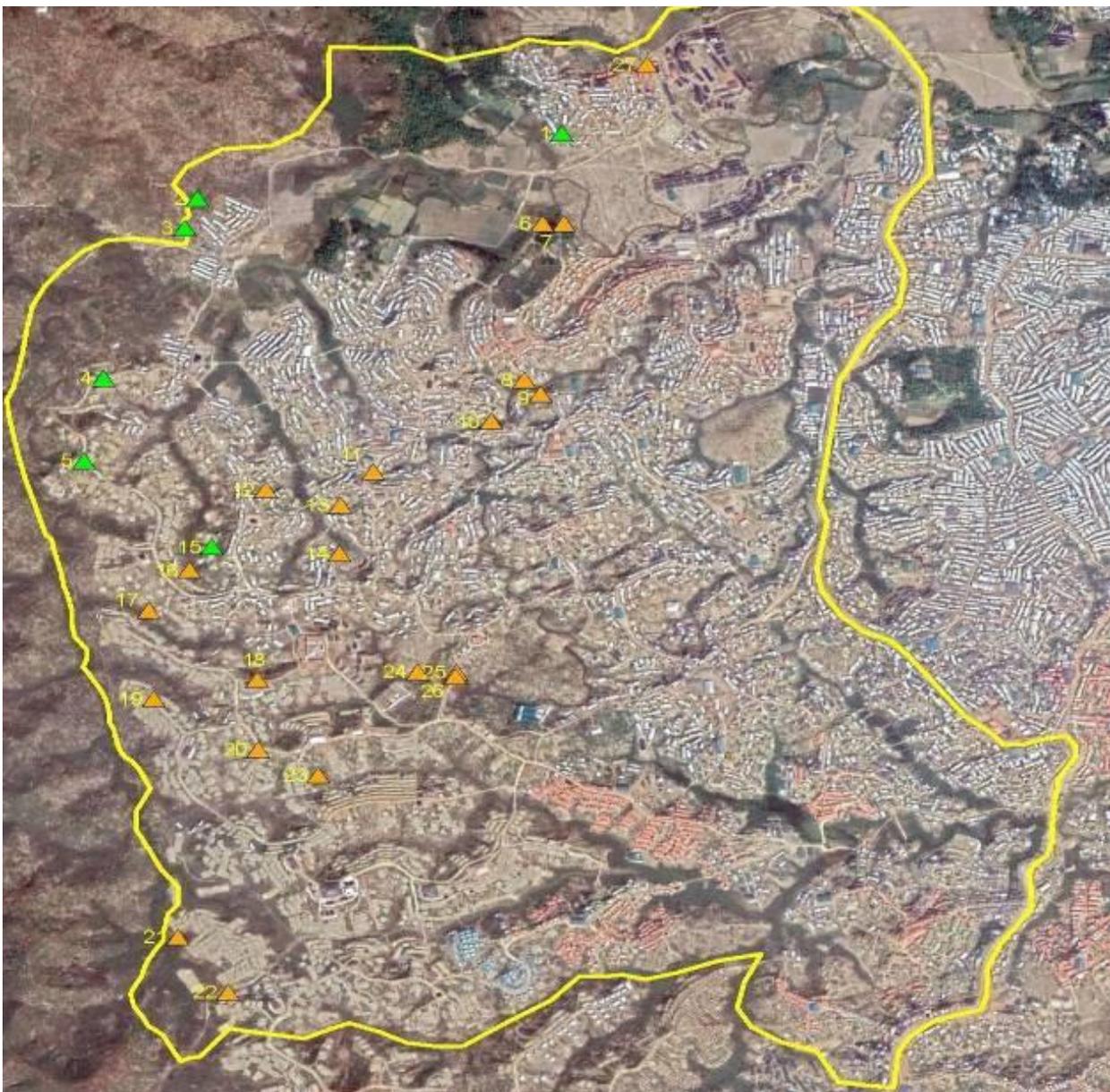


Plantation and Management Plan for Camp 4, Cox's Bazar

Biodiversity Conflict Mitigation around the Refugee Camp of
Cox's Bazar District Project



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1. Introduction

Bangladesh provided shelter to more than 700 thousand displaced Rohingya people since August 2017 in several camps in and around the forests of Cox's Bazar district. For fulfilling their daily needs of fuel wood, these people are depending on forest resources. The dependence of large population over the forest has significant impact over biodiversity and forest resources. There is a great need to take steps to reduce degradation of forest and improve the ecosystem functioning through plantation in and around the camp area in the Cox's Bazar-Teknaf peninsula.

Given the urgency of the improvement of this highly-disturbed landscape, the degraded land of camp needs to be restored through plantation of fast-growing and native tree species. There is an opportunity to motivate and engage Rohingya community in plantation and its management within the camp areas. Plantation of fast-growing species will help in stabilization of soil and can be a good source of fuel wood in the future. In addition, plantation of native species will enrich the ecosystem by providing food and shelter to wildlife and other microorganism, improving overall goods and services we can attain from the ecosystem.

Immediately before and after the influx of the Rohingya people to Cox's Bazar, a few studies on forest resources utilization and extent of degradation were conducted by a number of agencies. In mid-2017, the IOM and the FAO studied fuel-wood collection and consumption by the refugee community in Kutupalong Registered Camp². At the end of 2017, the UNDP studied the environmental degradation situation due to the expansion of the camp in Cox's Bazar³. Bangladesh Forest Department (BFD)⁴ also assessed the damages of the Cox's Bazar-Teknaf forests from to Rohingya influx and settlement, but did not include any site-specific restoration plan.

More recently, in July 2018, the FAO proposed the technical specifications for plantation in the report on 'Landscape Restoration inside the camps of Cox's Bazar South Forest Division'. The purpose of the report is to increase green coverage in the denuded space with mixed vegetation; to engage refugee households in planting suitable trees, shrubs and grasses around their houses and available communal space; and to reduce landslide risk and support natural regeneration. At the same time, UNHCR Bangladesh has prepared a 'Mixed Plantation Strategy for Refugee Camps in Cox's Bazar' with the same objectives.

Realizing the growing needs for greening the camps and scope for engage Rohingya communities in any plantation programme, IUCN, in collaboration with UNHCR, has carried out a study in August 2018 in Camp 4 of Kutupalong Extension Camp to identify suitable places for plantation, to select suitable species for plantation, and to outline management options for this plantation.

This report captures the scope of this study, methodology followed, and the proposed 'Plantation and Management Plan' for Camp 4.

² IOM & FAO. 2017. Assessment of fuel wood supply and demand in displacement settings and surrounding areas in Cox's Bazaar District, Dhaka, Bangladesh.

³ UNDP. 2017. Draft Report on Environmental Impact of Rohingya Influx. Dhaka, Bangladesh.

⁴ Anonymous. 2018. Report from the Divisional Forest Officer, Cox's Bazar South Forest Division, Cox's Bazar.

1.1. Scope of Work

Assessment of the present status and development of a management plan for plantation in degraded lands (Camp 4) were the main objectives of this study. IUCN and World Resources Institute (WRI) set out the 'Restoration Opportunities Assessment Methodology' (ROAM) for conducting national and sub-national assessments of Forest Land Restoration potential⁵. In the light of the ROAM, considering the availability of land, planning were done with specific activities for enhancing vegetation cover in the currently open area. The general practice of the restoration of degraded forests and lands relates to the development of plantations of fast-growing, short-rotation species for a quick vegetation cover, and long-rotation, slow-growing species for timber production. The proposed plantation activities of IUCN and UNHCR in Camp 4 of Kutupalong Extension Camp have the scope of multidimensional plantation activities involving the Rohingya community. The activities would involve the plantation of fast, medium and long-rotation tree species, including soil-stabilizing and agro-crops in suitable spaces within the camp settlement.

There are several reasons behind undertaking plantation on the degraded land of Kutupalong Extension Camp. The plantation will contribute to land stabilization, reduce risk of land slide, improve watershed, enrich micro-climatic condition, and improve biodiversity and its conservation. In addition, plantation will create opportunity for supplying fuel wood that will ultimately reduce pressure over the natural forest resources. Rohingya people staying within the camps have showed interest in planting trees so that they could have better micro-climatic condition and good source of fuel wood in near the future. The interest of Rohingya community needs to be capitalized on for the betterment of tree-cover condition within the camps.

The present study assessed the total scenario of the Camp 4 of Kutupalong Extension Camp indicating the future plans for bringing back the forests in more or less similar conditions. The present report identifies the available lands (around homes, marginal lands, roadsides, fallow lands, along stream or *chhara* and small blocks) with prescriptions for plantations with suitable species.

1.2. Objectives

- Increase the green coverage of Camp 4 of Kutupalong Extension Camp with suitable agro- and forest crops;
- Involve the displaced Rohingya communities in plantation activities in and around their houses and available common spaces;
- Stop soil erosion, reduce the risk of landslide and improve the watershed areas; and
- Make a healthy environment for the camp inhabitants and improve the livelihood opportunity with horticultural crops (seasonal vegetable).

⁵ IUCN & WRI. 2014. A guide to the Restoration Opportunities Assessment Methodology (ROAM): Assessing forest landscape restoration opportunities at the national or sub-national level. Working Paper (Road-test edition), Gland, Switzerland: IUCN 125 pp. Website: <https://www.iucn.org/theme/forests/our-work/forest-landscape-restoration/restoration-opportunities-assessment-methodology-roam>

2. Plantation and Management Plan for Camp 4

2.1. Purpose of Management Planning in Camp 4

A Forest Management Plan can have diverse objectives that should be set to sustainably meet the demand for forest products and services in specific locations, situations and communities. According to FAO & UNHCR (2018)⁶, the four main purposes of management interventions in displacement settings are:

- The natural regeneration or rehabilitation, protection and use of degraded forest land;
- Plantations for energy (wood fuel);
- Plantations for timber production; and
- Plantations for fodder production.

Although forest rehabilitation, reforestation and afforestation interventions require considerable work and finance, they are essential to ensure an efficient and sustainable supply of wood fuel and other forest products for the community staying in the camps.

2.2. Degraded Forest Lands and Forest Rehabilitation

Degraded forest lands are characterized by a lack of forest vegetation (although single or small groups of pioneer trees or shrubs may be present), low soil fertility, poor soil structure (e.g. soil compaction, waterlogging and other physical and chemical limitations), soil erosion, high risk of landslides, a lack of suitable microhabitats for seed germination or establishment, and very low resilience to extreme weather conditions.

The prioritization of degraded forest lands for rehabilitation should take into account the location and condition of the land, the interests of stakeholders, and the availability of resources for the work (FAO & UNHCR 2018). The common four strategies for the rehabilitation of degraded forest lands are i) protective measures; ii) measures to accelerate natural recovery; iii) measures to assist natural regeneration; and iv) tree-planting for rehabilitation and protection.

2.3. Erosion Control and Creation of Vegetative Cover in Camp 4

In Kutupalong Extension Camp, erosion is one of the imminent threats. It can be controlled economically and effectively through vegetative measures on all, except the steepest slopes. In the latter, only solid structures or engineered measures will be able to provide the desired protection and stability.

The desired characteristics of plants used for erosion control include⁷:

- The ability to grow on degraded and eroded sites;
- Rapid development for quick protection;
- Deep and widespread root systems for good anchorage in subsoils;
- Dense and wide-spreading crowns to quickly form closed canopies;
- Ease of establishment, preferably by cuttings, stumps or bare-root seedlings;
- The high production of litter or nitrogen to improve soil conditions;

⁶ FAO & UNHCR. 2018. *Managing forests in displacement settings: guidance on the use of planted and natural forests to supply forest products and build resilience in displaced and host communities*, by A. Gianvenuti, A. Guéret and C. Sabogal. Rome, 84 pp.

⁷ Weidelt, H.J. 1976. *Manual of reforestation and erosion control for the Philippines*. Eschborn, Germany, Deutsche Gesellschaft fuer Technische Zusammenarbeit.

- The ability to withstand physical stresses such as drought, and landslides;
- The ability to survive when temporarily submerged; and
- The ability to provide economic returns by producing timber, wood fuel, or other useful products.

Since a single species rarely possesses all these qualities, it is usually necessary to plant a mixture of trees, shrubs and grasses with complementary characteristics.

2.4. Technical Aspects of Land Rehabilitation and Protection

Land rehabilitation and protection from erosion require fast-growing pioneer species to quickly cover the barren soil. The focus should be on the root systems and soil-holding capacity of the trees, which can be enhanced by the judicious choice of species and the application of certain management techniques.

The following list sets out some of the considerations:

- Identify the rehabilitation site;
- Choose the right species – among other factors, species should be fast-growing and adapted to the climate and topography, and have strong root systems;
- Define the size and shape of the plantations, according to factors such as slope and areas to be protected;
- Calculate the number of seedlings needed for the site;
- Obtain seeds, seedlings or cuttings of the selected species;
- Know how to grow the species in nurseries, including seed pretreatment and seedling;
- Hardening (applicable next years' plantation programme with own nurseries);
- Define planting density: It should be high enough to quickly provide cover for the soil but not so high that it prevents trees from developing fully. Density will also depend on the species and might range from about 2,500 stems per hectare (2 x 2 m) to more;
- Determine the work required to prepare the site and to outplant and tend the seedlings;
- Determine the need for fencing. This will have major cost implications but may be essential for success;
- Specify the water-harvesting techniques to be used and the work involved in these (e.g. pits need to be dug);
- Determine whether additional watering will be required; and
- Indicate the period over which the plantation should be guarded by watchers.

3. Plantation Establishment in Selected Sites of Camp 4

The 'Plantation and Management Plan' for Camp 4 was developed based upon a thorough field visit in Camp 4 in August 2018. The study team consisted of a forestry expert of IUCN's Commission on Ecosystem Management (CEM) in Bangladesh, IUCN staff, and several ERT members of Camp 4.

3.1. Site Selection

The study team identified 27 available sites for plantation programme in Camp 4 (Table 1). They also prioritized 6 sites for plantation in 2018. The ordinates along with the area and proposed planting species are provided in Table 1 and Figure 1.

Table 1. Details of 27 proposed sites found suitable for plantation activities in Camp 4.

Sl. No.	Latitude	Longitude	Area (m ²)	Name of Maji (Leader)	Slope (Max.)	Priority for plantation
1	21.213499	92.143282	250	Sultan Maji	45	This season
2	21.212683	92.139621	500	Monir Ahamed	45	This season
3	21.212311	92.139494	1,500	Motin Ahamed	45	This season
4	21.210439	92.138679	5,000	Obaidul Maji	45	This season
5	21.209407	92.138482	10,000	Obaidul Maji	45	This season
6	21.21237	92.143092	5,000	Yasin Maji	45	Next season
7	21.212369	92.143308	1,000	Syed Alam Maji	45	Next season
8	21.210421	92.142906	700	Yasin Maji	45	Next season
9	21.21024	92.143071	10,000	Nur Maji	45	Next season
10	21.209898	92.142578	4,000	Nabi Hossain	45	Next season
11	21.209267	92.141386	600	Rafiq Maji	50	Next season
12	21.209042	92.140309	1,500	Jafarullah Maji	50	Next season
13	21.208854	92.141056	2,000	Solim Maji	50	Next season
14	21.208247	92.141046	2,000	Solim Maji	50	Next season
15	21.20833	92.13977	2,500	Sirajul Haque Maji	30	This season
16	21.20804	92.139544	2,500	Sirajul Haque Maji	30	Next season
17	21.207534	92.139136	5,000	Sirajul Haque Maji	20	Next season
18	21.20643	92.139178	4,000	Sirajul Haque Maji	30	Next season
19	21.206667	92.140224	4,000	Jamal Maji	40	Next season
20	21.205796	92.14023	6,000	Ali Mia Maji	30	Next season
21	21.203451	92.139426	2,000	Aziz Maji	15	Next season
22	21.20276	92.139927	4,000	Aziz Maji	15	Next season
23	21.205475	92.14084	6,000	Hossain Maji	0	Next season
24	21.206767	92.141837	10,000	Ma Hosson Maji	15	Next season
25	21.206759	92.142231	15,000	Ashanul Haque Maji	30	Next season
26	21.206708	92.142217	250	Sadek Maji	15	Next season
27	21.214359	92.144145	100	Islam Maji	0	Next season
TOTAL			105,400 (10.50 ha)			

The current location of Camp 4 was originally covered with Dipterocarp-dominated, wet-evergreen to semi-evergreen natural, primary forests. However, forest degradation started in this area during 1980–90 and finally the land drastically converted to refugee camps after massive clearing of forests and extensive earth work for road and drainage system construction, and creating flat space on the hills for shelters. The area is now highly degraded and completely denuded. The soil is sandy and exposed to parent materials indicating poor fertility in most of the 27 selected sites. Area available for plantation is also variable because of scattered small houses made as the shelters.

Among the 27 sites suitable for plantation, six sites were selected for plantation in August 2018 (Figure 1). These are serial nos 1, 2, 3, 4, 5 and 15 in Table 1 and make up about 19,750 m² (or about 2 ha). Details of these six sites are given below.

<p><u>Priority Plantation Plot – 1</u> Location: Besides ERT Tower Sultan Majhee Tila GPS coordinate: Latitude: 21.213499 Longitude: 92.143282 Area (proposed): 250 m² (0.07 acre) Status: Almost barren with 15-25° slope</p>	<p><u>Priority Plantation Plot – 2</u> Location: South part of Knowledge park school (Munir) GPS coordinate: Latitude: 21.212683 Longitude: 92.139621 Area (proposed): 500 m² (0.013 acre) Status: Barren with few regeneration/ weed</p>	<p><u>Priority Plantation Plot – 3</u> Location: Motin Ahmed Tila, proposed IT moktab GPS coordinate: Latitude: 21.212311 Longitude: 92.139494 Area (proposed): 1,500 m² (0.375 acre) Status: Almost barren with low flat land</p>
<p><u>Priority Plantation Plot – 4</u> Location: Obaidul Majhee Tila GPS coordinate: Latitude: 21.210439 Longitude: 92.138679 Area (proposed): 5,000 m² (1.25 acre) Status: Almost barren</p>	<p><u>Priority Plantation Plot – 5</u> Location: Obaidul Majhee Tila GPS coordinate: Latitude: 21.209407 Longitude: 92.138482 Area (proposed): 10,000 m²(2.5 acre) Status: Almost barren</p>	<p><u>Priority Plantation Plot – 15</u> Location: Siraj Majhee Tila GPS coordinate: Latitude: 21.20833 Longitude: 92.13977 Area (proposed): 2,500 m² (0.625 acre) Status: Barren land</p>

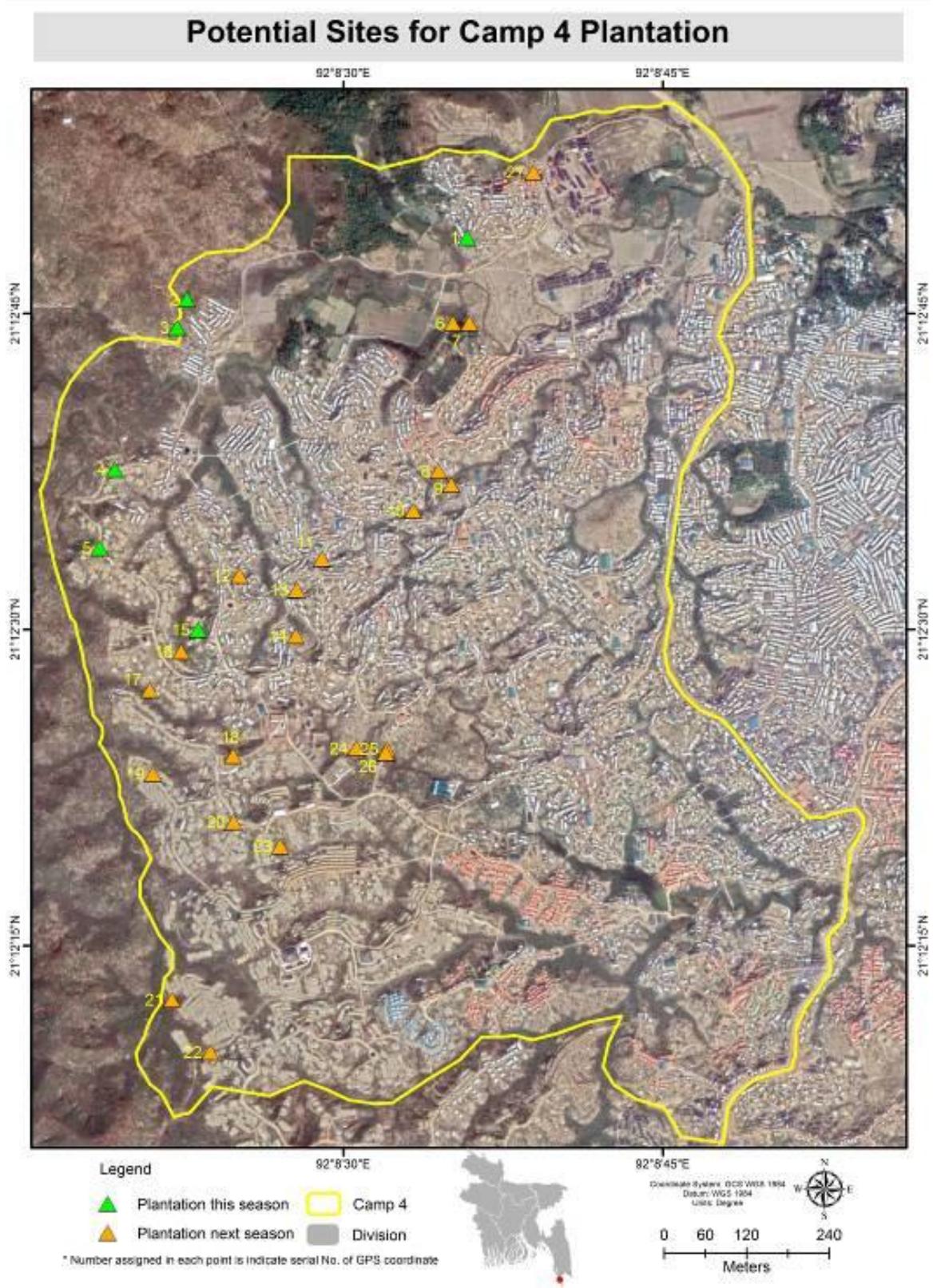


Figure 1. Map of Camp 4 in Kutupalong Extension Camp, Cox's Bazar, indicating the GPS locations of 27 proposed plantation sites, including six priority sites (green triangles).

3.2. Site Preparation

Since the planting shall start in August, the site should be well-prepared immediately for the plantations.

- The fallow forest sites with bushes of coppice shoots and weeds/grasses, shall be lightly slush, but the coppice shoots of native tree species, for example Puti jam, Kharullah, Suregada, Chatian, and Dumur should be left alone.
- Predetermine the planting position with appropriate spacing and stacking with bamboo sticks.
- On hills/hillocks, make stacking across the slopes for minimizing soil erosion.
- After stacking, make planting pit/hole of 30 cm x 30 cm x 30 cm dimension. Care should be taken to make pits in steep slopes for avoiding soil erosion and land slide. Augur may be use in those areas for making the pits.
- Put handful of decomposed cow dung and 20 g of TSP in each pit, mix well with top soil before planting the seedlings.
- For soil conservation and stabilization, only line planting of Vetiver/ Phuljaru/ Arahar should be done for minimal soil disturbance.



Figure 2. Indication of suitable species on different spaces of Camp 4.

3.3. Planting Techniques

3.3.1. Spacing

- Long-, medium- and short-rotation forest trees: 2 m x 2 m
- Shed trees: 4 m x 4 m or depending on suitable lands around homesteads
- Plants for soil stabilization with Vetiver, Phuljaru, Arahar: 40 cm x 40 cm
- Bamboo offset/seedlings/cuttings along creeks/*chhara*: 5 m x 5 m in alternate position

3.3.2. Planting the seedlings

- Distribute the seedlings according to the design of the plantations (short-, medium and long-rotation).
- Short-rotation, fast-growing species shall be planted in mix on the hill-tops.
- Slow-growing, long-rotation species shall be planted at the hill bottom and mid slope.
- Cut polybag with a sharp knife and remove it carefully so that the ball of earth does not break.
- Place the seedling with the ball of earth in the pit/ hole. Take proper care so that roots do not curl or bend in the holes.
- Make sure that root-collar region of the seedling is just below the soil surface. Tighten the soil by tramping with feet/hand around the seedlings, so that there does not remain any air-space inside the planting hole.
- In the low-lying areas, ensure that no water can stand at the root-collar zone. This may be achieved by slightly raising the soil surface in the seedling region.

3.4. After care and Management of Plantation

3.4.1. Weeding

Weeding schedule is given below:

- 3 weeding in 1st year (August, October & April-May of next year).
- 2 weeding in 2nd year (July-August and May-June).
- 1 weeding in 3rd year (May-June depending on rainfall & severity of weed growth).
- Note: Weeding pattern shall be circular (50 cm around the seedling/sapling) or line (50 cm all along). Complete weeding is not recommended for halting the soil erosion.

3.4.2. Vacancy filling

- If any vacancy occurs, have to fill it up at the end of the plantation programme (if rain exists).
- Priority shall be given for the same species for vacancy filling.

3.4.3. Fertilizations

- If the soil of the plantation area is fertile, generally fertilization is not essential.
- Since the camp plantation site is degraded, it needs adequate fertilizer application: Urea 30 g, TSP 20 g with a basal doze of 20 kg/ha of MP.
- Thoroughly mix full doze of TSP and half of urea with the soil of planting hole/pit.
- Apply the rest half of urea after 30-40 days of planting the seedlings (if drought starts, be careful about the application of urea).

3.4.4. Watering/ Irrigation

- If watering/ irrigation is possible, seedlings must be benefited and growth will be enhance.

3.4.5. Mulching

Mulching is useful to conserve soil moisture for the seedlings during the dry period and release nutrients after gradual decomposition.

- Mulching helps to conserve 20–25% soil moisture, thus helps the seedling further growth during dry period.
- Kitchen waste (biodegradable) and leaf-litter/grass may be used for mulching in the camp site.
- About 2” thick mulching may be given from 1-2” distance from the seedling.

3.4.6. Distribution of seeds of vegetable to the Rohingya families

- Seeds of vegetables (fruit/leafy) may be given to Rohingya families for cultivating in and around the available spaces of their houses.
- Vegetables not only increase the greening, but also provide nutrition to their diet.

3.4.7. Records, Monitoring, and Evaluation

- Make a register/plantation Journal for each site, indicating the details of plantation activities.
- Make a detailed map of the plantation indicating the ordinates, plantation type and species with topography of the site.
- Keep record of all activities, e.g. nursery raising, purchase of seedlings (species, prices and average height), field preparation and out-planting etc.
- Record the silvicultural treatments, e.g. weeding, cleaning, vacancy filling, mulching, irrigation and any damages, if happened, etc.
- Take photographs of the activities (before, during and after planting activities).
- Record the survival, height growth and diameter of the seedlings plated at each site.

The number of the site, available area (m²) for plantation, name of the maji (leader of the cluster shelters), suggested species for plantation, and budget for immediate plantation programmes for six priority sites (i.e. 1, 2, 3, 4, 5 and 15) are given in Table 2.

Table 2. Area and suggested species for plantation at six priority sites in Camp 4 with indicative budgets.

Sl. No.	Area (m ²)	Name of Maji	Tree Species by plantation length			Horticultural crops & soil stabilization		Budget (Taka)
			Short	Medium	Long	Utility/ shed species in shelter homes	Soil stabilization	
1	250	Sultan Maji	Akashmoni, Gamar, A. hybrid	Gamar, Moos, Toon	Garjan, Telsur, Champa, Boilam, Goda	Amra, Amloki, Lebu	Vetivera, bamboo, Phuljaru, Arahar, Daincha	25,050
2	500	Monir Ahamed	Akashmoni, Gamar, A. hybrid	Gamar, Moos, Toon	Garjan, Telsur, Champa, Boilam, Goda	Amra, Amloki, Lebu	Vetivera, Phuljaru, bamboo, Arahar, Daincha	30,150
3	1500	Motin Ahamed	Akashmoni, Gamar, A. hybrid	Gamar, Moos, Toon	Garjan, Telsur, Champa, Boilam, Goda, Jarul	Amra, Amloki, Lebu	Vetivera, Phuljaru, Arahar, Daincha	37,525
4	5000	Obaidul Maji	Akashmoni, Gamar, A. hybrid	Gamar, Moos, Toon	Garjan, Telsur, Champa, Boilam, Jarul, Goda	Amra, Amloki, Lebu	Vetivera, Phuljaru, Arahar, Daincha	60,025
5	10000	Obaidul Maji	Akashmoni, Gamar, A. hybrid	Gamar, Moos, Toon	Garjan, Telsur, Champa, Boilam,	Amra, Amloki, Lebu	Vetivera, Phuljaru, Arahar, Daincha	89,500

Sl. No.	Area (m ²)	Name of Maji	Tree Species by plantation length			Horticultural crops & soil stabilization		Budget (Taka)
			Short	Medium	Long	Utility/ shed species in shelter homes	Soil stabilization	
					Goda			
15	2500	Sirajul Haque Maji	Akashmoni, Gamar, A. hybrid	Gamar, Moos, Toon	Garjan, Telsur, Champa, Boilam, Goda	Amra, Amloki, Lebu	Vetivera, Phuljaru, Arahar, Daincha	43,225

Considering the site, soil status and previous vegetation of the camp site, the following species are recommended for plantation in Camp 4 area of Kutupalong Extension Camp (Table 3).

Table 3. Local and scientific name of the proposed plant species for Camp 4 plantation.

Proposed Tree Species			Remarks
A. Short rotation (8–10 years) forest tree species			
	Local name	Scientific name	
1	Akashmoni	<i>Acacia auriculiformis</i>	N-fixing colonizing fast-growing tree species
2	Acacia hybrid	<i>Acacia</i> hybrid	
3	Gamar	<i>Gmelina arborea</i>	
B. Medium rotation (15–18 years) forest tree species			
4	Kadam	<i>Neolamarckia cadamba</i>	Suitable for low-lying areas
5	Pitali	<i>Trewia nudiflora</i>	
6	Moos	<i>Brownlowia elata</i>	Native species
C. Long rotation (40+ years) forest tree species			
7	Jarul	<i>Lagerstroemia speciosa</i>	Native tree species of this forest naturally-grown and encouraged for bringing back these climate-resilient species again.
8	Tellya Garjan	<i>Dipterocarpus turbinatus</i>	
9	Sada Garjan	<i>Dipterocarpus costatus</i>	
10	Bhatta Garjan	<i>Dipterocarpus alatus</i>	
11	Telsur	<i>Hopea odorata</i>	
12	Champa	<i>Michelia champaca</i>	
13	Boilam	<i>Anisoptera scaphula</i>	
14	Dhaki Jam	<i>Syzygium firmum</i>	
15	Toon	<i>Toona ciliata</i>	
16	Goda / Arsol	<i>Vitex peduncularis, V. glabrata</i>	
D. Ornamental trees for planting in front of school, hospitals, mosque etc.			
17	Katbadam	<i>Terminalia catappa</i>	
18	Bot	<i>Ficus bengalensis</i>	

E. Soil binding/ Nitrogen fixing crops for erosion control & improvement of degraded soil			
19	Vetivera	<i>Vetiveria zizanioides</i>	Along canal banks, charas; besides the degraded hills for reducing soil erosion and land slide and also for soil stabilization
20	Phuljaru	<i>Thysanolaena maxima</i>	
21	Arahar	<i>Cajanus cajan</i>	
22	Daincha	<i>Sesbania sesban</i>	
23	Dhol Kolmi	<i>Ipomoea fistulosa</i>	
24	Bamoo (Baijja)	<i>Bambusa vulgaris</i>	
25	Muli bamboo	<i>Melocana baccifera</i>	
F. Horticultural crops (vegetables)			
26	Kalmi shak	<i>Ipomoea aquatica</i>	HH premises; top of the roof and Ipomoea in the low lying lands (already grown in some areas). These may include in agroforestry practices also.
27	Pui shak	<i>Basella rubra</i>	
28	Notay shak	<i>Amaranthus viridus</i>	
29	Kankanotey	<i>Amaranthus tricolor</i>	
30	Morich	<i>Capsicum annuum</i>	
31	Mistikumra	<i>Cucurbita maxima</i>	
32	Lau, Kodu	<i>Lagenaria siceraria</i>	
33	Chichinga	<i>Trichosanthes anguina</i>	
34	Sheem	<i>Lablab purpureus</i>	
35	Parul	<i>Luffa cylindrica</i>	
36	Jhinga	<i>Luffa acutangula</i>	
37	Derash	<i>Abelmoschus esculentus</i>	

Note: Homestead species are not suggested here as these are being given by other NGOs to Rohingya families in Camp 4 (Ref. information received from the agencies working in the camp and recommendation from the recent meeting with the Bangladesh Forest Department).

3.5. Issues need to be considered for restoration activities in Camp 4

- Plantations at proposed priority sites better be completed by August 2018.
- Plantations should be across the hills/hillocks, so that soil erosion may be reduced.
- Akashmoni, Gamar, and Acacia hybrid should be on top of the hill/high slope areas.
- Medium- and slow-growing, long-rotation species should be at the bottom, moist sides, rather than the steep slopes.
- Mix plantation is better than mono-plantation. The mix may be alternate, in rows or small blocks.
- Traditional spacing of 30 cm x 30 cm x 30 cm is better for gentle slope to bottom lands, but on steep slope (>45°) augur hole is better (less disturbance to soil).
- Jarul and Pitali should be planted in low-lying areas where waterlogged/moist area exists for a few months.
- Akashmoni, Gamar, Acacia hybrid, and Moos should be planted in exposed, degraded, eroded lands.
- Planting materials of utility/shed trees, if promoted, should be distributed to shelter homes (10 per shelter home), since camp inhabitants showed interest during the field visit.
- Vetivera, Phuljaru, and bamboo should be planted mainly to control soil erosion. Bamboo should be planted on both sides of the canal/chhara only.
- Arahar and Daincha seeds should either be broadcast in the open, exposed areas or around the planted seedlings, so that they provide shade to the seedlings during dry period and subsequently provide nitrogen fixation at the site.
- Garjan, Telsur, Boilam, Moos, and Champa are the original species of this degraded forest area. These native species need to be prioritized for bringing back to the forests.

- A few natural regenerations of Batna, Got Boro (wild ziziphus), Callicarpa, Suregada, and Moos were seen at the proposed plantation sites in Camp 4. These natural regeneration/coppices need to be protected from cutting.
- Seeds of some winter vegetables/leafy vegetables may be given to the Rohingya families for cultivation in the available premises. It will create greenery as well as provide nutrition to these families.
- Bean, bitter gourd, sweet gourd, and Luffa may be grown on the roof of the shelter houses.

4. Conclusion

The impacts of recent Rohingya influx in allocated camps of the forest lands have significantly degraded the forest cover in Cox's Bazar-Teknaf peninsula. The environment is also deteriorating due to extensive soil erosion, landslide, floods, and harsh conditions with extreme weather.

It is essential to gradually bringing back vegetation cover in this area for an adaptable living condition for the displaced Rohingya people while they stay in their temporary shelters and also for the local host people. Although small-scale plantation activities have been started by BRAC, Caritas, FAO-BFD and a few other organizations in the monsoon of 2018, thousands of acres of land remain suitable for reforestation and restoration programmes. Due to the disturbance of natural habitats of Asian elephants in this region, human-elephant conflict increased during September 2017 to March 2018. IUCN has taken an initiative to reduce the conflict through making watch-tower, creating awareness among the Rohingya community and forming Elephant Response Teams (ERTs).

The present initiative of greening the barren degraded forest lands by IUCN-UNHCR in Camp 4 is a pilot effort for 2018 at six priority sites. If the piloting is successful, it may be scaled up to other camps and sites to improve vegetation coverage in this territory. Since the restoration process is a challenging job at a highly degraded site, careful selection of species and implementation of appropriate silvicultural treatments are crucial. With proper selection and maintenance of forest restoration processes, the ecosystem services may be improved in this biodiversity-rich forest area of the Cox's Bazar-Teknaf region.