

CHAPTER 3

CHANGE IN FOREST COVER

3.01 Approach

Forest Survey of India not only assesses forest cover of the country biennially but also monitors the changes in the forest cover during the two-year period. “Change” from one class of land cover to another class is a spatial term, i.e., it can be shown on a map. If we consider only two broad classes of land cover, i.e., forest cover and non-forest and if an area that was non-forest in the earlier assessment is found to have tree vegetation cover in the current assessment, there is said to be a gain in forest cover. On the other hand, an area that was earlier classified as forest but now, due to harvesting of trees or degradation, has been classified as non-forest in the current assessment, signifies loss in forest cover. The difference between sum-total of all such gains and losses is described as “net change” and it is a non-spatial entity and is shown as a statistical number denoted by extent of area of net change.

The net change in forest cover within a region may be nil but it does not mean there has been no change in forest cover in that region. It only implies that total gains in forest cover compensated the total loss therein. Even if there is a net gain in forest cover within a region, there might be areas where losses have occurred and only it can be said that total gains exceeded the total losses in forest cover. Thus, change in forest cover between two assessments can be best understood or explained only on a map showing all kinds of positive and negative changes occurring in different locations during the intervening period. The forest cover change maps for particular area can be obtained from FSI on demand basis.

In this report the net changes in forest cover between 2001 and 2003 assessments in the country, States/UTs and districts have been tabulated. However, describing change through a “change matrix” is the best way of representing change from one class to another and vice versa in a non-spatial or a statistical form. It is table of numbers in a matrix form that shows total changes within different classes. Such matrix for the country has been shown in this chapter while change matrices for individual States and UTs have been given in Chapter 7.

3.02 Net Change in Forest Cover

The net change in forest cover during the period between 2001 and 2003 assessments is estimated by comparing the extent of forest cover recorded in the two assessments. The results are given in Table 3.01. It is found that during this period, there is a net increase of 2,795 km² in overall forest cover. It is also found that there has been a net reduction in the dense forest by 26,245 km² while the open forest has shown net gain of 29,040 km².

Table 3.01: Net Change in forest cover in the country since 2001 assessment

(km²)

Assessment Year	Dense Forest	Open Forest	Total Forest Cover	Scrub
2001	416,809	258,729	675,538	47,318
2003	390,564	287,769	678,333	40,269
Change	-26,245	29,040	2,795	- 7,049

The change matrix for the whole country is given in Table 3.02.

Table 3.02: Change Matrix for the whole Country

(Area in km²)

Class	Dense Forest	Open Forest	Scrub	Non-Forest	2001 Assessment
Dense Forest	332,928	55,640	420	27,821	416,809
Open Forest	46,177	194,401	1,366	16,785	258,729
Scrub	749	4,217	34,703	7,649	47,318
Non-Forest	10,710	33,510	3,780	2,516,407	2,564,407
2003 Assessment	390,564	287,769	40,269	2,568,661	
Net Change	-26,245	29,040	-7,049	4,254	

The change matrix for the country reveals that there has been a lot of transformation between classes. For instance, as much as 27,821 km² area that was classified as dense forest during 2001 assessment is now without forest cover whereas 10,709 km² area earlier classified as non-forest has now come to dense forest category. Similarly, large chunks of land has come into and gone out of open forest category also. Considerable portion of these changes has been due to misclassification or wrong inclusion and omission during the previous assessment that has been corrected now. This is explained in the next paragraph.

3.03 State/UT wise Net Change in Forest Cover

State/UT wise net change in forest cover between 2001 and 2003 assessments is given in Table 3.3.

Table 3.03: State-wise Change in Forest Cover since 2001 Assessment

(Area in km²)

State/UT	2001 Assessment			2003 Assessment			Change		
	Dense	Open	Total	Dense	Open	Total	Dense	Open	Total
Andhra Pradesh	25,827	18,810	44,637	24,379	20,040	44,419	-1,448	1,230	-218
Arunachal Pradesh	53,932	14,113	68,045	53,511	14,508	68,019	-421	395	-26
Assam	15,830	11,884	27,714	13,042	14,784	27,826	-2,788	2,900	112
Bihar	3,372	2,348	5,720	3,027	2,531	5,558	-345	183	-162
Chhattisgarh	37,880	18,568	56,448	38,980	17,018	55,998	1,100	-1,550	-450
Delhi	38	73	111	52	118	170	14	45	59
Goa	1,785	310	2,095	1,255	901	2,156	-530	591	61
Gujarat	8,673	6,479	15,152	6,345	8,601	14,946	-2,328	2,122	-206
Haryana	1,139	615	1,754	520	997	1,517	-619	382	-237
Himachal Pradesh	10,429	3,931	14,360	8,976	5,377	14,353	-1,453	1,446	-7

Jammu & Kashmir	11,848	9,389	21,237	10,497	10,770	21,267	-1,351	1,381	30
Jharkhand	11,787	10,850	22,637	11,681	11,035	22,716	-106	185	79
Karnataka	26,156	10,835	36,991	22,461	13,988	36,449	-3,695	3,153	-542
Kerala	11,772	3,788	15,560	9,628	5,949	15,577	-2,144	2,161	17
Madhya Pradesh	44,384	32,881	77,265	41,843	34,586	76,429	-2,541	1,705	-836
Maharashtra	30,894	16,588	47,482	28,387	18,478	46,865	-2507	1890	-617
Manipur	5,710	11,216	16,926	6,538	10,681	17,219	828	-535	293
Meghalaya	5,681	9,903	15,584	6,491	10,348	16,839	810	445	1,255
Mizoram	8,936	8,558	17,494	7,488	10,942	18,430	-1,448	2,384	936
Nagaland	5,393	7,952	13,345	5,707	7,902	13,609	314	-50	264
Orissa	27,972	20,866	48,838	28,170	20,196	48,366	198	-670	-472
Punjab	1,549	883	2,432	743	837	1,580	-806	-46	-852
Rajasthan	6,322	10,045	16,367	4,496	11,330	15,826	-1,825	1,285	-540
Sikkim	2,391	802	3,193	2,362	900	3,262	-29	98	69
Tamilnadu	12,499	8,983	21,482	12,007	10,636	22,643	-492	1,653	1,161
Tripura	3,463	3,602	7,065	5,046	3,047	8,093	1,583	-555	1,028
Uttar Pradesh	8,965	4,781	13,746	5,996	8,122	14,118	-2,969	3,341	372
Uttaranchal	19,023	4,915	23,938	18,422	6,043	24,465	-601	1,128	527
West Bengal	6,346	4,347	10,693	6,045	6,298	12,343	-301	1,951	1,650
Andaman & Nicobar	6,593	337	6,930	6,284	680	6,964	-309	343	34
Chandigarh	5	4	9	9	6	15	4	2	6
Dadra & Nagar Haveli	151	68	219	145	80	225	-6	12	6
Daman & Diu	2	4	6	2	6	8	0	2	2
Lakshdweep	27	0	27	12	11	23	-15	11	-4
Pondicherry	35	1	36	17	23	40	-18	22	4
Total	416,809	258,729	675,538	390,564	287,769	678,333	-26,244	29,040	2,795

When analysing satellite data of two periods, the changes in land cover noticed during the interpretation can be due to two main reasons. The first and the most apparent is the actual change in the ground situation. Secondly, some changes may also be noted due to interpretational corrections as a result of progressive ground truthing. After all the remote sensing technology applied for forest cover assessment is still not perfect and has several limitations as indicated in para 2.04 in Chapter 2. When the scale of forest cover assessment was enlarged to 1:50,000 scale during the eighth cycle in 2001, a large number of smaller patches of tree crops down to 1 ha got included in the forest cover. These were mostly surrounded by agricultural crops. It was some times difficult to distinguish them from certain agricultural crops, such as sugarcane or cotton, as these also gave similar kind of reflectance. The ground verification necessary for a large number of small patches is much more extensive and time consuming than required for large forested lands. During 2001 assessment, considering cost and time, this could not be done adequately. Another way to eliminate agricultural crops from getting wrongly interpreted as forest cover is to use and compare satellite data of two seasons during the same year. However, this would also entail huge cost and time. Refinement in forest cover assessment at the national level is a long-term process. The accuracy of reporting improves with every cycle of assessment. The periodic assessments done by FSI can also be seen as a process of correcting certain misclassifications of the past.

Thus, the net changes in forest cover reported in Table 3.03 may be seen in this light. In certain states, such as Punjab, Rajasthan and Haryana (where substantial net loss has been recorded) and Tamilnadu and West Bengal (where large net gain has been shown), the net changes are mostly composed of corrections (wrong inclusion or omission of areas in the previous assessment).

