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Study for Tree Enumeration of Attarsumba Range, Gandhinagar Forest Division, India

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***Abstract*:** It was during late-sixty and early seventies that the forest area of the state was sampled for knowing the growing stock. It was conducted by pre-investment survey now known as forest survey of India, Dehradun, India to know how much supply of raw material is possible from forest resources. Gandhinagar Forest Division has 48 villages and area of 11,263.31 hectare. It was surveyed covering the entire area in 20 meter wide strips laid parallel to each other with 200 m distance from one another. Strip enumeration methodology was thus adopted. Range wise details enumeration revealed that in Attarsumba range is rich range with 12,35,650 trees and available tree species are 78.

Keywords: Tree enumeration, Attarsumba range, Gandhinagar forest division.

I. INTRODUCTION

Biodiversity of plant forms like trees and shrubs constitute the important component of the forest. Though the number of species belonging to trees and shrubs are comparatively less than that of herbs and climbers, the former groups dominate the forest cover due to their wide spread canopy coverage. Contribution of trees and shrubs to the total biomass of any forest is much higher than that of any other biotic component. Being perennial in nature and due to long life span, trees and shrubs supply Non Wood Forest Products (NWFP) year after year, besides the supply of timber. The NWFPs obtained from plant resources, including seeds, flowers, Fruits, leaves, roots, bark, latex, resins and other plant parts have gained much attention for conservation now. The growing commercial trade of natural products, in particular plant medicines and crafts, has resulted in overexploitation (Ticktin, 2004 [1]). Forest dwellers have remained dependent for their livelihood on trees and shrubs. They not only provide timber and firewood, but they act as a sustainable source of several kinds of non-wood forest produce to forest dwellers. It is important to know important NWFP trees in an area.

II. LITERATURE SURVEY

Maximum benefits, in term of utility of trees and shrubs over a long period of time, can be reaped through the assessment of the total stocks of different species in terms of their number, density and spread over different girth classes in an area. It is, therefore, important to enumerate the trees and shrubs in an area (Tyagi *et al*, 2007 [2]; 2009 [3]). It was in the year of 1967, a survey covering all forest areas of Gujarat state was carried out. Tree species, their number in different girth class, their total number and their density could be known at that time from the survey. Since then, there has been lot of changes in composition of forests with increasing abiotic and biotic factors influencing them. Therefore, current assessment of Forest Resource is very much needed (Tyagi *et al*, 2007 [2]; 2009 [3]). The management of India's forest resources is the key to progress in the field of agriculture and allied sectors, infrastructure, rural, health and hygiene, water conservation and to overall socio-economic development (Bahuguna, 2000 [4]).

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Importance of tree enumeration: Tree enumeration data can compare with remote sensing, calculating green cover, calculate available carbon stock in forest area, to balance biodiversity conservation, nitrogen fixation, to save native community from invasive species, ensuring their sustainability and stable ecosystem.

Present Forest Resource survey was undertaken to create database in Gandhinagar forest division for the due revision of working plan. It was established by the investigations that some species are holding on and growing successfully in the area with dominant replacement to other tree species in the forest range.

Gandhinagar range is divided in three ranges. Attarsumba range, Dharoi range and Mansa range. As Attarsumba range is reach in production of NWFPs which have good market and medicinal value, it has been selected for present study. Percentage contribution to worth/income for various NWFPs in decreasing order of their contribution is as: Baval gundar (39%), Shatavari mool (27%), Dholi musli (12%), Chanothi pan (10%), Madh (4%), Limbodi (2%), Kakarash beej (2%), Kher (2%), Puvaad beej (1%) and Piluda mool (1%). Population living near or in forests have a long history of Non-wood Forest Products (NWFP) extraction for substance or sale. NWFPs make an important contribution to the livelihood of those households who gather and consume them (Jasrai *et al*, 2014 [5]).

Statement

- Plant composition and configuration that persisted before changed over a period because of variations in climatic conditions.
- This requires a careful planned and detailed forest resource survey for necessary inputs for evaluation and analysis with meticulous planning for conservation, protection and development of forest in desired form.
- People from villages on the fringes of forests collect several NWFPs from the forest.
- These forest resources are essential to understand required database on dependency of local people on forests.
- This survey was conducted to document a database to help and generate prescriptions for future plans to be adopted. Total forest area covered by this division is about 11263.31 hectare, out of which 6390.11 hectare is reserved forest, 44.92 hectare is protected forests and the remaining 4828.28 hectare forest areas is yet to be settled. The same forest area of 4828.28 hectare has been notified under Section 4 of Indian Forest Act, 1927 (Anonymous, 2008 [6]).

The forest included under this division is distributed over 18 villages of Kapadvanj Taluka of Kheda district (Anonymous 2002 [7]). According to Champion and Seth (1968) [8] the revised classification of forest type (Table-1),

Table – 1: Distribution of different types of forests in Attarsumba range of Gandhinagar Forest Division

Name of District and Taluka	Forest Area (hr)			
	Reserved	**Protected**	**Unclassed**	**Total**
Kapadvanj (Kheda)	2,000.28	44.92	-	2,045.20
Dehgam (Gandhinagar)	886.51	-	-	886.51
Total	**2886.79**	**44.92**	**-**	**2,931.71**

III. MATERIALS AND METHODOLOGY

The map of the Gandhinagar Forest Division was stratified in 48 villages on the basis of density-composition of species of the particular forest area.

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Species enumerated:

A list of common tree species in the area to be enumerated was prepared before starting the work. Every strip along the base line was enumerated; thus covering a 10 % enumeration. All the tree species occurring in the forests were enumerated in terms of girth classes as 0-30 cm, 31-60 cm, 61-90 cm, 91-120 cm, 121-150 cm and above 150 cm. The tree species encountered in the enumeration survey was also collected for herbarium preparation and correct identification.

The most important part is the correct location of the starting point on the field based on the point marked on the village map. The help of local people and the forest department staff was also essential. This was ascertained with available features on the ground and a peg was fixed at this point with details (corresponding to the details on the map).

Establishing strip-line on the base-line and enumeration work

The first cruise-line was fixed at right angle to the base line, at 100 m from the starting point. The straight line of cruise-line was created and continued exactly as followed for the base-line with the help of Flagman.

For every 250 m length of the strip, one tree-enumeration form was done. That means, if the strip is 750 m long as per the map, then tree forms are to be filled-up accordingly.

IV. RESULT AND DISCUSSION

The data on tree enumeration was collected during the survey and analysis for the period 2012-2014. The entries in the enumeration format for each 12.5 m length of up and down strip of each village surveyed were feed to the prepared computer table. The total stock of each surveyed village was calculated. The results were compiled to get total stock of the stratified village and range of the division.

The species-wise data was also analyzed. The entries of each of the surveyed villages were collected to get the species-wise total stock for each village in the range. Thus, the stock of each village surveyed was calculated by multiplying stock (10% as surveyed data) in each girth class by 10. Plant identification was done with the help of forest flora of Gujarat state Patel, R. I. (1984) [9] and Flora of Gujarat State Part I &II by Shah G. L. (1978) [10], Cook (1901-1908) [11], Deshpande *et al* 1993 [12].

Table-2: Species wise total trees in different girth classes

Sr. No.	Scientific Name	Local Name	Girth (in cm)						Total
			0-30	31-60	61-90	91-120	121-150	Above 150	
1	*Acacia catechu* Willd	Kher	1010	1460	610	120	20		3220
2	*Acacia farnesiana* (L) Willd	Bhoy Baval	570						570
3	*Acacia jacquemontii* Benth	Rato Baval	130						130
4	*Acacia leucophloea* (Roxb) Willd	Aniyar	420	870	320	30		10	1650
5	*Acacia nilotica* (L) Dell	Deshi Baval	9560	9790	5210	2330	550	170	27610
6	*Acacia planifrons* Koen Ex Wt	Akhari Baval	1760	1210	780	310	70		4130

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7	*Acacia senegal* Willd	Gorad	70080	44820	7590	190			122680
8	*Acacia tortiles* (Forsk) hyne	Isaraili Baval	83010	87020	55840	11660	2190	1320	241040
9	*Aegle marmelos* (L) Corr	Bili	210	520	140				870
10	*Ailanthus excelsa* Roxb	Araduso	1520	940	190	40			2690
11	*Alangium salvifolium* (L f) Wang	Ankol	220	390	30				640
12	*Albizia amara* Boivin	Kaliyo	150	620	180	70			1020
13	*Annona squamosa* L	Sitafal	460	20					480
14	*Anogeissus pendula* Edgew	Dhav	270	10					280
15	*Anogeissus sericea* Brandis	Indrok	12170	10420	3920	1210	110	20	27850
16	*Azadirachta indica* A Juss	Limdo	36220	20270	4510	470	50		61520
17	*Balanites aeguptiaca* (L) Del	Ingoriyo	56920	6050	30				63000
18	*Bauhinia racemosa* Lam	Asitro	2410	1480	240	30			4160
19	*Bombax ceiba* L	Simlo	30	140	230	450	120	20	990
20	*Butea monosperma* (Lam) Taub	Khakhro	390	300	130				820
21	*Canthium parviflorum* Lam	Gengani	2710	300					3010
22	*Capparis grandis* L f	VattBor	1030	590	10				1630
23	*Capparis sepiaria* L	Kanther	79910	1950					81860
24	*Carissa congesta* Wt	Kali Kanther	2690						2690
25	*Cassia fistula* L	Garmalo	500	120					620
26	*Cassia siamea* Lam	Kashid	120	140	100	40			400
27	*Cordia garaf* (Forsk) E& A	Gundi	2080	450	80	60	20		2690
28	*Cordia perrottetii* Wt	Muvadiyo	4380	410	100				4890
29	*Crateva nurvala* Buch Ham	Vainiyo		10					10
30	*Dalbergia paniculata* Roxb	Pahi						10	10
31	*Dalbergia sissoo* Roxb	Sisam	850	850	330	20			2050
32	*Derris indica* L	Kanjo	2190	540	210				2940
33	*Dichrosachys cinerea* (L) W & A	Madhar	60550	9600	80				70230
34	*Diospyros montana* Roxb	Makrod	1260	750	320				2330
35	*Emblica officinalis* Gaertn	Amla	80						80
36	*Eucalyptus globules* Labill (P)	Nilgiri	180	20	580	180	420	20	1400
37	*Ficus arnottiana* (Miq) miq	Umaro	60	70					130
38	*Ficus hispida* L	Dhed Umaro	3680	1030	100				4810
39	*Ficus religiosa* L	Pipal				10			10
40	*Flacourtia indica* (Burm f) Merr	Katedi	1300	60					1360
41	*Garuga pinnata* Roxb	Kakad		110	60				170

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42	*Gmelina arborea* L	Sevan	130						130
43	*Grewia damine* L	Sisoti	140						140
44	*Grewia flavescens* Juss	Tambat	101700	800					102500
45	*Grewia tenax* (Forsk) Fiori	Ganjeti	5710	350					6060
46	*Grewia tiliaefolia* Vahl	Dhaman	170	300	30				500
47	*Holoptelia integrifolia* (Roxb) P	Kanji	34540	10170	4110	980	190	120	50110
48	*Hymenodictyon excelsum* (Roxb) Wall	MadhMahudo		10	10				20
49	*Kirganelia reticulata* (Poir) Baill	Kamboi	1720						1720
50	*Leucaena leucoephala* (Lam)	Su Baval	30		20	20			70
51	*Limonia acidissima* L	Kothi	100	20	90	10			220
52	*Manilkara hexandra* (Roxb) Dub	Rayan	20	20					40
53	*Maytenus emarginata* (Willd) D Hou	Kankayo	22280	4860	190	30			27360
54	*Miliusa tomentosa* (Roxb) Sinclair	Umbiyo	520	260	130	10			920
55	*Mitragyna parvifloa* (Roxb) Korth	Kalam		60	70	30			160
56	*Moringa concanensis* Nimmo	Saragvo	70	110	70	100	30		380
57	*Nyctanthus arbortritis* L	Chhayadi	6080	120	10				6210
58	*Peltophorum pterocarpum* (DC) Backer	Peltoforam		10					10
59	*Phoenix sylvestris*(L) Roxb	Khajuri	4290	20	80				4390
60	*Pithecellobium dulce* (Roxb) Bth	Goras Amli	120	50	60	80	140	10	460
61	*Prosopis cineraria* (L) Druce	Khijdo	2460	3410	1760	420	90	60	8200
62	*Prosopis juliflora* (Sw) DC	Gando Baval	34670	5890	2180	1960	620		45320
63	*Salvadora persica* L	Vagdo	20700	5810	4490	3340	1450	820	36610
64	*Santalum album* L	Chandan	1000	690	20				1710
65	*Sapindus emarginatus* L	Arithi	880						880
67	*Secrinega virosa* (Roxb Ex Willd)	Dhudhan	12200	290					12490
68	*Stribulus asper* L	Haredo	22840	13850	3660	1040	380		41770
69	*Syzygium cumini* (L) Skeels	Jambu		30	20				50
70	*Tamarindus indica* L	Amli	550	420	50	70	80	30	1200
71	*Tecomella undulata* (sm) Seems (P)	Rohido	1230	670	60				1960
72	*Tectona grandis* L f	Saag	40						40
73	*Wrightia tinctoria* R Br	Dudhi	12330	3460	1200	100	40		17130
74	*Wrightia tomentosa* (Dominant)	Nani Dudhi	2020	110	160				2290

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	R & S								
75	*Xeromphis spinosa* (Thunb) Keay	Mindhal	1050	160					1210
76	*Zizyiphus oenoplia* (L) Mill	Aalemadi	3080						3080
77	*Zizyphus nummularia* (Burm f) W & A	Bor	96630	14020	920	20			111590
78	*Zizyphus xylopyra* (Retz) Willd	Ghat Bor	50						50
Total			**8,30,430**	**2,69,300**	**101,310**	**25,430**	**6,570**	**2,610**	**12,35,650**

V. CONCLUSION

Attarsumba range has 23 villages. Total number of species present in the range was 78. At Attarsumba range, the ground flora was dense and varying due to high humidity of Vatrak River passing through the range. Thus the plant diversity was high in comparison to neighboring Mansa range. This density of tree species needs enhanced protection measures rather than new plantation at the range.

Range is mainly dominated by *Acacia tortiles* (Forsk) hyne (2,41,040 trees). It makes 25% of the total tree stock (12,35,650). *Acacia Senegal* Willd (1,22,680), *Zizyphus nummularia* (Burm f) W & A (1,11,590), *Grewia florescence* Juss (1,02,500) etc. are the other leading species surveyed in Attarsumba range. In higher girth class (above 150cm), the tree are like *Acacia tortiles* (Forsk) hyne (1,320), *Salvadora persica* L (820), *Acacia nilotica* (L) Dell (170), *Holoptelia integrifolia* L (120) dominating. In the range, maximum covers were found in lower classes (Table-2). At Attarsumba range, the gigantic and heaviest *Bamboosa arundinacea* (Retz) Wiild – Bamboo (Local name-Vans), clumps were observed in flowering stage at Vaghjipur village. This is a rare phenomenon that though massive but observed in less number in good conditions for this particular forest range.

REFERENCES

1. T Tickin, *The ecological implications of harvesting Non-Timber Forest Products*, Journal of applied Ecology, Vol. 41, pp. 11-21, 2004.
2. S N Tyagi, P M Joshi, B D Oza, and H N Dalal, *Forest Resource Survey Chhotaudepur Forest Division (Vadodara District) Series II- Tree Enumeration*, Forest Department, Gandhinagar, 2007.
3. S N Tyagi, P M Joshi, B D Oza, and H N Dalal, *Forest Resource Survey Godhara Forest Division (Panchmahal District) Series II- Tree Enumeration*, Forest Department, Gandhinagar, 2009.
4. V K Bahuguna, *Forest in the Economy of the Rural Poor: An Estimation of the Dependency Level*-Ambio:-A Journal of the Human Environment, vol. 29, pp. 126-129, 2000.
5. Y T Jasrai, Y B Patel, N C Khokhariya, S R Verma, S H Chauhan, Field Survey for Forest Resources in Gandhinagar Circle, Gujarat, India. Forest Department, Gujarat State, Aranya Bhavan, 1st Ed., ISBN: 978-93-82799-03-0, 2014.
6. Anonymous, *Special Habitats and Threatened plants of India wild life institute of India*, Vol.11. No.1 2008, Dehradun.
7. Anonymous, *Working plan of Gandhinagar Forest Division. Working Plan Circle*, Vadodara, 2000.
8. H G Champain and S K Seth, *A Revised Surveyed of the Forest Types of India*, Government of India, 1968, Reprinted 2005.
9. R I Patel, *Forest flora of Gujarat state (2nd Edition) Forest Department*, Gujarat State, Baroda, 1984.
10. G L Shah, *Flora of Gujarat State Part I & II, Sardar Patel University*, Vallabh Vidhyanagar, 1978.
11. T Cook, *The Flora of the Presidency of Bombay Vol. I-III.* Botanical Survey of India, Calcutta, 1901-1908.
12. S Deshpande, B Sharma, M P Nayar, *Flora of Mahabaleshwar and adjoining, Maharastra, vol- I-II*, botanical survey of India, Howarah, 1993.