



Buffer Area Site Selection: Chunati Wildlife Sanctuary & Teknaf Game Reserve



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Executive Summary

A total of 1537 ha at Chuanti Wildlife Sanctuary and 857 ha in Teknaf Game Reserve was identified as potential areas of buffer plantation along the 0.5 km inside periphery. Beat wise distribution of the areas are shown in table as well as in maps in the document.

Inside buffer (0.5 km) were created in ArcView3.2 for CWS and TGR. These layers were then used to cut/clip the landuse created from LISS III (24 meter resolution) for both the PA to generate Beat wise buffer landuse.

In the buffer landuse the following viz agriculture, homestead and settlements, water and or salt pan were termed as unusable area. Total hectare under these above mentioned landuse was then deducted from the total buffer area for respective Beats and termed as usable area for plantation in buffer area.

Later, data were obtained from both PA on hectare of plantations raised in different projects in respective Beats located within 0.5 km. Those data were then deducted from the usable area and termed as potential area for plantation in the 0.5 km buffer area for CWS (1537 ha) and TGR (857 ha).

The area calculated in this document is not highly accurate, because:

1. Orthographic correction was not done for the LISS III images of these two PAs.
2. Accuracy of the landuse derived from the LISS III image is not stated or estimated.
3. Past plantations said (by the respective ACFs/RO/BO) to be located within 0.5 km may not be entirely correct, especially for Teknaf Game Reserve.

For proper identification and estimation of areas within the proposed 0.5km inside buffer area, more detailed field investigation is necessary.

As the current report can only say or provide an idea about how much area is available for plantation in the proposed 0.5 km buffer area Beat wise. It can not be said where the said hectare is located in the half km area.

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1. Background of the Report

Forest Department under Nishorgo Support Project has been doing different habitat restoration activities since FY 2005-06 and 2006-07 in and around the five pilot Protected Areas under Component 2 of contract between USAID & IRG (stated as Objective 6 of approved PP). Major habitat restoration activities include raising enrichment, buffer, special fruit/fodder tree plantation, assisted natural regeneration, grass plantation etc.

Forest Department (FD) while carrying of these restoration activities, faced problems as area is not clearly demarcated as buffer area or core area of the Protected Area (PA) where species composition varies according to the zone prescribed in the approved management plans for Chunati Wildlife Sanctuary and Teknaf Game Reserve. To augment this problem, the Department requested NSP to show buffer and core area of aforesaid two PAs in the map so that future plantations can be established correctly and synchronized.

Accordingly, a five-day field trip was made by the NSP team member(s) in these two PAs, consultation was done with the Beat Officers, Range Officer and ACF and information is summarized in this preliminary report.

2. Objectives of the Report

The objectives of the report are:

- to show in the map buffer area plantation sites.
- to identify suitable areas for plantation

3. Scope of the Report

This report deals with two PAs, viz, Chunati Wildlife Sanctuary (CWS) and Teknaf Game Reserve (TGR). Within these two PAs, the area earmarked here as buffer area consists of a strip of width 0.5km inside from the outer boundary.

4. Methodology

From the GIS data base of CWS and TGR, a half-kilometer (0.5km) inside buffer was created using ArcView 3.2. This buffer was then laid on the recent landuse maps (LISS, 24 meter created in 2006) and clipped to generated buffer landuse. In the buffer landuse the following viz agriculture, homestead and settlements, water and or salt pan were termed as unusable area. Total hectare under these above mentioned landuse was then deducted from the total buffer area for respective Beats and termed as usable area for plantation in buffer area. Later, data were obtained from both PA on hectare of plantations raised in different projects in respective Beats located within 0.5 km. Those data were then deducted from the usable area and termed as potential area for plantation in the 0.5 km buffer area for CWS and TGR.

5. Limitation

1. Shortage of time: Traversing the whole 0.5km periphery along the boundary of CWS (7,763.94 ha) and TGR (11,610 ha) is practically not possible, and 5 days is not sufficient either to locate potential plantations sites.

2. Limitation of field data: Record of past plantations although obtained from the field office, however, it can not be said accurately if those plantations are located within the 0.5 km proposed buffer area. In this regard, had to depend on information supplied by the officials of respective PA.
3. Accuracy of the interpreted landuse image: Orthographic correction was not done for landuse images.

6. Outcome

6.1 Chunati Wildlife Sanctuary

Total area of 0.5km inside buffer area/strip in the CWS is about 3348 ha (Table 1), as calculated from LISS III Landuse image (24m resolution). Of which areas where plantations can not be raised (agriculture, settlements & homestead area, water bodies and salt pan area) is about 1252 ha. Remaining 2095 ha is identified as potential area for future buffer area plantation (Table 1).

Table 1: Total and Potential Buffer Areas under Chunati Wildlife Sanctuary

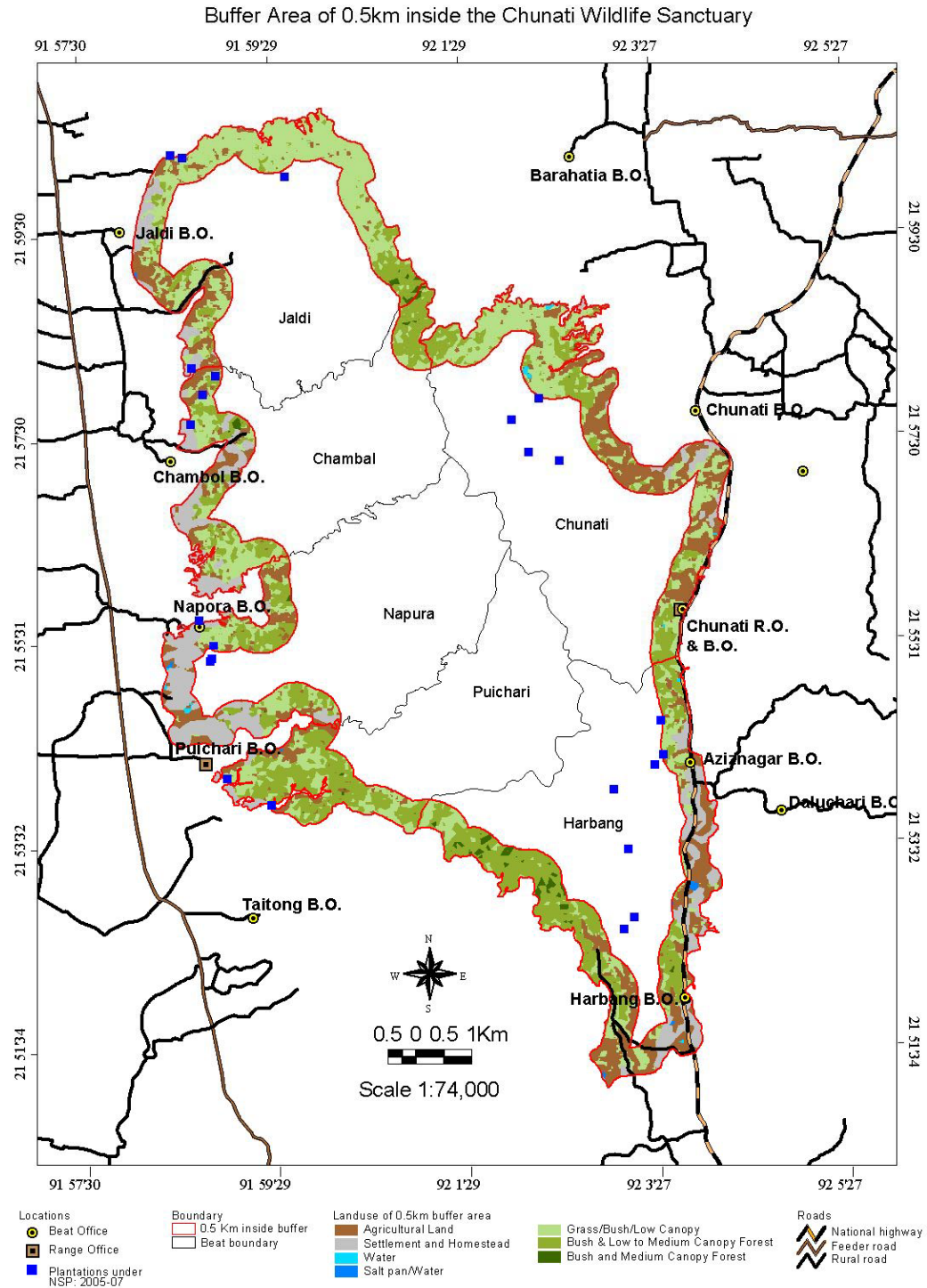
Land use Types (ha)	Beats under Chunati Wildlife Sanctuary						Grand Total
	Chambal	Chunati	Harbang ¹	Jaldi	Napura	Puichari	
Agricultural Land	60.45	224.99	230.65	106.01	87.79	45.49	755.38
Settlement and Homestead Forest	103.86	29.47	132.85	50.34	152.78	16.44	485.74
Salt pan/water			3.4	0.51	0.89	0.2	5
Water		3.64	0.7		2.24		6.58
Unusable Area	164.31	258.1	367.6	156.86	243.7	62.13	1252.7
% of total buffer area	38.45	37.49	44.22	24.30	57.94	18.45	37.41
Bush & Very Low Canopy Forest ²	96.01	178.57	100.52	231.62	62.82	82.26	751.8
Bush & Low to Medium Canopy Forest	136.07	131.5	281.81	86.91	88.26	167.31	891.86
Bush and Medium Canopy Forest	5.89	0.62	19.9	5.22	0.92	0.94	33.49
Grass & Bush ²	17.53	67.82	23.33	109.22	12.76	14.1	244.76
Grass/Bush / Young Plant/Water/Shadow ²	7.49	51.84	38.11	55.59	12.14	8.45	173.62
Usable Area	262.99	430.35	463.67	488.56	176.9	273.06	2095.53
% of total buffer area	61.55	62.51	55.78	75.70	42.06	81.46	62.59
Total buffer area (0.5km)	427.3	688.45	831.27	645.42	420.6	335.19	3348.23

Note: 1= RIMS data base does not show area of Aziznagar Beat which was created splitting Harbang Beat; 2 = in Map 1, these three categories are shown as one due to more clarity.

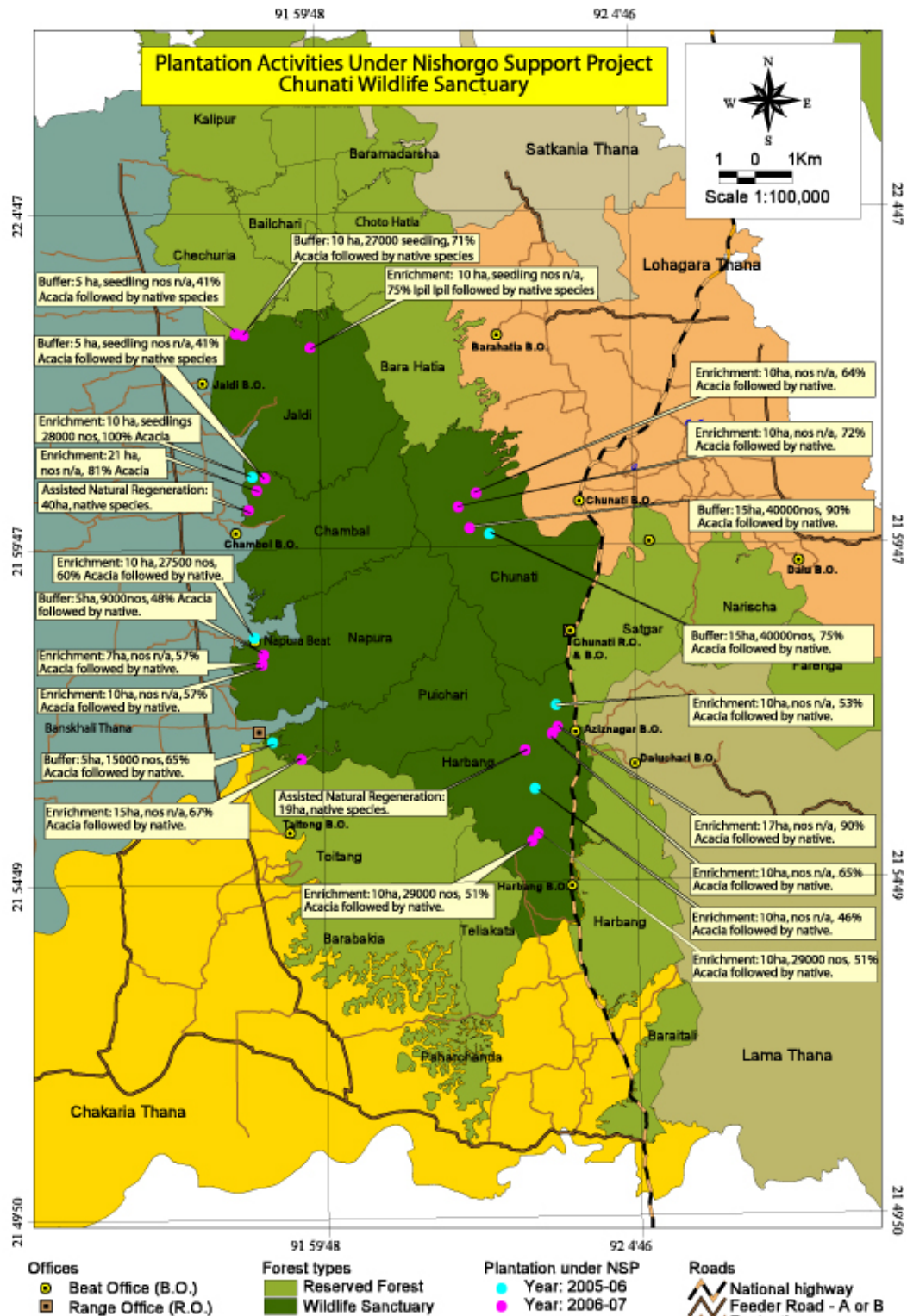
However, near about 550 ha of plantations of different types were raised in the proposed buffer area at Chunati Wildlife Sanctuary from 1996-97 up to 2006-07 under revenue

budget, Forestry Sector Project, Banskali Eco-park Project phase – 1 and 2, Nishorgo Support Project (see Table 2).

These areas are deducted from the Potential buffer area of the respective beats and the available area for future plantations at 0.5km buffer is shown in Table 3.



Map 1: Landuse of inside buffer area (0.5km) at Chunati Wildlife Sanctuary



Map 2: Location of Plantation Sites Raised under Nishorgo Support Project

Table 2: Plantation raised at CWS under various project in the proposed buffer area
(1996-2006-07)

Plantations Type in Buffer Area	Chambal	Chunati	Harbang	Aziz- nagar	Jaldi*	Napura	Puichari	Grand Total
Biodiversity conservation			0		10	20		30
Buffer Zone		30	25		10	5	5	75
Enrichment	30.9	0	0	20		20		70.9
Fruit and fodder	5	10	0	17.22	5	7	15	59.22
Long Rotation			28.22					28.22
Medicinal Plant		5	5		5		5	20
Rare & Engendered Species	15				150		20	185
Special fruit tree for habitat	10	5	25	20		10	20	90
Grand Total	60.9	50	83.22	57.22	180	62	65	558.34

Note: * = includes plantations in Eco-park.

Source: Wildlife Management and Nature Conservation Division, Chittagong.

Table3: Potential buffer area (ha) in different Beats of Chuanti Wildlife Sanctuary

Potential Plantation Area	Beats under Chunati Wildlife Sanctuary						Grand Total
	Chambal	Chunati	Harbang & Aziznagar	Jaldi	Napura	Puichari	
Area (ha)	202.09	380.35	323.23	308.56	114.9	208.06	1537.19

Below observations from the field and recommendations of BO/RO of FD is summarized:

6.1.1 Chunati Beat

Beat Officer of Chunati suggested two places for buffer plantations – (1) from the southern boundary of Chunati Beat towards Range Office and (2) after Range Office up to proposed 2007-08 long-rotation plantation site under **Basnkhali (Eco-Park) and Chunati (Wildlife Sanctuary) Development Project**.

Proposed Site 1:-

This site starts from the southern boundary of Chuanti Beat where Jungalia Foot Trail starts up to 0.5km inside along the trail then towards Range Office along the half-kilometer strip (see Map 3). The existing vegetation identified in the LISS III image as Bush and low to medium canopy Forest & Bush and very low canopy forest. Field observation found that the area is covered by naturally regenerated Bamboo, Teak, Sal,

Chapalish, Garjan, Dumur (*Ficus spp*), Aamloki, Chalta, Jam and various other species like creepers, shrubs distributed in patches.

These naturally regenerated species are cover by heavy shrubs layer or bamboo making these patches a suitable habitat for Elephant and Red Jungle Fowl, presence of which was found (Elephant dung; saw Red Jungle Fowl, B.O. heard Barking Deer). May be due to proximity to road and/or from protection (either CPG or FD) activities, disturbance is low in this area making natural regeneration to establish themselves.

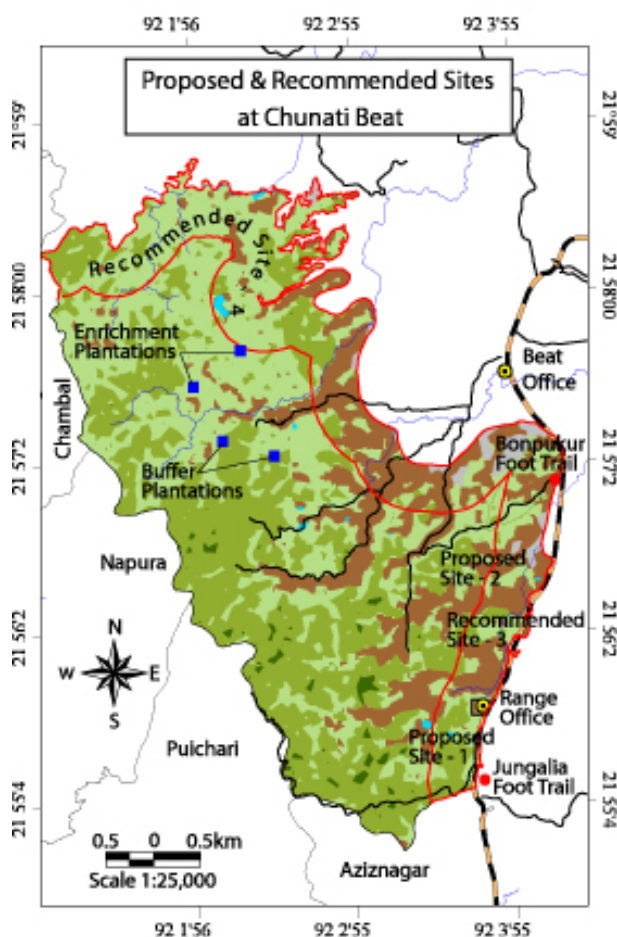
Recommendation:

There are areas in this proposed site where partial hill sides/slopes (gentle) are barren (only low shrubs). It is therefore recommended that if plantation has to be done in this site, then proper care be taken to patches where natural regeneration is taking place. Such patches can be freed from heavy creepers or shrubs layer to assist growth of existing tree species.

Proposed Site 2:- The second site proposed by the Beat Officer is from Range Office to the site where long-rotation plantation has been proposed for the FY 2007-08. This site however, does not fall within the 0.5km suggested buffer area.

Some small area in this proposed site however is available within the 0.5km buffer area. Vegetation in this area is dominated by plantations raised under NSP along the Bonopukur Foot Trail and barren hills (see Map 3).

Recommended site 3:- This site is between Site – 1 and Site – 2, and the vegetation is dominated by shrubs in the gently slopping hill sides. Buffer plantation can be made in this place.



Map 3: Proposed & Recommended sites at Chuanati Beat

The area has not been visited, however, it appears based on field visit to other areas that in some places there may exist natural regeneration of different kinds. So, before plantation, proper site visit should be done to identify important patches in order to carry out ANR activities. Planting this site may be difficult due to less road network.

6.1.2 Aziz-Nagar & Harbang Beat

Due to unavailability of boundary shape file of Aziznagar and Harbang Beat, these two Beats are shown together.

Aziznagar Beat: Along the 0.5km proposed buffer area, very few sites are available for proposed buffer plantation (Map 4) at Aziznagar Beat. Along with Beat Officer, two such sites were identified. Along this half-kilometer strip, natural regeneration of Teak & Sal is coming back due to proximity to main road and protection, and rest area is either agricultural land or homestead area.

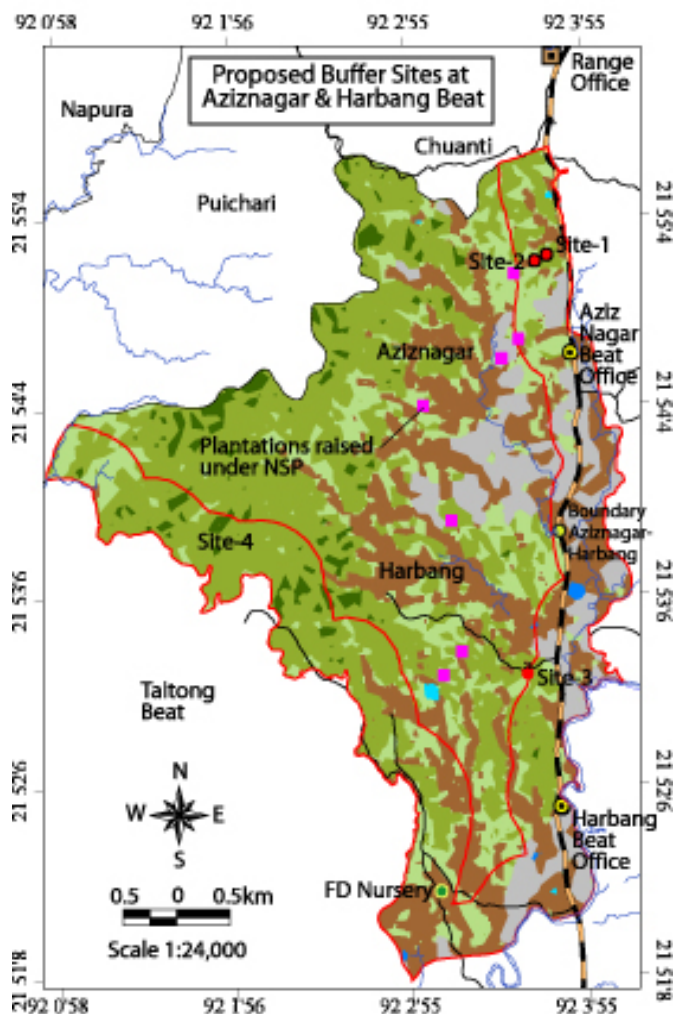
Proposed Site 1:- Part of this hill towards west can be brought under plantation, current vegetation is dominated by shrubs & muli-bamboo. Towards east of this hill is coppice of Sal (Map 4).

Proposed Site 2:- This entire hill towards south is barren. This hill can be brought under buffer plantation. Area available is approximately 10ha as per assumption of Beat Officer (Map 4).

Recommended site 1:- From boundary of Chuanti Beat down to Site 1 & 2 (mentioned above), the area is covered by patches of natural regeneration, degraded past plantations and barren hills. This area can also be brought under plantation, however, proper care be taken to retain any natural regeneration that is coming up.

Harbang Beat:

Proposed Site 3:- Adjacent hills of this site can be brought under plantation (Map 4).

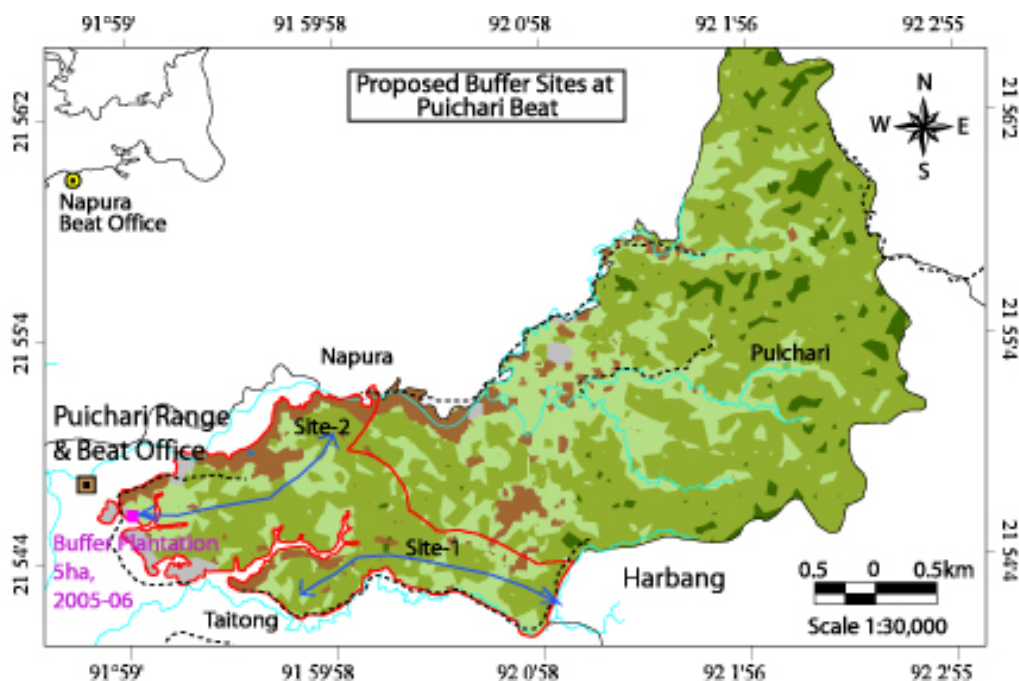


Map 4: Proposed sites at Aziznagar & Harbang Beat

Current vegetation is bamboo and natural regeneration of Teak distributed sporadically.

Proposed Site 4:- Again, this is a long 0.5km belt starting just after the FD's nursery along the old road that runs from Harbang Beat up to Puichari Beat. Dominant vegetation is grass or shrubs with natural regeneration of teak, sal and other species sporadically distributed. The existing FD's nursery currently has 15,000 seedlings of Garjan, Sal, Ammloki, shil-koroi, Arjun, Chapalish, Dhaki-jam and Puti-jam. As per the prescription

of the management plan for buffer plantation, other species can be obtained from nurseries around and plantation can be done immediately.



Map 5: Proposed sites at Puichari Beat

6.1.3 Puichari Beat:

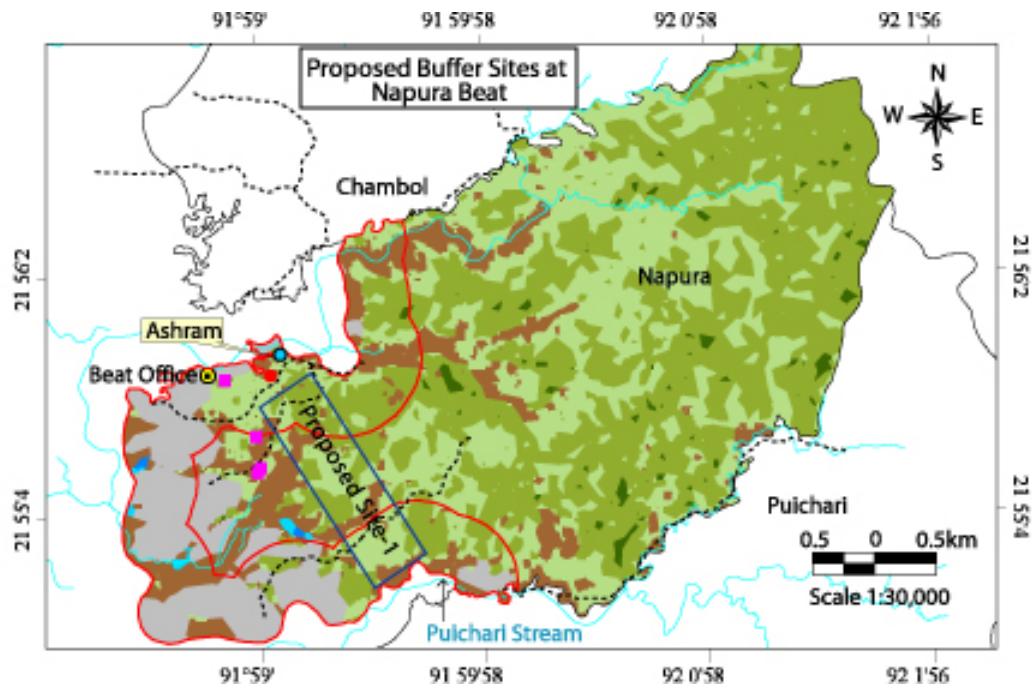
Two sites were identified initially.

Proposed Site 1:- Site one is the continuations of “Proposed Site – 4” under Harbang Beat, and starts from boundary of Harbang-Puichari Beat up to the boundary of Taitong-Puichari Beat (Map 5).

Proposed Site 2:- Second site starts from 2005-06’s 5ha buffer plantation up to boundary of Puichari-Napura. This entire hill belt is covered by shrubs.

6.1.4 Napura Beat:

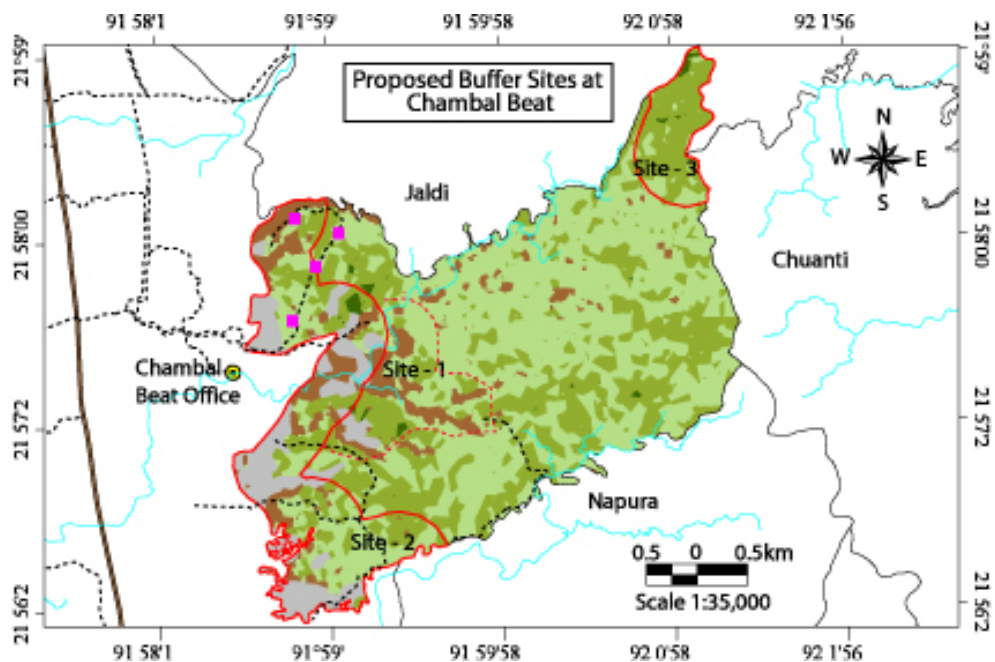
Proposed Site – 1: The Beat Officer of Napura Beat strongly recommended that a buffer strip belt be raised immediately from existing plantations (see Map 6, pink colored dots) up to Puichari stream. The Beat Officer has already raised some plantations from Ashram (Hindu Temple) towards Puichari stream. Additional plantations are required and need special emphasis due to encroachment problem (see agricultural and homestead area in the Map 6). Encroachment problem is also evident from Table 1, where percentage of unusable area in Napura Beat is about 58% which is the highest compared to other Beats.



Map 6: Proposed Buffer Sites at Napura Beat

6.1.5 Chambal Beat:

Due to unavailability of Beat Officer at Chambal Beat during field visit, the site selection was not thorough. However, based on limited time spent, and the observations of Beat Officer of Napura Beat, the following sites are proposed:



Map 7: Proposed Buffer Sites at Chambal Beat

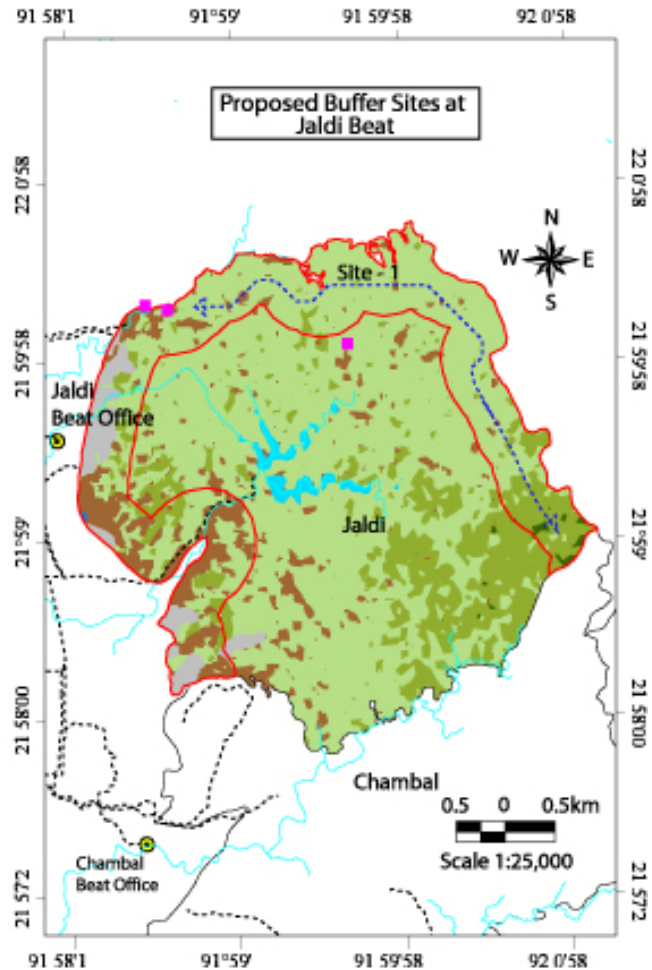
Proposed Site 1:- Continuation of buffer strip around homestead (encroached area) and agricultural area in order to stop encroachment / conversion of forest lands (see dotted red-lines in Map 7).

Proposed Site 2:- Continuation of buffer strip from Napura Beat (Map 7).

Proposed Site 3:- Continuation of buffer strip from boundary of Chunati-Chambal and up to the same of Jaldi-Chambal Beat (Map 7).

6.1.6 Jaldi Beat:

Proposed Site 1:- The Beat Officer of Jaldi proposed that from current 5ha fruit & fodder and 10 ha buffer plantation up to Chambal Beat is degraded barren hill. This site is obviously the continuation of buffer strip from Chunati via Chambal Beat. The entire area is covered by shrubs and grasses.



Map 8: Proposed Buffer Sites at Jaldi Beat

6.2 Teknaf Game Reserve

Total area of 0.5km inside buffer area/strip in the TGR is about 3286 ha (Table 4) calculated from LISS III Landuse image (24m resolution). Of which areas where plantations can not be raised (agriculture, settlements & homestead area, water bodies and previous plantations under FSP and NSP) is about 2428 ha (Table 4). Remaining approximately 858 ha is identified potential area for future buffer area plantation (Table 4).

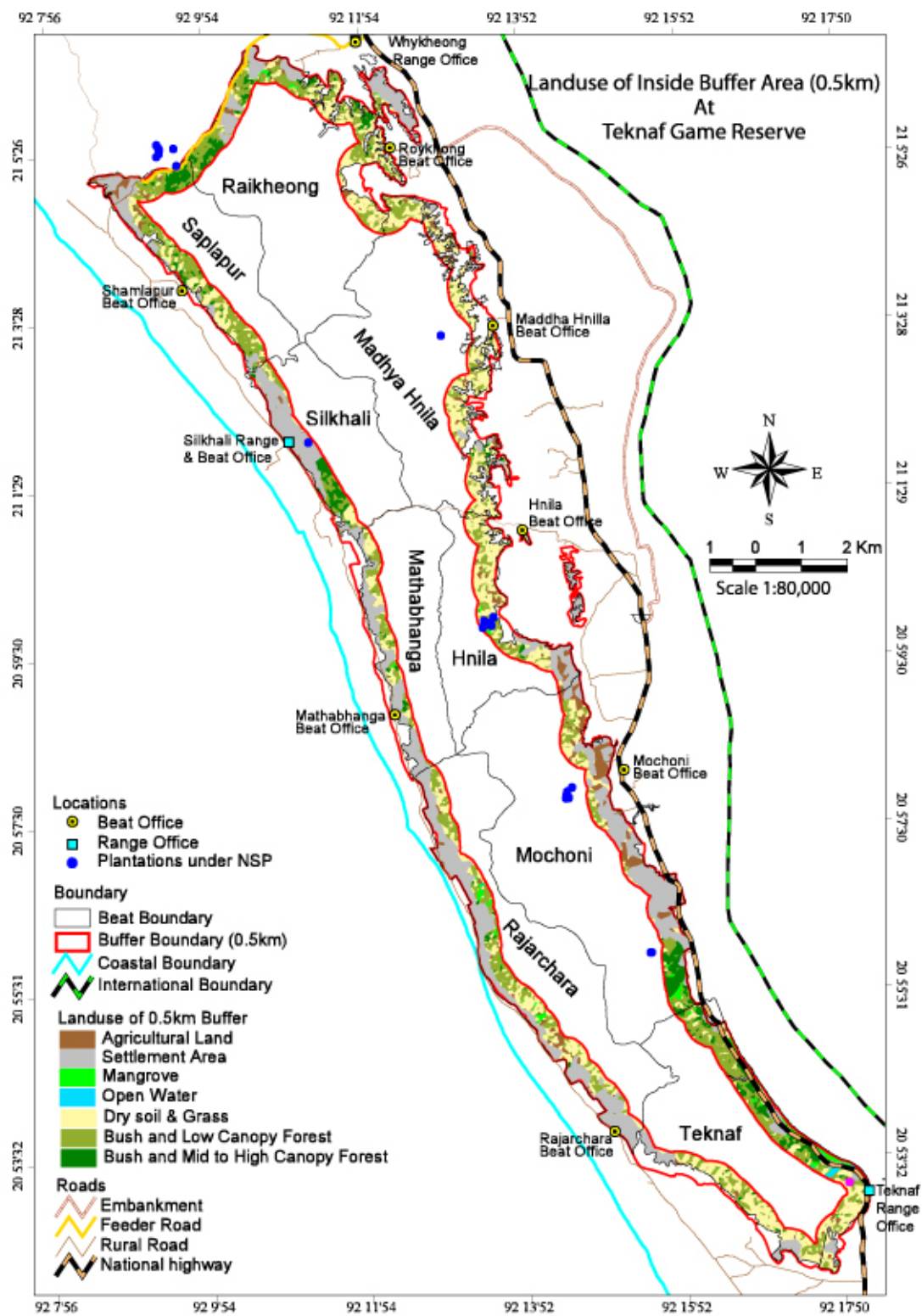
However, areas (in ha) that are not available for plantations exceeds the total area of 0.5km buffer in two Beats, Mochoni and Silkhali (Table 4). In Mochoni Beat such area is about 12 ha and for Silkhali it is 127 ha.

This problem may have arose due to the fact that the stated figures for plantations both under FSP (150 ha at Mochoni and 150 ha in Silkhali) and NSP (32.65 ha) may not entirely fall within the proposed 0.5km buffer area, but which is believed (by the ACF, RO & BO) to be within the proposed buffer area.

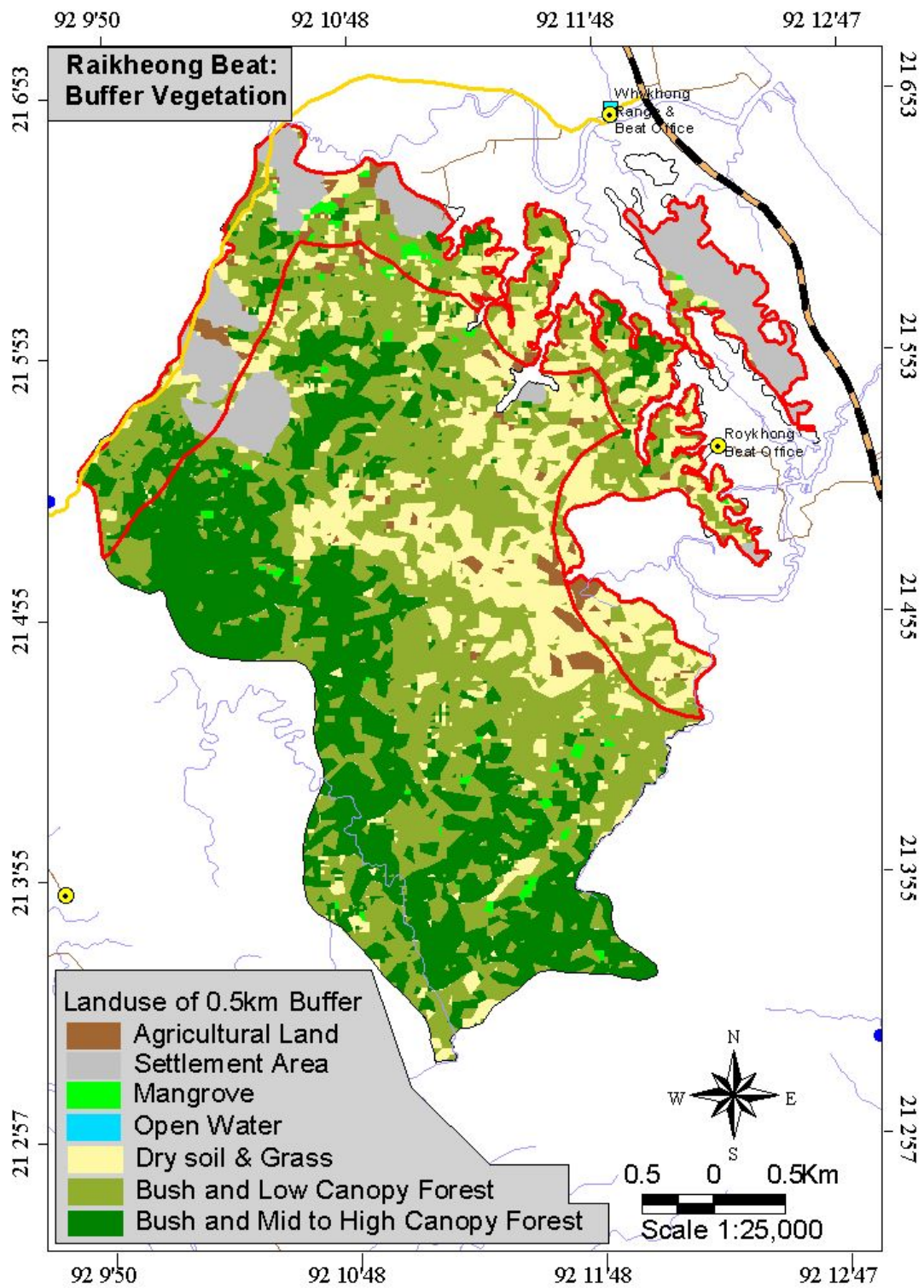
Due to unavailability of time for this assignment, the 0.5km buffer areas of Teknaf Game Reserve were not properly visited. Therefore, Beat wise description like that of Chuanti Wildlife Sanctuary is not provided here. However, map of each Beat of the buffer area vegetation is shown below. Also included a table (5) where location of some sites suggested by the Beat Officers is given.

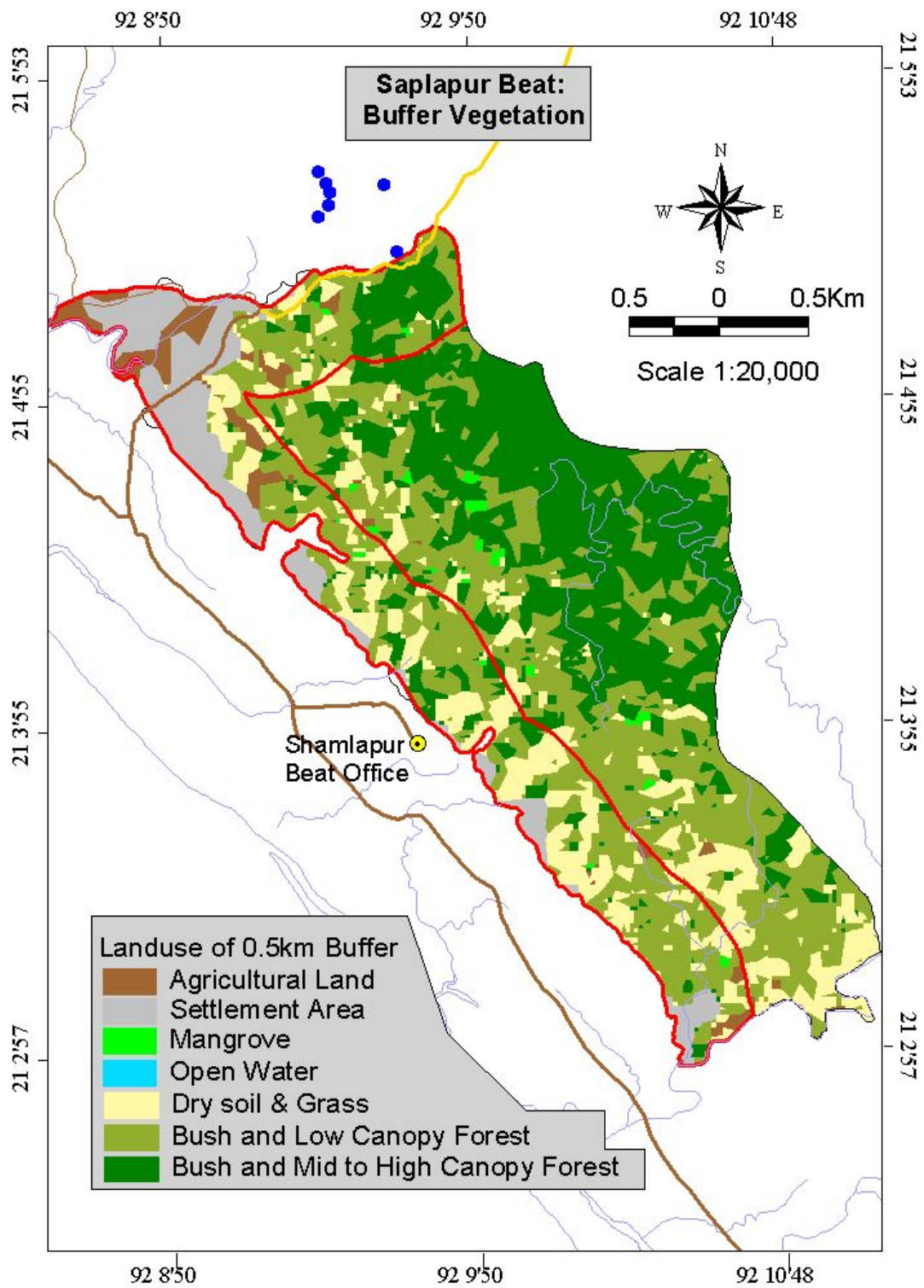
Table 4: Total and Potential Buffer Areas under Teknaf Game Reserve

Land use Types (ha)	Beats under Teknaf Game Reserve									Grand Total
	Hnila	Madhya Hnila	Mathabhanga	Mochoni	Raikheong	Rajarchara	Saplapur	Silkhali	Teknaf	
Total Buffer Area	249.75	337.79	199.29	467.01	462.86	507.39	327.44	205.37	528.92	3285.82
Agricultural Land	25.03	40.27	0.03	68.4	26.17	22.98	22.14	5.34	13.88	224.24
Settlement and Homestead Vegetation	58.98	31.08	102.26	220.31	113.55	241.92	66.71	117.61	76.89	1029.31
Water	0.08	0	0	0	0	0.96	0	0	5.58	6.62
FSP plantations in buffer area	150.00	120.00	40.00	150.00	120.00	80.00	0	150	85	895.00
NSP plantations in buffer area	0	0	0	0	0	0	10	32.65	5	47.65
Unusable area	236.74	196.88	148.98	478.76*	302.02	354.18	139.12	322.88*	238.46	2427.93
Potential Area for buffer plantation (Total buffer area – Unusable area) ha	13.01	140.91	50.31	0 (-11.66)	160.84	153.21	188.32	0 (-127)	290.46	857.89

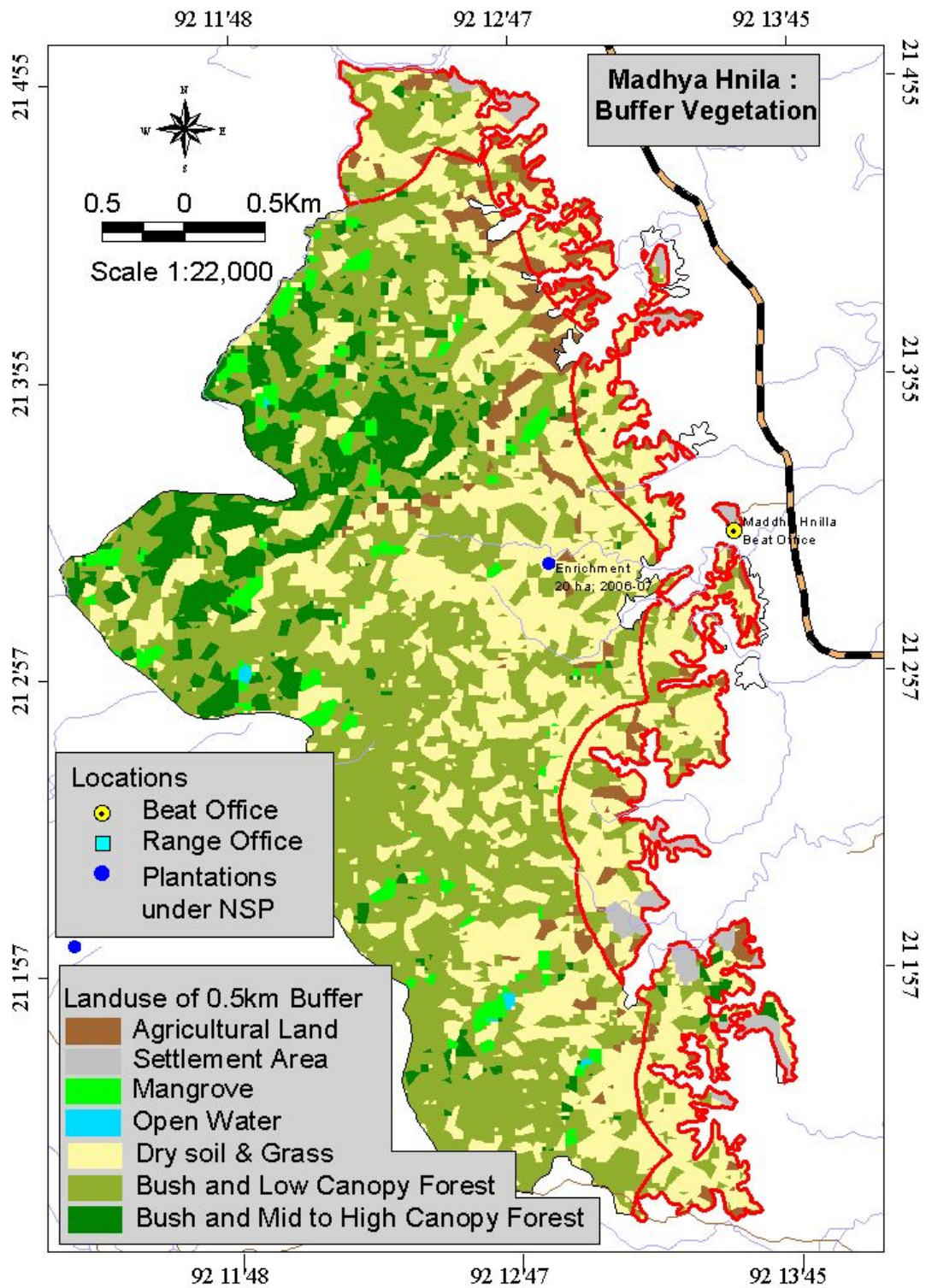


Map 9: Landuse of inside buffer area (0.5km) at Teknaf Game Reserve

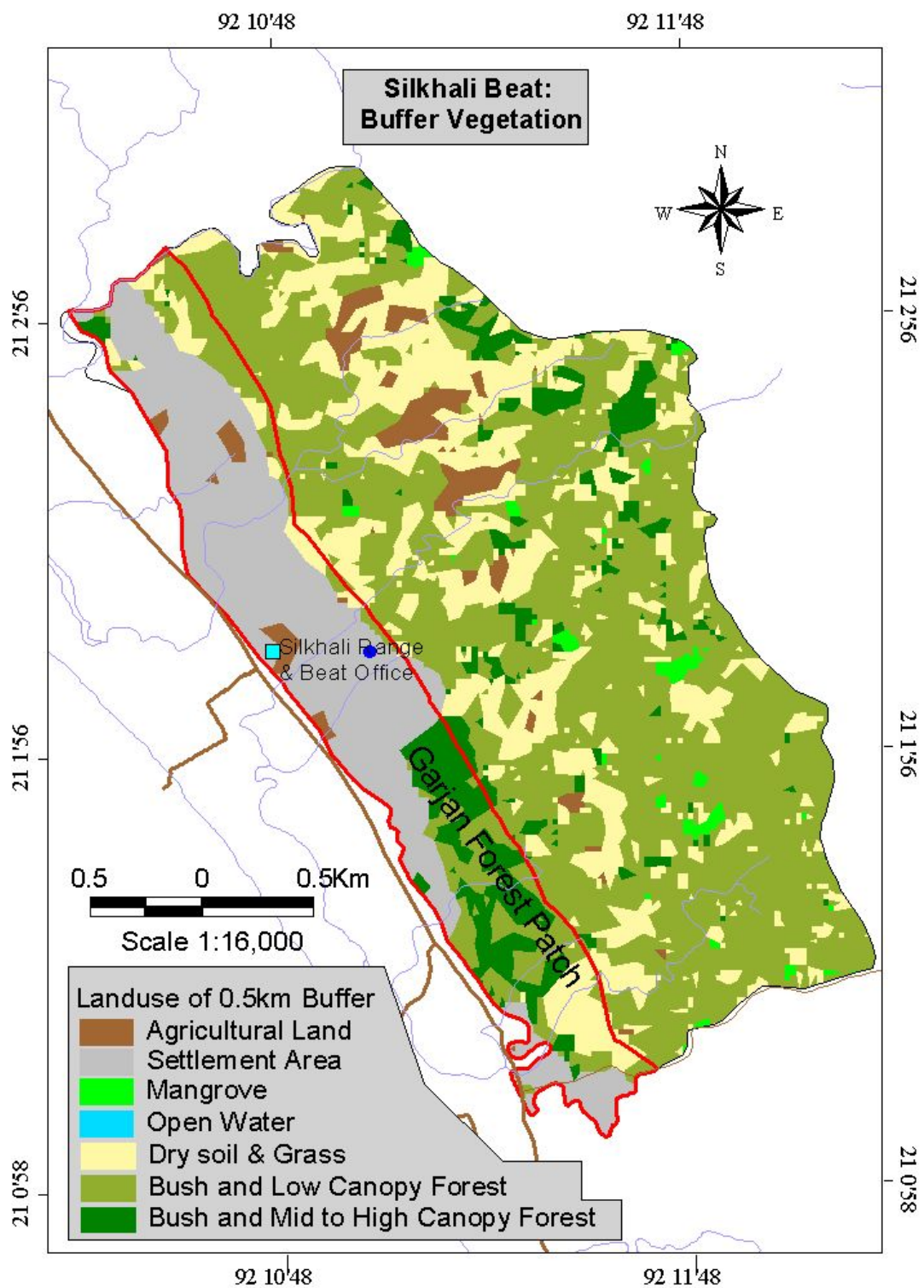




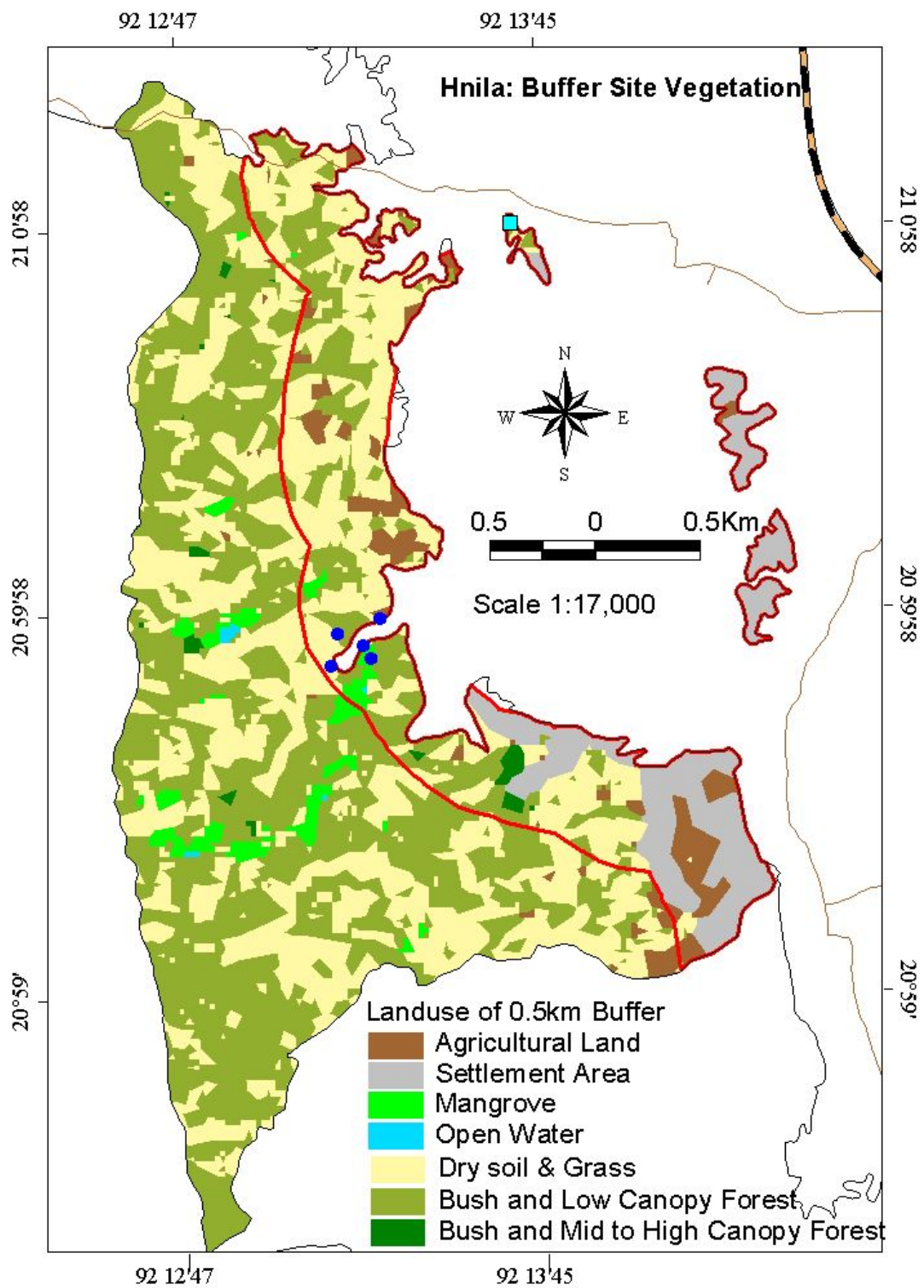
Map 11: Landuse of inside buffer area (0.5km) at Saplapur Beat



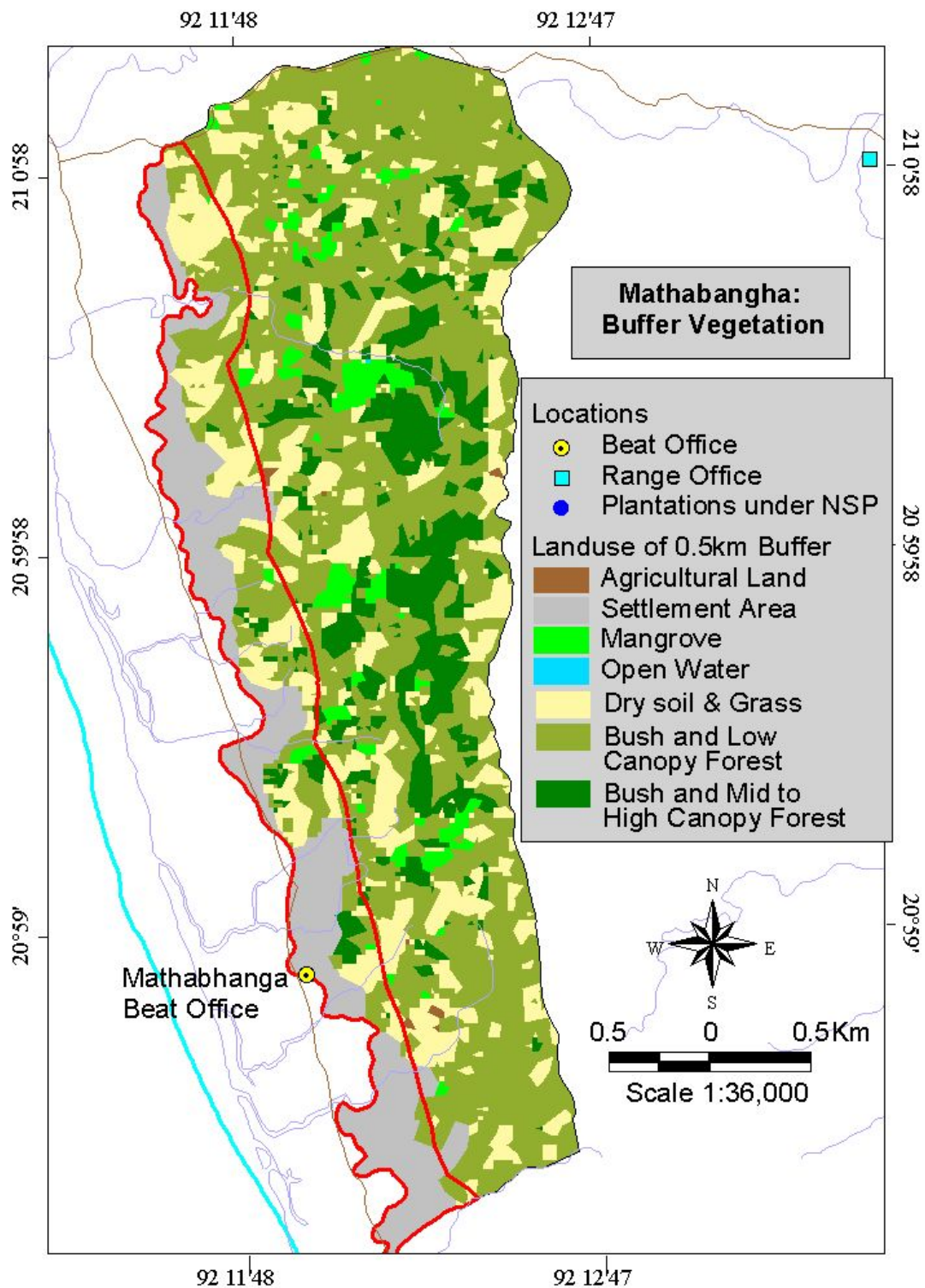
Map 12: Landuse of inside buffer area (0.5km) at Madhya-Hnila Beat

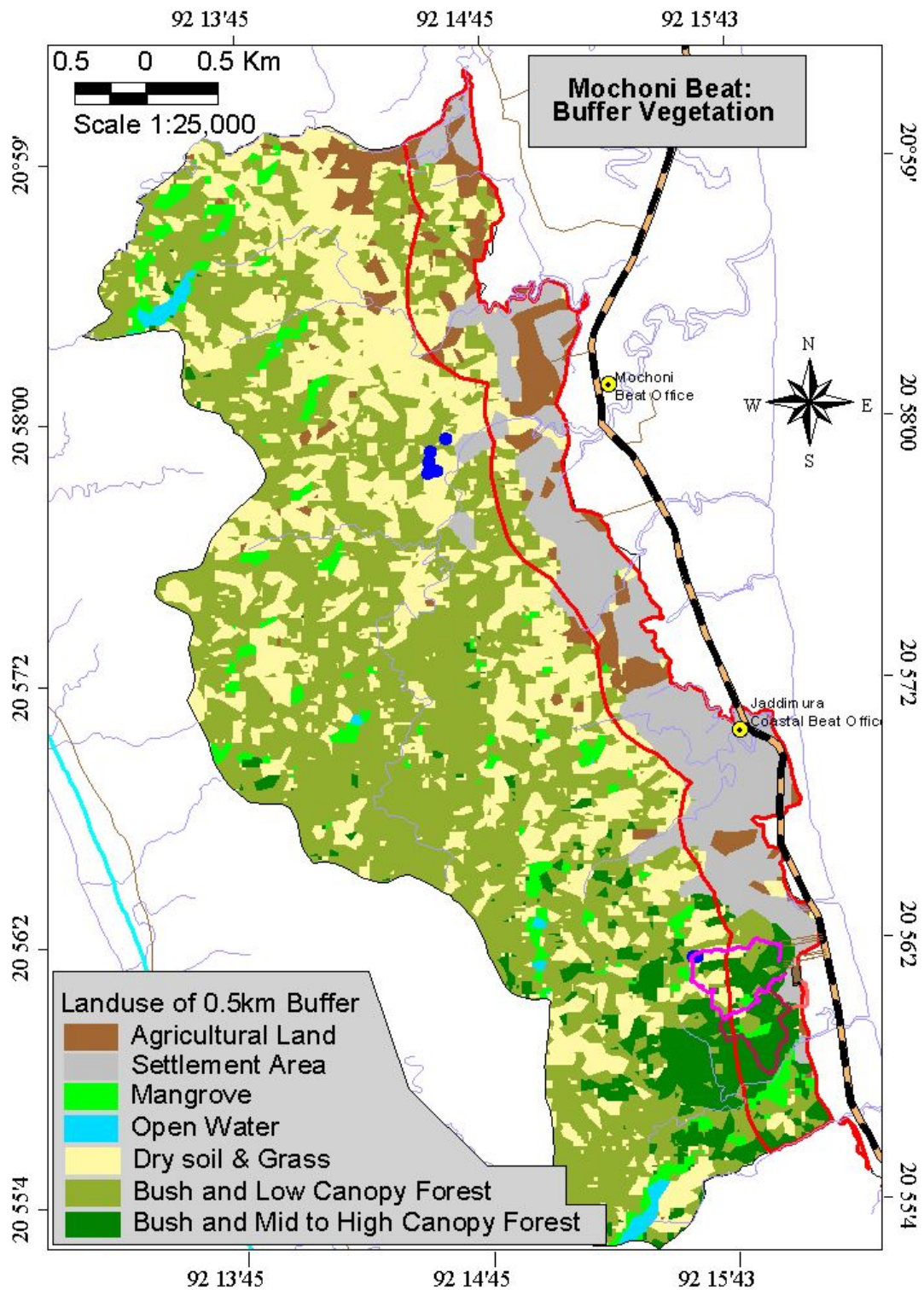


Map 13: Landuse of inside buffer area (0.5km) at Silkhali Beat

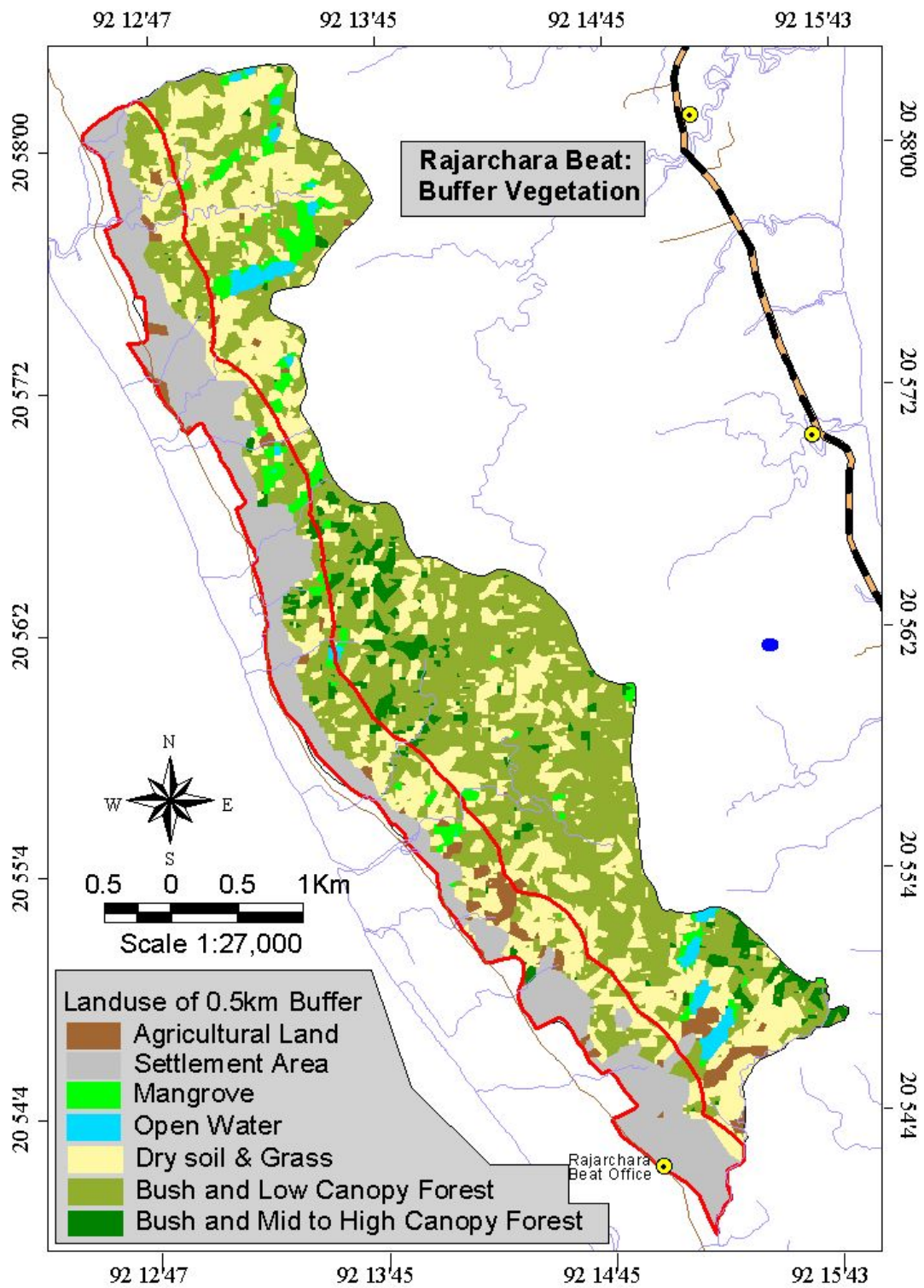


Map 14: Landuse of inside buffer area (0.5km) at Hnila Beat

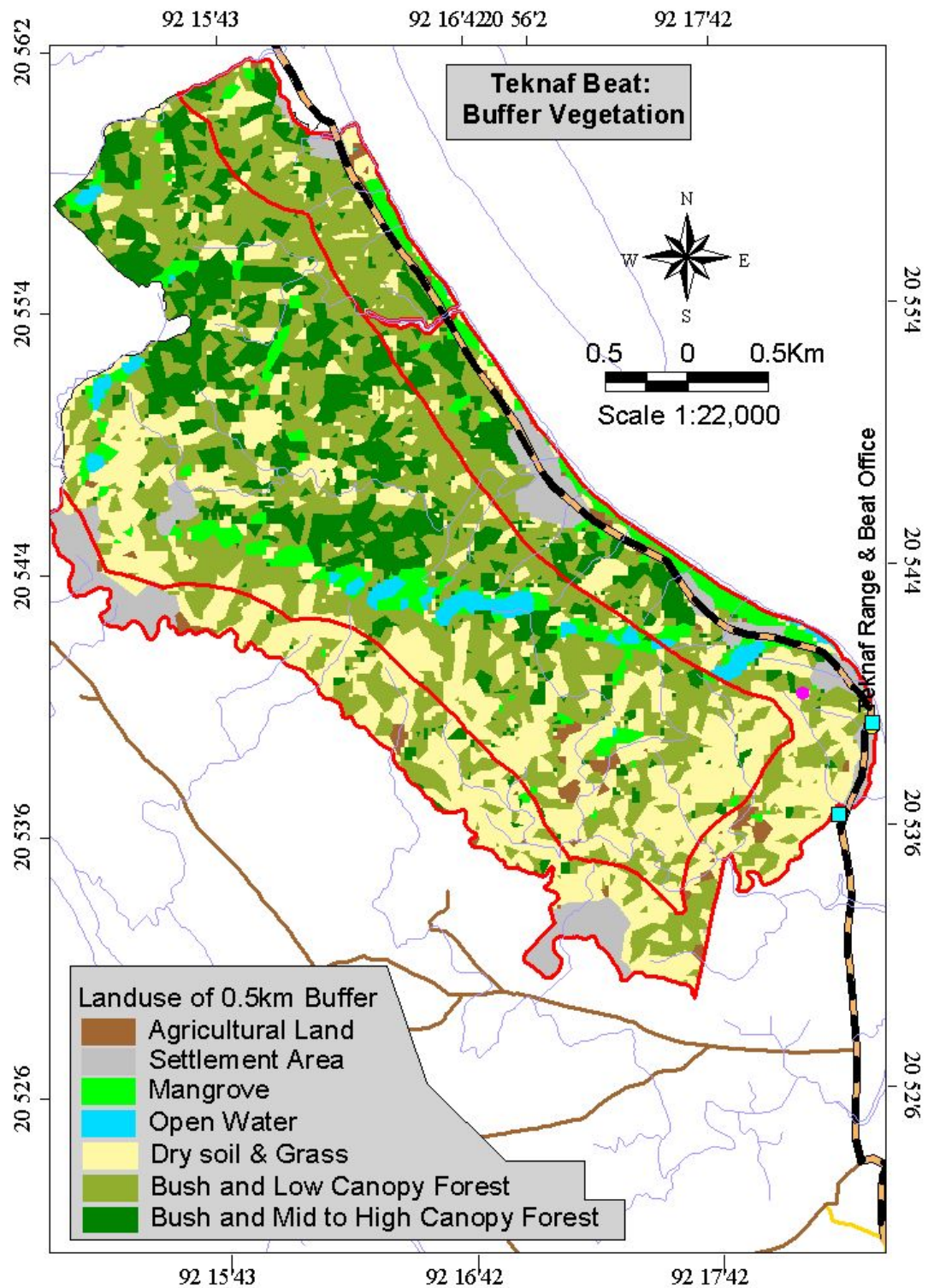




Map 16: Landuse of inside buffer area (0.5km) at Mochoni Beat



Map 17: Landuse of inside buffer area (0.5km) at Rajarchara Beat



Map 18: Landuse of inside buffer area (0.5km) at Teknaf Beat

Table 5: Suggested Sites for Buffer Plantation at Teknaf Game Reserve

	Mid-Nila	Nila	Mochuni	Silkhali
Name of Selected site	Chaliatoli Gona, Combonia	Pankhali Dalar Raster Mur.	Beside Noyapara Refugee camp	Jahaj Chora, Purba Math Para.
Site Location	About 3 Km from Beat office. Village of CPA one $\frac{1}{2}$ Km distance from the site.	Nila Bazar is about 2 Km for from the site. Proposed site is very near from pankhali village.	The site is situated in west side of the Noyapara Refugee Camp.	Site is situated in the southern side of "Silkhali Garjan Sample Plot
Area (in hectare)	50 hectare to 80 hectare	more than 50 hectare	100	50 to 70 ha
Site condition	Water source present (Chora) A Nursery bed present (Previous)	Water Source available; sungrass dominated site;	Water Source available; sungrass dominated site; refugee camp near, need plantation otherwise encroachment may occur.	Water Source available; Koroi plantation in the past. Currently, sungrass & other unknown species in scattered condition.
Total number of CPG	42	42	nil	105
	N 21,02,27.3 E 92,13,17.3 N 21,02,36.3 E92,13,6.0	N 21,01,12.6 E 92,30, 18.8 N 21,01,9.7 E 92, 13, 21.9 N 21,01,20.2 E 92, 13,15.4	N 20,57,40.4 E 92, 14,43.0 N 20,57,42.9 E 92,14,41.0 N 20,57,47.1 E 92, 14, 39.5	

7 Conclusion:

For proper identification and estimation of areas within the proposed 0.5km inside buffer area, more detailed field investigation is necessary. Beat wise half-kilometer buffer vegetation map is available which can send to respective Beat Officer with GPS for identification and demarcation.

Annex-1: Description of plantations raised at Chunati WS from 1996-97 to 2006-07

Plantation Type in Buffer Area	Aziz-nagar	Chambal	Chunati	Eco-Park	Harbang	Jaldi	Napura	Puichari	GT
Biodiversity conservation					0	10	20		30
Buffer Zone			30		25	10	5	5	75
Enrichment	20	30.9	0		0		20		70.9
Fruit and fodder	17.22	5	10	0	0	5	7	15	59.22
Long Rotation					28.22				28.22
Medicinal Plant			5	5	5			5	20
Rare & Engendered Species		15		40		110		20	185
Special fruit tree for habitat	20	10	5		25		10	20	90
Grand Total	57.22	60.9	50	45	83.22	135	62	65	558.34

Plantation Type in Core Area	Aziz-nagar	Chambal	Chunati	Eco-Park	Harbang	Jaldi	Napura	Puichari	GT
Biodiversity conservation					20	0	0		20
Buffer Zone			0		0	0	0	0	0
Enrichment	0	0	10		20		0		30
Fruit and fodder	0	0	0	10	20	0	0	0	30
Long Rotation					15				15
Medicinal Plant			0	36	0			0	36
Rare & Engendered Species		0		365		0		0	365
Special fruit tree for habitat	0	0	0		0		0	0	0
Grand Total	0	0	10	411	75	0	0	0	496

Total Plantation Types	Aziz-nagar	Chambal	Chunati	Eco-Park	Harbang	Jaldi	Napura	Puichari	GT
Biodiversity conservation					20	10	20		50
Buffer Zone			30		25	10	5	5	75
Enrichment	20	30.9	10		20		20		100.9
Fruit and fodder	17.22	5	10	10	20	5	7	15	89.22
Long Rotation					43.22				43.22
Medicinal Plant			5	41	5			5	56
Rare & Engendered Species		15		405		110		20	550
Special fruit tree for habitat	20	10	5		25		10	20	90
Grand Total	57.22	60.9	60	456	158.22	135	62	65	1054.34