of Economic & Statistics, Ministry of Agriculture.

5.3.5 The pesticides and insecticides used in agriculture have a negative impact on the productivity conditions of the soil. **Tables 5.3.5 and Table 5.3.6 at shows the capacity and production of chemical industry for insecticides, fungicides, herbicides, weedicides, roddenticides and fumigants.**

Table 5.3.5 : Capacity and production in the chemical industry in India (Insecticides)

(thousand metric tonnes)

Sl. No.	Products	2004-05		2005-06		2006-07		2007-08		2008-09		2009-10		2010-11		2011-12	
		Cap.	Pro.	Cap.	Pro.	Cap.	Pro.	Cap.	Pro.	Cap.	Pro.	Cap.	Pro.	Cap.	Pro.	Cap. 2010-11	Pro.
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18
	Insecticides																
1	D.D.T.	6.3	4.0	6.3	4.4	6.3	4.5	6.34	3.44	6.30	3.31	6.30	3.61	6.30	3.09	6.30	3.62
2	Malathion	11.9	4.7	11.8	2.7	8.8	4.0	8.80	3.97	8.80	2.00	8.80	0.62	8.80	0.64	8.80	0.70
3	Parathion (Methyl)	4.0	1.0	4.0	0.5	4.0	0.0	4.00	0.00	4.00	0.00	4.00	0.00	4.00	0.00	4.00	0
4	Dimethoate	3.2	0.9	3.2	0.8	3.2	1.0	3.22	0.87	3.20	0.56	3.20	0.96	3.20	1.12	3.20	0.69
5	D.D.V.P.	4.3	5.0	4.3	3.8	4.3	3.9	4.32	3.29	5.40	2.73	5.40	3.12	5.40	3.13	5.40	4.18
6	Quinalphos	4.0	0.9	4.0	0.9	4.0	0.8	4.00	0.52	4.00	0.89	4.00	0.99	4.00	1.01	4.00	0.99
7	Monocrotophos	13.9	9.5	14.0	4.9	14.0	4.9	13.97	5.12	14.00	4.57	14.00	5.74	14.00	8.60	14.00	8.60
8	Phosphamidon	3.9	0.4	3.9	0.5	3.9	0.4	3.90	0.71	3.90	0.85	3.90	1.00	3.90	0.03	3.90	0.06
9	Phorate	8.2	3.6	8.2	6.2	8.2	5.7	8.20	3.23	8.20	2.03	8.20	2.00	8.20	2.63	8.20	2.33
10	Ethion	5.6	1.8	5.6	1.5	5.6	1.8	5.63	0.77	5.60	0.16	5.60	0.43	5.60	0.65	5.60	0.00
11	Endosulphan	10.1	3.1	10.1	2.9	9.9	3.9	9.90	3.96	9.90	4.26	9.90	2.80	9.90	1.73	9.90	0.02
12	Fenvalerate	2.6	0.6	2.7	0.6	2.7	0.5	2.65	0.72	2.60	0.49	2.60	0.53	2.60	0.08	2.60	0.05
13	Cypermethrin	5.9	6.5	6.9	6.5	6.9	5.1	6.90	4.66	6.90	4.03	6.90	6.32	6.90	4.95	6.90	8.80
14	Anilophos	1.1	0.4	1.1	0.2	1.1	0.0	1.10	0.00	1.10	0.00	1.10	0.00	1.10	0.00	1.10	0.00
15	Acephate	6.1	6.1	9.2	8.5	9.2	8.3	9.22	10.06	9.20	9.65	9.20	10.83	9.20	12.84	9.20	14.60
16	Chlorpyriphos	8.6	9.0	9.1	4.9	9.1	4.7	9.09	4.54	9.10	3.89	9.10	2.90	9.10	3.35	9.10	1.90
17	Phosalone	1.0	0.5	1.0	0.3	1.0	0.2	1.00	0.50	1.00	0.00	1.00	0.00	1.00	0.00	1.00	0.00
18	Metasystox	*	0.6	*	0.3	*	0.6	*	0.00	*	0.00	*	0.00	*	0.00	*	0.00
19	Abate	*	0.0	*	0.0	*	0.0	-	-	*	-	*	0.00	*	0.00	*	0.00
20	Fenthion	*	0.2	*	0.3	*	0.1	*	0.00	*	0.00	*	1.00	*	1.58	*	0.70
21	Triazophos	*	2.9	*	2.9	*	1.8	*	1.84	*	2.06	*	0.00	*	0.00	*	0.00
22	Lindane	1.4	0.4	0.7	0.2	0.7	0.3	0.73	0.08	0.70	0.00	0.70	0.00	0.70	0.00	0.70	0.00
23	Temephos	0.2	0.3	0.2	0.0	0.2	0.1	0.24	0.08	0.20	0.13	0.20	0.02	0.20	0.00	0.20	0.00
24	Deltamethrin	0.5	0.4	0.5	0.3	0.5	0.3	0.55	0.26	0.50	0.03	0.50	0.02	0.50	0.00	0.50	0.32
25	Alphamethrin	1.3	0.3	1.5	0.2	1.5	0.2	1.53	0.21	1.53	0.02	1.50	0.00	1.50	0.51	1.50	0.32
	Total	104.1	63.1	108.4	54.5	105.3	53.2	105.29	48.82	106.13	41.64	106.10	42.89	106.10	45.94	106.10	47.88

Source : Department of Chemicals & Petrochemicals, Ministry of Chemicals & Fertilizers

* : Not available

Note : Cap. = Capacity & Pro. = Production

5.3.6 The use of pesticides above permissible limits enters the food chain, causing health hazards. A major concern particularly about chlorinated hydrocarbons like DDT is their persistence in soil.

Table 5.3.6 : Capacity and production in the chemical industry in India (Fungicides, Herbicides, Weedicides, Rodenticides, Fumigents)

Sl. No.	Products	2004-05		2005-06		2006-07		2007-08		2008-09		2009-10		2010-11		2011-12	
		Cap.	Pro.	Cap.	Pro.	Cap.	Pro.	Cap.	Pro.	Cap.	Pro.	Cap.	Pro.	Cap.	Pro.	Cap. 2010-11	Pro.
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18
I	Fungicides	26.2	22.7	26.1	19.4	26.1	23.5	26.12	27.37	26.20	0.04	26.20		26.20		26.20	14.00
1	Captan & Captafol	1.8	0.8	1.8	0.0	1.8	0.2	1.80	0	1.80	0	1.80	0.00	1.80	0.00	1.80	0.90
2	Ziram (Thio Barbamate)	0.5	0.3	0.5	0.1	0.5	0.2	0.45	185	0.50	0.07	0.50	0.00	0.50	0.00	0.50	0.54
3	Carbendazim (Bavistin)	1.5	0.7	1.5	0.4	1.5	0.1	1.47	68	1.50	0.19	1.50	0.19	1.50	0.26	1.50	0.16
4	Calixin	0.2	0.1	0.2	0.0	0.2	0.0	0.20	0	0.20	0	0.20	0.00	0.20	0.00	0.20	0.00
5	Mancozab	20.7	20.8	20.7	18.9	20.7	22.9	20.70	27115	20.70	35	20.70	31.05	20.70	26.05	20.70	12.40
6	Copper-Oxychloride	1.5	0.0	1.5	0.0	1.5	0.0	1.50	0	1.50	0	1.50	0.00	1.50	0.00	1.50	0.00
II	Herbicides	1.7	0.4	1.7	0.6	1.7	0.2	1.70	0.30	1.70	0.00	1.70		1.70	0.09	1.70	0.03
1	2, 4-D	1.2	0.1	1.2	0.3	1.2	0.0	1.20	270.0	1.20	0	1.20	0.21	1.20	0.00	1.20	0.00
2	Butachlor	0.5	0.3	0.5	0.3	0.5	0.2	0.50	28	0.50	0	0.50	0.12	0.50	0.09	0.50	0.03
III	Weedicides	10.1	5.9	8.8	5.9	8.8	5.4	8.03	4.48	8.00	0.01	8.00		8.00	6.18	8.00	3.46
1	Isoproturon	5.4	4.7	5.4	4.3	5.4	3.2	5.39	2962	5.40	3	5.40	2.98	5.40	3.90	5.40	2.50
2	Glyphosate	3.9	1.0	2.6	1.5	2.6	2.1	2.64	1517	2.60	2	2.60	2.33	2.60	2.28	2.60	0.96
3	Paraquat	*	0.0	*	0.0	*	0.0	*	*	*	*	*	0.01	*	0.20	*	0.18
4	Diuron	0.1	0.0	0.1	0.0	0.1	0.0	0.10	75	0.10	0.01	0.10	0.26	0.10	0.24	0.10	0.67
5	Atrazine	0.5	0.0	0.5	0.0	0.5	0.1	0.50	218	0.50	0.26	0.50	0.00	0.50	0.00	0.50	0.00
6	Fluchloralin	0.2	0.2	0.2	0.1	0.2	0.1	0.20	0	0.30	0	0.30	0.00	0.30		0.30	0.00
IV	Rodenticides	3.2	1.7	3.2	1.8	3.2	2.3	3.2	2.1	3.2	1.7	3.2		3.2	2.2	3.2	2.2
1	Zinc Phosphide	0.9	0.3	0.9	0.3	0.9	0.8	0.86	462	0.9	0	0.9	0.33	0.9	0.42	0.9	0.39
2	Aluminium Phosphide	2.3	1.4	2.3	1.5	2.3	1.5	2.3	1615	2.3	1722	2.3	2.16	2.3	1.80	2.3	1.80
V	Fumigants	0.4	0.1	0.4	0.0	0.4	0.1										
1	Methyl Bromide	0.2	0.0	0.2	0.0	0.2	0.0	*	*	*	*	*		*		*	0
2	Dicofol	0.2	0.1	0.2	0.0	0.2	0.1	0.15	88	0.02	88	0.02	2.00	0.02	0.04	0.02	0.08
Total		145.7	93.9	148.7	82.2	145.5	84.7		83.42		85.338	59.78					19.76

Source : Department of Chemicals & Petrochemicals, Ministry of Chemicals & Fertilizers

* : Not Available

0" : Production is either zero or negligible

Among fertilizers, the conversion of fertilizer-N to gaseous forms-ammonia (NH₃) and various oxides of Nitrogen lead to atmospheric pollution. Escape of fertilizer-N as ammonia gas is called ammonia volatilization. The presence of ammonia and sulphur dioxide may lead to acid rains which ultimately degrade the soil. Atmospheric ammonia contaminates water bodies, impairs visibility and causes corrosion. Nitrous oxide also contributes to global warming.

5.5.1 The activity of mining and quarrying covers underground and surface mines, quarries and wells and includes extraction of minerals and also all the supplemental activities such as dressing and benefaction of ores, crushing, screening, washing, cleaning, grading, milling floatation, melting floatation and other preparations carried out at the mine site which are needed to render the material marketable.

Table 5.5.1 : State wise distribution mining leases

Sl. No.	State	No. of Leases	Percentage	Leases Area (in ha)	Percentage
1	2	3	4	5	6
1	Andhra Pradesh	1999	18.17	68047.13	12.42
2	Assam	8	0.07	929.50	0.17
3	Bihar	11	0.10	2074.72	0.38
4	Chhattisgarh	316	2.87	23551.77	4.30
5	Goa	336	3.05	24393.26	4.45
6	Gujarat	1152	10.47	30035.65	5.48
7	Haryana	118	1.07	12255.12	2.24
8	Himachal Pradesh	54	0.49	3440.41	0.63
9	Jammu & Kashmir	57	0.52	2671.84	0.49
10	Jharkhand	332	3.02	37071.32	6.77
11	Karnataka	754	6.85	59204.59	10.81
12	Kerala	82	0.75	2878.62	0.53
13	Madhya Pradesh	1100	10.00	30930.93	5.65
14	Maharashtra	251	2.28	16093.72	2.94
15	Manipur	2	0.02	610.17	0.11
16	Meghalaya	21	0.19	1297.63	0.24
17	Odisha	532	4.84	77743.91	14.19
18	Rajasthan	2696	24.50	107102.01	19.55
19	Sikkim	3	0.03	96.32	0.02
20	TamilNadu	945	8.59	37780.11	6.90
21	Uttar Pradesh	95	0.86	7608.54	1.39
22	Uttarakhand	89	0.81	1276.76	0.23
12	West Bengal	50	0.45	720.28	0.13
	All States	11003	100.00	547814.31	100.00

Source : Annual Report-2011-12, Indian Bureau of Mines (IBM), Nagpur

* : Excluding fuel, atomic and minor minerals.

5.5.2 The mining activities in the country are governed by the Mineral Conservation Development Rules (MCDR), 1988. Every license holder of mining lease shall take all possible precautions for protection of environment and control of pollution while conducting prospecting, mining beneficiation or metallurgical operations in the area. Specific provisions for proper removal and utilization of top soil, storage of overburden and waste rocks, reclamation and rehabilitation of lands, precautions against air pollution, noise and ground vibrations, restoration of flora, discharge of toxic liquid, control of surface subsidence have been provided under the MCDR. The Indian Bureau of Mines collects the statistics on all these aspects under the above rules.

The State wise mines reported (2005- 2011) in India is presented below in table 5.5.2.

Table 5.5.2 : Number of reporting Mines* in India [Excluding atomic and minerals, Petroleum (crude) Natural Gas & Minor Minerals]							
Sl. No.	State	2005-06	2006-07	2007-08	2008-09	2009-10	2010-11
1	2	3	4	5	6	7	8
1	Andhra Pradesh	409	415	418	469	456	427
2	Arunachal Pradesh				1	1	1
3	Assam	9	9	12	12	11	11
4	Bihar	9	8	6	5	6	9
5	Chhattisgarh	148	144	148	162	152	153
6	Goa	76	72	78	77	75	75
7	Gujarat	431	457	457	440	446	412
8	Himachal Pradesh	27	26	26	26	26	24
9	Jammu & Kashmir	1	0	0	11	11	10
10	Jharkhand	7	11	11	300	299	291
11	Karnataka	297	293	294	241	233	238
12	Kerala	236	231	226	32	30	28
13	Meghalaya	37	33	30	8	9	9
14	Madhya Pradesh	5	8	10	329	287	292
15	Maharashtra	333	336	331	158	158	157
16	Odisha	150	154	163	239	220	175
17	Rajasthan	235	233	226	291	289	270
18	Tamil Nadu	235	217	243	178	175	179
19	Uttar Pradesh	173	177	171	26	25	23
20	Uttarakhand	23	26	26	32	34	36
21	West Bengal	36	37	32	113	112	108
Total		2877	2887	2908	3150	3055	2928

Source : Indian Bureau of Mines

P: Provisional

* Reporting mine: A mine reporting production or reporting 'Nil' production during a year but engaged in developmental work such as overburden removal, underground driving, winzing, sinking work; exploration by pitting, trenching or drilling as evident from the MCDR returns.

The detail of underground mines in India is exhibited in table 5.5.3 below:

Table 5.5.3: Number of underground mines

Mineral	2008-09 (P)			2009-10 (P)#			2010-11#		
	Total	A' Category	B' Category (Other than 'B')	Total	A' Category	B' Category (Other than 'B')	Total	A' Category	B' Category (Other than 'B')
1	2	3	4	5	6	7	8	9	10
Apatite	1	0	1	1	-	1	1	-	1
Asbestos	3	1	2	3	1	2	3	1	2
Ball Clay	1	0	1	1	-	1	1	-	1
Barytes	1	0	1	1	-	1	-	-	-
Chalk	1	0	1	1	-	1	1	-	1
Chromite	5	5	0	5	5	-	6	6	-
Copper Ore	3	3	0	3	3	-	3	3	-
Gold	4	3	1	4	3	1	4	3	1
Lead & Zinc Ore	6	6	0	6	6	-	5	5	-
Limestone	10	4	6				13		
Manganese Ore	12	8	4	13	8	5	-	8	5
Mica	28	3	25	27	3	24	25	3	22
Ochre	0	0	0				1		
Salt (Rock)	1	0	1	1	-	1	1	-	1
Sand (Others)	7	0	7	21			21		
Steatite	22	1	21	21	2	19	21	2	19
Total	105	34	71	87	31	56	84	31	53

Source : Indian Bureau of Mines (IBM), Nagpur

Category 'A' : Mechanised Mines, > 150 labour in all and > 75 labour in workings below ground.

Category 'B' : Other than Category 'A'

P : Provisional

: Excluding fuel, atomic & minerals.

The number of Mines in various States and production of minerals are presented in tables 5.5.4 & 5.5.5 .

5.5.3 The details of machinery and explosives used in Mining Industry is exhibited in tables 5.5.6 & 5.5.7 .

5.5.4 The details of production of coal and lignite, consumption of minerals in various industry are elaborated in tables 5.5.8 to 5.5.12 .

5.5.5 The condition of reserves and resources for various minerals in the Country is presented in table 5.5.13 .

5.5.6 Environmental issues associated with mining can include erosion, formation of sinkholes, loss of biodiversity, and contamination of soil, groundwater and surface water by chemicals from mining processes. In some cases, additional forest logging is done in the vicinity of mines to increase the available room for the storage of the created debris and soil. Contamination resulting from leakage of chemicals can also affect the health of the local population if not properly controlled. Mining companies in most countries are required to follow stringent environmental and rehabilitation codes in order to minimize environmental impact and avoid impacts on human health. These codes and regulations all require the common steps of Environmental impact assessment, development of Environmental management plans, Mine closure planning (which must be done before the start of mining operations), and Environmental monitoring during operation and after closure. However, in some areas, particularly in the developing world, regulation may not be well enforced by governments.

Table 5.5.4 :Number of reporting mines (2000-01 to 2010-11)

Year	Total*	Coal & Lignite	Metalic Minerals	Non-Metallic Minerals
1	2	3	4	5
2000-01	3191	596	565	2030
2001-02	3193	570	574	2049
2002-03	3145	562	591	1993
2003-04	3131	562	612	1957
2004-05	3209	571	625	2013
2005-06	2999	556	636	1807
2006-07	3005	570	639	1796
2007-08	3025	570	693	1762
2008-09	3150	574	719	1857
2009-10	3055	573	701	1781
2010-11	2928	573	687	1668

Source : Indian Bureau of Mines (IBM), Nagpur

* : Includes iron & steel

P : Provisional

Reporting mine: A mine reporting production or reporting 'Nil' production during a year but engaged in developmental work such as overburden removal; underground driving, winzing, sinking work; exploration by pitting, trenching or drilling as evident from the MCDR returns.



Table 5.5.5: Production of minerals

(Excluding

Atomic and Minor Minerals)

Sl. No.	Minerals	Unit	2005-06	2006-07	2007-08	2008-09	2009-10	2010-11	2011-12(p)
1	2	3	4	5	6	7	8	9	10
	Fuel Minerals								
1	Coal	Thousnd Tonnes	407039	430832	457082	492757	532042	532694	539950
2	Lignite	Thousnd Tonnes	30066	31285	33980	32421	34071	37733	42332
3	Natural Gas (Ut.)	M.C.M.	32202	31747	32417	32845	47496	52222	47559
4	Petroleum (Crude)	Thousnd Tonnes	32190	33988	34118	33508	33690	37712	38090
	Metallic Minerals								
5	Bauxite	Tonne	12595803	15732535	22624960	15460202	14124093	12640785	12877394
6	Chromite	Tonne	3714284	5295551	4872847	4073479	3425580	4262207	3764120
7	Copper Ore	Tonne	2642706	3273906	3242371	3452406	3271169	3615038	3478189
8	Copper Conc.	Tonne	125392	149584	216966	137514	124577	136856	130458
9	Gold Ore	Tonne	479353	512609	681243	587215	517520	727020	492192
10	Gold (Primary)	Kg.	2880	2361	2936	2438	2084	2239	2192
11	Gold (by product)	Kg.	167	127	0	0	0	0	0
12	Iron Ore (Total)	Thousnd Tonnes	165230	187696	213246	212960	218553	207998	167289
13	Lead & Zinc Ore	Tonne	4801184	5139915	5783099	6680698	7101872	7489693	8041881
14	Lead Conc.	Tonne	95738	107334	125755	133768	133921	145043	161157
15	Zinc Conc.	Tonne	889007	947387	1035828	1224077	1279880	1420105	1412291
16	Manganese Ore	Tonne	1906353	2115507	2696980	2789025	2491950	2881080	2349300
17	Silver	Kg.	27961	53271	80697	105284	138780	148288	207142
18	Tin Conc.	Kg.	98734	100835	63218	59778	599016	61355	48971
	Non-Metallic Minerals								
19	Agate	Tonne	9	38	25	-	11	19	476
20	Apatite	Tonne	9053	9464	6691	6415	5992	3846	3053
21	Phosphorite	Tonne	-	-	-	1803954	1605489	2097490	2326876
21	Asbestos	Tonne	2323	390	269	315	243	268	280
22	Ball Clay	Tonne	406675	626801	796134	997676	932993	958454	1594634
23	Barytes	Tonne	1156227	1680695	1076290	1686148	2152552	2333805	1722804
24	Calcite	Tonne	73558	105724	86364	67284	49309	39370	51499
25	Chalk	Tonne	148352	210838	194934	203085	185218	174914	176010
26	Clay (Others)	Tonne	805765	1224235	818993	1220783	1056273	590702	744561
27	Corundum	Kg.	58000	156000	89920	21000	6600	-	-
28	Diamond	Carat	44170	2180	586	536	16891	19774	18489
29	Diaspore	Tonne	24494	15944	21236	24642	25569	26905	24124
30	Dolomite	Tonne	4750512	5171649	5852256	5509237	5911759	5064875	5416817
31	Dunite	Tonne	36621	29708	57989	50935	71642	18591	39223
33	Felspar	Tonne	426498	479715	488458	534032	496997	472041	660371
32	Felsite	Tonne	981	642	550	1238	1337	1670	1018
34	Fireclay	Tonne	535735	497315	544973	495781	548748	571421	759746
35	Fluorite (Graded)	Tonne	5577	2053	3970	3176	4995	59954	50147
36	Fluorite (Conc.)	Tonne	3764	0	3794	6814	8786	4394	-
37	Garnet (Abrasive)	Tonne	674541	858843	1275919	1151241	1580617	2126337	1824648
38	Garnet (Gem)	Kg.	0	0	0	-	-	-	-

39	Graphite (R.O.M.)	Tonne	125651	162293	170813	117767	124625	115697	148974
40	Gypsum	Tonne	3291478	3005572	3400050	3876671	3370322	4918170	3189229
41	Jasper	Tonne	536	0	0	99	-	-	-
42	Kaolin	Tonne	1335744	1460363	1466442	2083731	2798340	2727946	2734349
43	Kyanite	Tonne	8869	8059	5102	4620	5495	5954	4064
44	Laterite	Tonne	1040816	1373325	1478590	1237393	1300772	1220304	1665820
45	Lime Kankar	Tonne	291926	395817	336385	434332	335067	383817	311218
46	Limeshell	Tonne	110296	103548	128250	97856	62215	30410	33226
47	Limestone	Thousnd Tonnes	170029	196695	193089	221573	232950	246336	256669
48	Magnesite	Tonne	340674	238981	252849	252880	301070	235762	217662
49	Marl		-	-	4155925	4167452	5908226	4399379	4143975
50	Mica (Crude)	Tonne	2115797	1410576	4577835	1462	1061	1333	1807
51	Mica (Waste & Scrap) ⁽²⁾	Tonne	4754362	3169838	3504.865	5685	8098	7311	13690
52	Ochre	Tonne	1007088	1047831	1233221	766382	1258207	1218261	1352812
53	Perlite	Tonne	122	68	0	-	-	-	-
54	Pyrites	Tonne	-	-	-	-	-	-	-
55	Phosphorite	Tonne	2049277	1586843	1849188	-	-	-	-
56	Pyrophyllite	Tonne	182526	147807	203707	255699	240747	240082	239811
57	Pyroxenite	Tonne	340953	301733	289321	281785	279332	253205	87310
58	Quartz	Tonne	302259	293660	315281	430734	512320	497546	520146
59	Quartzite	Tonne	109210	102711	95850	97458	112652	118177	181065
60	Salt (Rock)	Tonne	1871	1714	1216	2011	1836	1200	-
61	Sand (Others)	Tonne	2277632	1770235	1804306	1808185	2159405	2057119	2625329
62	Selenite	Tonne	0	0	3864	15224	14598	6736	12852
63	Shale	Tonne	2683853	2849877	2894922	3047063	3033948	3081622	3338919
64	Silica Sand	Tonne	2369977	2663289	4303513	2836804	2545988	3380968	4334925
65	Sillimanite	Tonne	33119	26366	40537		33687	48784	58043
66	Slate	Tonne	2527	4	7827	8931	-	-	-
67	Steatite	Tonne	681534	739849	922505	15224	14598	6728	-
68	Sulphur ⁽³⁾	Tonne	152090	204186	227311	269572	263124	236998	381146
69	Talc/steatite/soapstone	Tonne	-	-	-	-	876548	902686	958746
70	Vermiculite	Tonne	6674	11827	8910	12647	11662	19234	9746
71	Wollastonite	Tonne	128582	131572	118666	111581	132385	183381	184445

Source : Indian Bureau of Mines, (Ministry of Petroleum & natural Gas, New Delhi, O/o Coal Controller, Kolkata and MCDR Returns.

(2) : Includes the mine waste and waste obtained while dressing of crude mica at the mine site

P: Provisional - not available * Obtained as by-product from fertilizer plants and oil refineries

Table 5.5.6 :Mining machinery in metalliferrous open mechanised cast mines during 2010-11

Sl. No.	Machinery	2006-07		2007-08		2008-09		2009-10		2010-11	
		In Use	In Reserve	In Use	In Reserve	In Use	In Reserve	In Use	In Reserve	In Use	In Reserve
1	2	3	4	5	6	7	8	9	10	11	12
1	Hauler/Dumper	4961	340	5473	321	5789	323	6578	362	6482	360
2	Drills/Blast Holes	474	42	780	91	839	100	723	83	791	84
3	Air Compressor	738	36	657	85	642	84	617	68	686	62
4	Front end loader	403	22	726	52	773	50	645	26	889	31
5	Dipper Shovels (Hydrl)	626	23	537	59	580	85	469	58	563	52
6	Bulldozer	352	27	467	20	513	17	381	24	512	22
7	Back Hoe	13	0	819	44	1001	58	816	54	1066	77
8	Crusher	624	70	348	16	398	13	347	7	198	3
9	Crane	140	4	175	3	176	3	154	3	414	14
10	Dipper Shovels (Mechl)	49	5	65	7	39	15	37	3	598	59
11	Motor Grader	0	0	88	6	88	2	82	1	109	2
12	Locomotives	20	0	12	0	17	0	19	-	23	-
13	Drag Lines	75	6	0	0	0	0	9	-	-	-
14	Surface Miners	816	99	9	0	15	0	0	0	11	-

Source : Indian Bureau of Mines

Table 5.5.7: Consumption of explosives for mining, 2010-11

Sl. No.	Mineral	Gun Powder (in Tonnes)	High Explosives (in Tonnes)	Detonators (in thousand)		Fuses (Meters) (in thousands)	
				Ordinary*	Electric	Safety	Cordtex
1	2	3	4	5	6	7	8
1	Bauxite	0	747	10	67	15	1319
2	Chromite	46	176	1	203	3	357
3	Copper Ore	0	2347	2	0	2	516
4	Graphite	0	83	0	0	0	52
5	Iron Ore	0	22792	48	145	44	2144
6	Lead & Zinc Ore	0	30985	1	207	0	853
7	Manganese Ore	0	459	2	109	2	190
8	Dolomite	0	561	35	36	26	189
9	Limestone	0	21287	155	1013	376	3573
10	Pyrophyllite	0	16	1	82	2	0
11	Steatite	0	503	145	17	366	318
12	Others	0	4046	62	221	72	300
	Total	46	84002	462	2100	908	9811



Source : Indian Bureau of Mines

P : Provisional

* Includes ordinary and other detonators

**Table 5.5.8 : Production of coal
2000-01 to 2010-11**

Year	Quantity (Lakh tonnes)	Value (Rs. Crores)	No of Mines	Labour * Employed (Av. Daily)**
1	2	3	4	5
2000-01	3137	20352	591	449021
2001-02	3278	21648	564	428855
2002-03	3413	24187	556	413467
2003-04	3612	25440	554	405719
2004-05	3826	30434	563	393513
2005-06	4070	33675	547	384644
2006-07	4308	34837	561	371490
2007-08	4571	38465	559	357467
2008-09	4928	45537	561	356848
2009-10	5320	41318	560	356848
2010-11(P)	5327	62021	559	356848

Source : Indian Bureau of Mines (IBM), Nagpur

* : Excluding Meghalaya

** : Including Lignite.

P : Provisional



Table 5.5.9 : Production of lignite 2000-01 to 2010-11

Year	Quantity (Lakh tonnes)	Value (Rs. Crores)	No. of Mines
1	2		
2000-01	242	1418	5
2001-02	248	1695	6
2002-03	260	1743	6
2003-04	280	2038	8
2004-05	305	2201	8
2005-06	301	2153	9
2006-07	313	2626	9
2007-08	340	2961	11
2008-09	324	3688	13
2009-10	341	3776	13
2010-11	377	4331	14

Source : Indian Bureau of Mines (IBM), Nagpur

P : Provisional

**TABLE 5.5.10 : Consumption of minerals in Iron & steel industry
(2000-01 to 2010-11)**

Year	Iron Ore*	Coal*	Limestone*	Dolomite**	Manganese Ore**	Ferro-Alloys**	Bauxite**
1	2	3	4	5	6	7	8
2000-01	313	222	48	2850	351	212	14
2001-02	322	240	52	2760	255	223	20
2002-03	338	224	50	3142	212	228	16
2003-04	374	252	54	2988	101	265	1
2004-05	378	252	53	3644	169	259	1
2005-06	402	352 #	59	3740	123	395	1
2006-07	484	218#	70	4330	139	418	1
2007-08 (R)	513	180#	73	4580	108	449	1
2008-09(R)	517	178#	62	4790	148	538	1
2009-10(P)	564	186#	73	4360	135	574	1
2010-11	599	186#	76	4450	139	585	1

Source : Indian Bureau of Mines (IBM), Nagpur

* Lakh Tonnes ** : Thousand Tonnes

P : Provisional R : Revised

All the figures in these tables are based on non-statutory returns and estimates.

Dispatches of Coal, since consumption data is not available.

**TABLE 5.5.11 Consumption of minerals in cement industry
(2000-01 to 2010-11)**

('000 tonnes)

Year	Limestone*	Coal*	Gypsum*	Quartz **	Bauxite **	Iron Ore **	Kaolin/1* *	Fireclay **
1	2	3	4	5	6	7	8	9
2000-01	985	110	36	180	336	726	NA	NA
2001-02	1073	131	37	274	339	701	163	178
2002-03	1137	144	38	271	345	828	177	207
2003-04	1185	146	41	304	423	832	203	270
2004-05	1264	162	43	290	504	985	207	273
2005-06	1320	147#	49	289	516	950	238	262
2006-07	1570	147#	57	293	693	1066	243	262
2007-08	1680	153#	60	293	615	1022	270	247
2008-09	1725	131#	66	298	1144	1074	339	245
2009-10	2031	131#	70	279	1043	1294	642	245
2010-11	2006	131#	71	277	888	1130	663	245

Source : Indian Bureau of Mines (IBM), Nagpur

* Lakh tonnes

P: Provisional 1

Pertains to raw/unprocessed china clay.

** Thousand Tonnes

NA : Not Applicable

R : Revised

All the figures in these tables are based on non-statutory returns and estimates.

Dispatches of Coal, since consumption data is not available.

**TABLE 5.5.12 Consumption of minerals in refractory industry
(2000-01 to 2010-11)**

('000 tonnes)

Year	Dolomite	Fireclay	Magnesite*	Quartz & Quartzite	Bauxite & Diaspore	Chromite *	Kyanite & Sillimanite	Kaolin
1	2	3	4	5	6	7	8	9
2000-01	379	227	182	61	197	25	18	18
2001-02	392	274	183	59	176	22	17	20
2002-03	391	160	144	48	194	22	17	17
2003-04	372	162	154	48	193	13	17	18
2004-05	372	178	220	48	220	21	20	27
2005-06	373	188	215	61	295	21	24	24
2006-07	373	179	239	59	295	23	28	23
2007-08	63	182	239	53	304	23	20	28
2008-09	63	182	312	54	318	24	17	28
2009-10	63	163	229	55	128	24	18	33
2010-11 (P)	63	162	229	45	128	24	19	25

Source : Indian Bureau of Mines (IBM), Nagpur

* Includes iron & steel

P : Provisional

R : Revised

All the figures in these tables are based on non-statutory returns and estimates.

Table 5.5.13: Mineral reserves and resources

Sl.No.	Mineral/ Grades	Unit		As on 1.4.2010		
				Reserves (A)	Remaining Resources (B)	Total (A+B)
1	Andalusite	Th. Tonnes		0	18450	18450
2	Antimony	Tonnes	Ore	0	10588	10588
		Tonnes	Metal	0	174	174
3	Apatite	Tonnes		2090216	22138530	24228746
4	Asbestos	Tonnes		2510841	19655762	22166
5	Ball Clay*	Tonnes		16777842	66615662	83393504
6	Barytes	Tonnes		31584128	41149746	72733874
7	Bauxite	Th. Tonnes		592938	2886682	3479620
8	Bentonite	Th. Tonnes				
	Bentinite	Th. Tonnes		25060508	543306838	568367346
9	Borex	Tonnes		0	74204	74204
10	Calcite	Tonnes		2664338	18281110	20945448
11	China clay	Th. Tonnes				
	Chalk	Tonnes		4332	585	4917
	China clay	Tonnes		177158	2528049	2705207
12	Chromite	Th. Tonnes		53970	149376	203346
13	Cobalt	Mill. Tonnes		0	44.91	44.91
14	Copper	Th. Tonnes	Ore	394372	1164086	1558458
		Th. Tonnes	Metal	4768.33	7518.34	12286.67
15	Corundum	Tonnes		597	740194	740792
18	Diamond	Carats		1045318	30876432	31921750
16	Diaspore	Tonnes		2859674	3125144	5984818
17	Diatomite	Th. Tonnes		0	2885	2885
19	Dolomite	Th. Tonnes		738185	6992372	7730557
20	Dunite	Th. Tonnes		17137	168232	185369
21	Emerald					
	Emerald			NE		
22	Feldsper	Tonnes		44503240	87832212	132335452
23	Fire Clay	Th. Tonnes		30104	683415	713519
24	Fluorite	Tonnes		4712316	13501588	18213904
25	Fuller's Earth	Tonnes				
	Fuller's Earth	Tonnes		58200	256593879	256652079
26	Garnet	Tonnes		19324793	37638032	56962825
27	Gold*	Tonnes	Ore (Primary)	24124537	469570375	493694912
		Tonnes	Metal (Primary)	110.54	549.3	659.84
		Tonnes	Ore (Placer)		26121000	26121000
		Tonnes	Metal (Placer)		5.86	5.86
	Granite (Dimen Stone)	th. cum		263692	45966608	46230300
29	Graphite	Tonnes		8031864	166817781	174849645
30	Gypsum	Th. Tonnes		39096	1247402	1286498
31	(Heamatite)	Th. Tonnes		8093546	9788551	17882097
32	Iron Ore (Magnetite)	Th. Tonnes		21755	10622305	10644060
	Kyanite	Tonnes		1574853	101670767	103245620

(Contd...)

Table 5.5.13: Mineral reserves and resources (Contd...)

Sl.No.	Mineral/ Grades	Unit	As on 1.4.2010			
			Reserves (A)	Remaining Resources (B)	Total (A+B)	
	Laterite	Tonnes	24714	446119	470833	
35	Lead & Zinc Ore					
		Th.Tonnes	Ore	108980	576615	685595
		Th.Tonnes	Lead Metal	2245.01	9304.38	11549.39
		Th.Tonnes	Zinc Metal	12453.26	24211.64	36664.9
		Th.Tonnes	Lead & Zinc Metal	0	118.45	118.45
34	Limestone	Th.Tonnes		14926392	170008720	184935112
36	Magnesite	Th.Tonnes		41950	293222	335172
37	Manganese Ore	Th.Tonnes		141977	288003	429980
38	Marble	Th.Tonnes		276495	1654968	1931463
	Marl			139976150	11704870	151681020
39	Mica	Tonnes		190741448	341495531	532236979
		Tonnes	Ore	0	19286732	19286732
40	Molybdenum					
		Tonnes	Contained MOS ₂	0	12640	12640
41	Nickel Ore	Mill. Tonnes		0	189	189
42	Ochre	Tonnes		54942176	89319089	144261265
43	Perlite	Th.Tonnes		428	1978	2406
45	Pt. Grp of Metal	Tonnes	Metal	0	15.7	15.7
44	Potash	Mill. Tonnes		0	21816	21816
46	Pyrites	Th.Tonnes		0	1674401	1674401
	Phosphorite/Rock Phosphate	Th.Tonnes				
				34778650	261505701	296284351
47	Pyrophyllite	Tonnes		23275451	32807451	56082902
48	Quartzite	Th.Tonnes		429223	3069808	3499031
49	Quartz & Silica and Sand	Th.Tonnes		86599	1164649	1251248
52	Ruby	Kilogram		236	5112	5348
51	Rock Salt	Th.Tonnes		16026	0	16026
53	Sapphire	Kilogram		0	450	450
54	Shale	Th.Tonnes		15331	580	15911
	Sillimanite	Th.Tonnes		4085052	62902385	66987437
55	Silver	Tonnes	Ore	187558668	279426291	466984959
		Tonnes	Metal	8039.57	19588.68	27628.25
	Slate	Th.Tonnes		0	2369	2369
56	Sulphur	Th.Tonnes		0	210	210
57	Talc-Steatite - Soapstone	Th.Tonnes		90026	178996	269022
58	Tin	Th.Tonnes	Ore	7131	83719066	83726197
		Th.Tonnes	Metal	1132.43	101142.41	102274.84
59	Titanium Minerals	Th.Tonnes		22030223	371965694	393995917
60	Tungsten	Tonnes	Ore	0	87387464	87387464
		Tonnes	Contained WO ₃	0	142094.35	142094.35
61	Vanadium					
		Tonnes	Ore	410955	24307933	24718888
		Tonnes	Metal	1602.72	63284.45	64887.17
62	Vermiculite	Tonnes		1704007	803003	2507010
63	Wollastonite	Tonnes		2487122	14082751	16569873
64	Zircon	Tonnes		1347470	1786482	3133952

Source : Annual Report-2011-12, Indian Bureau of Mines (IBM), Nagpur

The data on rehabilitation of mining land and reclamation of abandoned mines in India shown in table 5.5.14 indicates the progress made in these areas.

Table 5.5.14 : Information on rehabilitation of mining land/reclamation of abandoned mines

Sl. No.	Item	2008-09	
		For the Year	Cumulative
1	2	3	4
1	No. of abandoned mines	0	102
2	No. of abandoned mines reclaimed	0	53
3	Total area reclaimed in abandoned mines (in hect.)	0	660
4	No. of mines (working) where reclamation / rehabilitation is carried out	37	1202
5	Area of such reclaimed / rehabilitation in working mines(in hect.)	524	11771

Source : Indian Bureau of Mines

5.5.7 Status of afforestation and trees survived in mining areas in India is presented in table 5.5.15 .



**Table 5.5.15 : Status of afforestation(related to Mining) and trees survived
(up to 2009-10)**

Sl. No.	Minerals	Mines Covered	Area Covered (in Hects.)	Trees Planted (in Nos.)	Trees Survived (in Nos.)	Survival (%)
1	2	3	4	5	6	7
1	Limestone	412	14289	22939	15530	68
2	Iron Ore	138	11267	45368	29631	65
3	Bauxite	83	2488	7358	5579	76
4	Manganese	58	2416	6387	4128	65
5	Lead & Zinc	9	1503	822	707	86
6	Chromite	14	1069	3159	2182	69
7	Magnesite	18	548	504	339	67
8	Gold	5	434	922	645	70
9	Copper	7	377	1525	966	63
10	Dolomite	75	336	532	342	64
11	Iron & Manganese	31	226	685	511	75
12	Pyrite	1	7	21	15	71
13	Others	404	3579	3965	2541	64
Total		1255	38539	94187	63116	67

Source : Indian Bureau of Mines



5.6 Natural disasters in India

5.6.1 Many of the natural disasters occurring in India are related to the climate of the country. They cause massive losses of Indian life and property. Droughts, flash floods, cyclones, avalanches, landslides brought on by torrential rains, and snowstorms pose the greatest threats. Other dangers include frequent summer dust storms, which usually track from north to south; they cause extensive property damage in North India and deposit large amounts of dust from arid regions. Hail is also common in parts of India, causing severe damage to standing crops such as rice and wheat.



Table 5.6.1 : Frequently occurring natural disasters in India

Sl. No.	Type	Location/ Area
1	2	3
1	Cyclones	Entire 5700 km long coastline of Southern, Peninsular India covering 9 States viz Gujarat, Maharashtra, Goa, Karnataka, Kerala, Tamil Nadu, Andhra Pradesh, Orissa and West Bengal and Union Territory of Pondicherry besides Islands of Lakshadweep and Andaman and Nicobar
2	Floods	8 major river valleys spread over 40 million hectares of area in the entire country
3	Drought	About 68% of total sown area and 16% of total area of the country spread in 14 States of Andhra Pradesh, Bihar, Gujarat, Haryana, Jammu & Kashmir, Karnataka, Madhya Pradesh, Maharashtra, Orissa, Rajasthan, Tamil Nadu, Uttar Pradesh, West Bengal & Himachal Pradesh covering a total of 116 districts and 746 blocks
4	Earthquake	56% of the total area of the country susceptible to seismic disturbances
5	Landslide	Entire sub Himalayan region and Western Ghats
6	Avalanche	Many parts of the Himalaya
7	Fires	States of Bihar, West Bengal, Orissa and north eastern States

Source : India: State of the Environment, 2001, Ministry of Environment & Forests

The details of the natural disasters occurred in India as depicted in table 5.6.2. indicates the frequency and impact of major natural disasters.

5.6.2 The two thirds of India lies in the Seismic zones of moderate to severe intensity. The Himalayan Range, the Indo-gangetic plains and the Kutch and Kathiwar region of Western India are geologically the most unstable parts, and are most prone to earthquakes. The Himalayan frontal arc flanked by the Chaman fault in the west constitutes one of the most seismically active intra-continental regions in the world. In a span of 53 years, four earthquakes, exceeding magnitude 8 on the Richter scale, occurred in this region. These are the Assam earthquakes of 1897 and 1950, the Kangra earthquake of 1905 and the Bihar-Nepal earthquake of 1934. Besides the Himalayan regions, the Union Territories of Andaman and Nicobar Islands are also quite vulnerable to earthquakes. Peninsular India comprises stable continental crust regions, which are considered stable since they are away from tectonic activity of the boundaries. These regions are considered seismically the least active but the Latur earthquake in Maharashtra on September 30, 1993 of magnitude 6.3 in the Richter scale showed that this region, too, is unstable and earthquake prone. Table 5.6.3 presents the major earthquakes in India.

5.6.3 Landslides are common in the Lower Himalayas. The young age of the region's hills result in labile rock formations, which are susceptible to slippages. Rising population and development pressures, particularly from logging and tourism, cause deforestation. The result is denuded hillsides which exacerbate the severity of landslides; since tree cover impedes the downhill flow of water. Parts of the Western Ghats also suffer from low-intensity landslides. Avalanches occurrences are common in Kashmir, Himachal Pradesh, and Sikkim.

5.6.4 Floods are the most common natural disaster in India. The heavy southwest monsoon rains cause the Brahmaputra and other rivers to distend their banks, often flooding surrounding areas. Though they provide rice paddy farmers with a largely dependable source of natural irrigation and fertilisation, the floods can kill thousands and displace millions. Excess, erratic, or untimely monsoon rainfall may also wash away or otherwise ruin crops. Almost all of India is flood-prone, and extreme precipitation events, such as flash floods and torrential rains, have become increasingly common in central India over the past several decades, coinciding with rising temperatures. Mean annual precipitation totals have remained steady due to the declining frequency of weather systems that generate moderate amounts of rain. Table 5.6.4 presents a record of damages due to floods in India.

5.6.5 The State wise details of damage to human lives and property due to heavy rains/ floods during 2011 in India is in table 5.6.5 and the details of extent of damage in various States due to disasters like cyclonic storms/heavy rains/landslide etc for various years can be found in table 5.6.6 .

5.6.7 Drought is a perennial and recurring feature in many parts of India. Drought leads to large-scale migration in search of alternative livelihoods, loss of human life due to stress, suicide, starvation or unhygienic conditions, and increased social conflict.

Table 5.6.7 gives the names of districts covered under Drought Prone Area Programme which was launched in 1973-74 to tackle drought prone areas. At present DPAP is under implementation in 972 blocks of 195 districts of 16 States. The details can be seen in Table 5.6.7

Table 5.6.2: India's major natural disasters since 1980

Sl. No.	Year	Type	Affected Population Location/Area	Life	Loss to Crops and Property
1	1980	Floods	Uttar Pradesh	1525	Rs. 2.0 Billion
2	1981	Floods	Uttar Pradesh	362	1.5 Million hectares of cropped area affected
3	1982	Floods	Orissa	1000	3 Million hectares of agricultural land affected. Loss estimated to run into thousands of millions of Rupees
4	1982	Cyclone	Saurashtra	514	Livestock death toll nearly 0.15 million. Loss to crops estimated at about Rs. 1.27 Billion
5	1983	Cyclone	Andhra Pradesh	134	Livestock death toll-42800. Damage to crops estimated at Rs. 0.34 Billion
6	1984	Cyclone	Andhra Pradesh and Tamil Nadu	658	Livestock death toll-90650. Damage to crops estimated at Rs. 2.32 Billion
7	1985	Floods	Haryana, Punjab and Uttar Pradesh	Heavy Toll	Large area of standing Kharif crop affected heavily
8	1986	Floods	Andhra Pradesh, Bihar and Uttar Pradesh	Heavy Toll	Large area of standing Kharif crop affected heavily
9	1987	Floods	Assam, Bihar and West Bengal	Over 1400	--
10	1988	Cyclone	West Bengal	532	Livestock death toll-57604
11	1989	Floods	Andhra Pradesh, Assam, Gujarat, Himachal Pradesh, Jammu and Kashmir, Karnataka, Maharashtra, Orissa, Uttar Pradesh and West Bengal	Over 1400	--
12	1990	* Cyclone	Andhra Pradesh and Tamil Nadu	928	Rs. 22.470 Billion
13	1991	* Earthquake	Uttarkashi, Uttar Pradesh	768	Rs. 0.890 Billion
14	1992	Drought	Maharashtra		Rs. 28.23 Billion
15	1993	* Floods	Arunachal Pradesh, Assam, Bihar, Gujarat, Haryana, Himachal Pradesh, J & K, Mizoram, Punjab, Rajasthan, Tripura and Uttar Pradesh	1643	Rs. 21.060 Billion
16	1994	Cyclone	Andhra Pradesh and Tamil Nadu	226	Loss to property estimated at Rs. 6.12 Billion in Tamil Nadu and 444194 Hectares of land in Andhra Pradesh
17	1995	Floods	Large parts of the country	1360	Property worth Rs. 17.7 Billion and crop in 2.35 Million Hectares damaged
18	1996	Floods	Large parts of the country	1700	Property worth Rs. 22.0 Billion and crop in 20.0 Million Hectares damaged
19	1996	Cyclone	Andhra Pradesh	1058	0.3 Million houses fully and a similar number partially damaged. 0.1 Million Hectares of crop damaged. Loss to property worth Rs. 61.26 Billion.
20	1997	* Earthquake	Jabalpur	39	--
21	1998	* Earthquake	Chamoli	100	--
22	1999	** Cyclone	Orissa	9887	1.8 Million Hectares of crop area and 1.6 Houses damaged
23	2001	Earthquake	Gujarat		Over 20,000 people killed, 1,50,000 injured and 1,59,00,000 affected, 12.54 lakhs house damaged
24	2004	Tsunami/Tide waves	A & N Island, Andhra Pradesh, Tamil Nadu, Pondicherry		over 10,749 persons were killed. 5640 person were eported missing. About 6.5 Lakhs person moved to refer place
25	2005	Earthquake	Pakistan & Kashmir		over 87,000 people in Pakistan & Kashmir dead.

Table 5.6.3 : Major earthquakes in India

Sl. No.	Date	Lattitude (Degree N)	Longitude (Degree E)	Magnitude	Region	Remarks
1	2	3	4	5	6	7
1	16.06.1819	24.00	70.00	8.0	Kutch	About 2000 people killed
2	12.06.1897	25.00	92.00	8.7	Assam	One of the greatest earthquake of historical time Shillong city was razed to the ground 1542 killed.
3	04.04.1905	32.30	76.25	8.0	Kangra	20000 lives lost
4	15.01.1934	26.60	86.80	8.3	India-Nepal Border	Most severe in Indian history, More than 10000 killed
6	26.06.1941	12.40	92.50	8.1	Andaman Islands	Flooding in port Blair
7	15.08.1950	28.46	96.66	8.5	Assam	532 people killed
8	06.08.1988	25.14	95.12	5.8	Burma-India Border	3 killed 11 injured
9	20.08.1988	26.78	86.61	6.5	Nepal-India Border	1000 people killed, 1000 injured
10	19.10.1991	30.75	78.86	6.6	West UP Hills/(Ittarkashi)	Extensive damage in Northern Bihar 768 people killed
11	30.09.1993	18.07	76.00	6.3	Latur, Osmanabad	7601 people killed
12	22.05.1997	23.08	80.06	6.0	Jabalpur	38 People killed
13	29.03.1999	30.41	79.42	6.8	Uttar Pradesh	there 1000 dead
14	26.01.2001	23.40	70.28	7.9	Gujarat	Over 20000 people killed, 150000 injured
15	8.10.2005	34.60	37.00	7.6	Pakistan & Kashmir	Over 87,000 in Pakistan & Kashmir dead

Source : Ministry of Environment & Forests

Table 5.6.4 : Flood damage/heavy rains in India

Year	Area Affected	Population Affected	Damage to Crops		Damage to House		Cattle Lost Nos.	Human Lives Lost	Damage to Public Utilities	Total Damages Crops Houses & Public Utilities
			Area	Value	Nos.	Value				
			(M.Ha)	(Rs. Crore)	('000)	(Rs. Crore)				
1953	2.29	24.28	0.93	42.08	265	7.42	47	37	2.9	52.4
1960	7.53	8.35	21.27	42.55	610	14.31	14	510	6.31	63.17
1965	1.46	3.61	0.27	5.87	113	0.20	7	79	1.07	7.14
1970	8.46	31.83	4.91	162.78	1434	48.61	19	1076	76.44	287.83
1975	6.17	31.36	3.85	271.49	804	34.10	17	686	166.05	471.64
1980	11.46	54.12	5.55	366.37	2533	170.85	59	1913	303.28	840.5
1985	8.38	59.59	4.65	1425.37	2450	583.86	43	1804	2050.04	4059.27
1990	9.30	40.26	3.18	695.61	1020	213.73	134	1855	455.27	1708.92
1991	6.36	33.89	2.70	579.02	1134	180.42	41	1187	728.89	1488.33
1992	2.64	19.26	1.75	1027.58	687	308.28	79	1533	2010.67	3344.53
1993	11.44	30.41	3.21	1308.63	1926	528.32	211	2864	1445.53	3282.49
1994	4.81	27.55	3.96	888.62	915	165.21	52	2078	740.76	1794.59
1995	5.24	35.93	3.24	1714.79	2002	1307.89	62	1814	679.63	3702.31
1996	8.05	44.73	3.83	1124.49	727	176.59	73	1803	861.39	3005.74
1997	4.57	29.66	2.26	692.74	505	152.5	28	1402	1985.93	2831.18
1998	10.85	47.44	7.50	2594.17	1933	1108.78	107	2889	5157.77	8860.72
1999	7.77	27.99	1.75	1850.87	1613	1299.06	91	745	462.83	3612.76
2000	5.38	45.01	3.58	4246.62	2629	680.94	123	2606	3936.98	8864.54
2001	6.18	26.46	3.96	688.48	716	816.47	33	1444	5604.46	7109.42
2002	7.09	26.32	2.19	913.09	762	599.37	22	1001	1062.08	2574.54
2003	6.12	43.2	4.27	7307.23	775	756.48	15	2166	3262.15	11325.87
2004	5.31	43.73	2.89	778.69	1664	879.6	134	1813	1656.09	3529.71

2005	12.56	22.93	12.30	2370.92	716	380.53	120	1455	4688.22	7660.49
2006	1.10	25.22	1.82	2850.67	1497	3636.85	267	1431	13303.93	21546.29
2007	7.14	41.4	8.79	3121.53	3280	2113.11	89	3389	8049.04	13425.34
2008	3.43	29.91	3.19	3401.56	1567	1141.89	102	2876	5046.48	9595.34
2009	3.84	29.54	3.59	4232.61	1236	10809.8	63	1513	17509.35	32554.77
2010	2.62	18.3	4.99	5887.38	294	875.95	40	1582	12757.25	19520.59
2011	1.90	15.97	2.72	1393.85	1153	410.48	36	1761	6053.57	7857.89
Total	426.25	1913.39	223.57	66009.63	74042	33373.32	5699	97551	110203.29	213114.9
Average	7.22	32.43	3.79	1118.81	1255	565.65	97	1653	1867.85	3612.12
Maximum (Year)	17.5 (1978)	70.45 (1978)	12.30 (2005)	7307.23 (2003)	3508 (1978)	10809.80 (2009)	618 (1979)	11316 (1977)	17509.35 (2009)	32554.77 (2009)

Source: Centre Water Commission (FMP Directorate) (as per the report received from State Revenue Authorities.)

Nil:0
data up to 14/08/2013.

Table 5.6.5 : State wise details of damage due to flood/heavy rains during 2011 in India

Name of the State/Uts.	Area Affected	Population Affected	Damage to Crops		Damage to House		Cattle Lost	Human Lives Lost	Damage to Public Utilities	Total Damages to Crops, Houses & Public Utilities
			Area	Value	Nos.	Value	(Nos)			
			(M.Ha)	(Rs. Crore)	('000)	(Rs. Crore)	('000)			
Andhra Pradesh	0	0	0	0	0	0	0	0	0	0
Arunachal Pradesh	0	0.12	0	0.50	0	0	3	20	1203.3	1203.8
Assam	0	0	0	0	0	0	0	0	0	0
Bihar	0	0.58	0.16	59.87	34906	17.79	39	143	25.79	103.45
Chhattisgarh	0.02	0.17	0.01	3.79	39126	4.49	318	21	53.78	62.06
Goa	0	0	neg	1	185	1	13	1	0	1.15
Gujarat	0	0.018	0	3.06	5007	3.35	212	110	5.83	12.24
Haryana	0	0	0	0	0	0	0	0	0	0
Himachal Pradesh	0.03	0.61	0.16	417.39	8467	0.48	2372	51	618.6	1036.47
J & K	0	0	0	0	0	0	0	0	0	0
Jharkhand	0	0	0	0	0	0	0	0	0	0
Karnataka	0	0	0	0	0	0	0	0	0	0
Kerala	0	0.37	0.01	60.21	8436	9.32	466	119	71.53	141.07
Madhya Pradesh	0	0	0.008	0.004	15431	6.51	203	82	2.45	8.97
Maharashtra	0	0	0	0	0	0	0	106	0	0
Manipur	0.083	0.066	0.025	7.75	Nil	Nil	Nil	Nil	5.9	13.65
Meghalaya	0	0	0	0	0	0	0	0	0	0
Mizoram	0	0	0	0	0	0	0	0	0	0
Nagaland	0	0	0	0	0	0	0	0	0	0
Odisha	0	5.98	0.52	0	178481	0	1487	87	2874.41	2874.41
Punjab	0	0	0.2	59.56	2538	6.47	28901	38	31.19	97.22
Rajasthan	0	0	0	0	0	0	0	0	0	0
Sikkim	0	0	0	0	0	0	0	0	0	0
Tamil Nadu	0	0	0	0	0	0	0	0	0	0
Tripura	0.002	0.08	0	5.86	653	0.6	29	14	1.05	7.5
Uttar Pradesh	0.53	2.31	0.4	199.94	313436	79.37	239	729	1159.13	1438.44
Uttarakhand	0	0	0	0	3325	0	1407	54	0	0
West Bengal	1.23	5.68	1.23	575.3	542519	281.56	293	186	0.6	857.46
Andaman & Nicobar	0	0	0	0	0	0	0	0	0	0
Chandigarh	0	0	0	0	0	0	0	0	0	0
Dadra & Nagar Haveli	0	0	0	0	0	0	0	0	0	0
Daman & Diu	0	0	0	0	0	0	0	0	0	0
Delhi	0	0	0	0	0	0	0	0	0	0
Lakshadweep	0	0	0	0	0	0	0	0	0	0
Puducherry	0	0	neg	0	0	0.025	0	0	0	0
Total	1.90	15.97	2.72	1393.85	1152518	410.48	35982	1761	6053.57	7857.89

Sources: Central Water Commission (FMP Directorate) (as per the report received from State Revenue Authorities and MHA)

Note: Neg: Negligible

NR : Not Reported

Nil: 0.000

Table 5.6.6: Year-wise damage caused due to floods, cyclonic storms, landslides etc. in India

Year	Live Lost human (in No)	Cattle Lost (in No)	Houses damaged (in No)	Cropped areas affected (in Lakh hectares)
2001-02	834	21269	346878	18.72
2002-03	898	3729	462700	21.00
2003-04	1992	25393	682209	31.98
2004-05	1995	12389	1603300	32.53
2005-06	2698	110997	2120012	35.52
2006-07	2402	455619	1934680	70.87
2007-08	3764	119218	3527041	85.13
2008-09	3405	53833	1646905	35.56
2009-10	1677	128452	1359726	47.13
2010-11	2310	48778	1338619	46.25

Source: Ministry of Home Affairs (MHA)



Table 5.6.7: List of districts covered under drought prone area programme (DPAP)

SI.No.	State/District		No. of Blocks	Area of Blocks (in hectare)
1	Andhra Pradesh			
	1	Adilabad	9	11793
	2	Chittoor	8	7761
	3	Cuddapah	7	8225
	4	Khammam	2	1228
	5	Kurnool	13	17366
	6	Mahabubnagar	16	18178
	7	Modak	5	4323
	8	Nalgonda	9	8178
	9	Prakasam	14	15165
	10	Ranareddy	7	5535
	11	Srikakulam	4	1466
	Total		94	99218
2	Bihar			
	1	Kaimur (Bhabhua)	5	2237
	2	Jamul	7	3062
	3	Madhubani	4	772
	4	Nawadah	9	2276
	5	Rohtas	2	639
	6	Sitamarhi	3	547
	Total		30	9533
3	Chattisga			
	1	Bastar	6	3857
	2	Bilaspur	3	1709
	3	Bijapur	3	6010
	4	Dantewada	3	
	5	Durg	2	1146
	6	Janjgir	1	440
	7	Kavardha	2	1386
	8	Korba	5	4309
	9	Rajnandgaon	4	2944
	Total		29	21801
4	Gujarat			
	1	Ahmedabad	6	4429
	2	Amreli	11	7393
	3	Bharuch	4	3129
	4	Bhavnagar	6	4896
	5	Dahod	7	3811
	6	Junagarh	6	3162
	7	Narmada	4	2800
	8	Navsari (Valsad)	1	593
	9	Panchmahals	10	4639
	10	Porbandar	2	1729
	11	Sabarkantha	1	368
	12	The Dangs	1	1723
	13	Vadodara	5	3244
	14	Valsad	3	2022
	Total		67	43938

Contd...

Sl.No.	State/District		No. of Blocks	Area of Blocks (in hectare)
5	Himachal Pradesh			
	1	Bilaspur	3	1120
	2	Solan	2	685
	3	Una	5	1514
	Total		10	3319
6	Jammu & Kashmir			
	1	Doda	6	11656
	2	Ramban	4	
	3	Kishtwar	5	
	4	Udhampur	3	3049
	5	Reasi	4	
	Total		22	14705
7	Jharkhand			
	1	Bokaro	2	755
	2	Chatra	4	2493
	3	Deoghar	7	2436
	4	Dhanbad	8	2000
	5	Dumka	16	3693
	6	Garhwa	14	3630
	7	Godda	7	2019
	8	Hazaribagh	6	430
	9	Ramgarh	4	
	10	Jamtara	4	0
	11	Kodarma	4	0
	12	Latehar	7	0
	13	Pakur	6	0
	14	Palamau	11	0
14	Sahebganj	6	0	
	Total		100	34843
8	Karnataka			
	1	Bangalore	4	5843
	2	Ramnagara	4	
	3	Belgaum	7	9450
	4	Bidar	4	4491
	5	Chamarajanagar	1	1406
	6	Chickmangalur	6	6416
	7	Chitradurga	5	6681
	8	Davangere	1	953
	9	Dharwad	4	3016
	10	Gadag	4	4210
	11	Gulbarga	9	14603
	12	Hassan	4	4002
	13	Haveri	6	4063
	14	Kolar	5	6370
	15	Chikkaballapura	4	2630
	16	Mysore	3	
17	Tumkur	10	10198	
	Total		81	84332

Contd...

Sl.No.	State/District		No. of Blocks	Area of Blocks (in hectare)
9	Madhya Pradesh			
	1	Badwani	6	3184
	2	Betul	10	7080
	3	Bhind	1	406
	4	Chindwada	8	7474
	5	Damoh	3	2204
	6	Dewas	3	3009
	7	Dhar	8	4981
	8	Guna	6	7196
	9	Ashok Nagar		
	10	Jabalpur	1	863
	11	Jhabua	12	6791
	12	Alirajpur	5	3886
	13	Khandwa		
	14	Khargone	5	3246
	15	Panna	3	2727
	16	Raisen	3	2325
	17	Rajgarh	2	1873
	18	Ratlam	1	681
	19	Rewa	4	2124
	20	Seoni	5	5424
	21	Shahdol	4	5225
	22	Annuppur		
	23	Shahjapur	2	1639
	24	Shivpuri	3	2780
	25	Sidhi	4	10350
	26	Singroli	4	
	27	Umaria	2	3633
	Total		105	89101
10	Maharashtra			
	1	Ahmednagar	10	14109
	2	Akola	7	5363
	3	Washim	6	5177
	4	Amravati	9	6407
	5	Aurangabad	6	8108
	6	Beed	6	9008
	7	Buldhana	9	6877
	8	Chandrapur	3	4206
	9	Dhule	3	5735
	10	Nandurbar	4	4886
	11	Gadchiroli	3	7686
	12	Jalgaon	7	6504
	13	Jalna	2	2826
	14	Latur	4	5676
	15	Nagpur	1	829
	16	Nanded	4	4703
	17	Nasik	13	15658
	18	Osmanabad	3	3197
	19	Parbhani	2	3288
	20	Hingoli	2	3308
	21	Pune	12	33355
	22	Sangli	7	7164
	23	Satara	4	5035
	24	Sholapur	10	13730
	25	Yeotmal	12	11638
	Total		149	194473

Contd...

Sl.No.	State/District		No. of Blocks	Area of Blocks (in hectare)
11	Orissa			
	1	Bargarh	6	2648
	2	Bolangir	8	3446
	3	Boudh	2	2516
	4	Dhenkanal	2	1167
	5	Kalahandi	10	5741
	6	Naupada	5	2685
	7	Phulbani (Kandhamal)	12	7376
	8	Sonepur	2	599
	Total		47	26178
12	Rajasthan			
	1	Ajmer	3	2660
	2	Banswara	8	5037
	3	Baran	2	3587
	4	Bharatpur	1	501
	5	Dungarpur	5	3793
	6	Jhalawar	3	3536
	7	Karouli	1	1393
	8	Kota	2	1964
	9	Swai Madhopur	1	1375
	10	Tonk	3	3176
	11	Udaipur	3	4947
	Total		32	31969
13	Tamil Nadu			
	1	Coimbatore	5	1530
	2	Dharmapuri	14	5751
	3	Krishnagiri		
	4	Dindigul	3	1846
	5	Karur	2	976
	6	Perambalur	2	2122
	7	Ariyalur	4	
	8	Pudukottai	4	1334
	9	Ramanathapuram	7	2988
	10	Salem	5	1087
	11	Namakkal	3	592
	12	Sivaganga	7	2616
	13	Thiruvannamalai	1	255
	14	Thothukudi	8	3662
	15	Tiruchirapalli	1	475
	16	Tirunelveli	1	326
	17	Vellore	6	1349
	18	Virudhunagar	7	2507
	Total		80	29416
14	Uttar Pradesh			
	1	Allahabad	1	587
	2	Bharaich	14	5405
	3	Sravasthi		
4	Balrampur (Gonda)	4	2090	

Sl.No.	State/District		No. of Blocks	Area of Blocks (in hectare)
	5	Banda	6	3546
	6	Chitrakoot	5	3647
	7	Hamirpur	3	2216
	8	Jalaun	3	2140
	9	Jhansi	5	3281
	10	Lakhimpur Kheri	2	392
	11	Lalitpur	2	1793
	12	Mahoba	2	1835
	13	Mirzapur	2	1385
	14	Sitapur	3	1108
	15	Sonebhadra	8	6273
		Total	60	35698
15	Uttarakhand			
	1	Almora &		
	2	Bageswar	8	3114
	3	Chamoli	4	5850
	4	Garhwal (Pauri)	10	4070
	5	Pithoragarh &		
	6	Champavath	5	1709
	7	Tehri Garhwal	3	1053
		Total	30	15796
16	West Bengal			
	1	Bankura	7	2185
	2	Birbhum	2	397
	3	Midnapur	7	2707
	4	Purulia	20	6305
		Total	36	11594
	DPAP Total: 195 Districts		972	745914

Source : Central Water Commission,
(Information System Organisation, Water Resources Information Systems Directorate)
Department of Land Resources, Ministry of Rural Development