Steps Toward Forest Landscape Restoration in the Context of the Rohingya Influx:

Creating Opportunities to Advance Environmental, Humanitarian, and Development Progress in Bangladesh

Heather Tallis, Cindy Huang, John Herbohn, Karen Holl, Sharif A. Mukul, and KAM Morshed

Abstract

Since August 2017, over 740,000 Rohingya refugees have fled atrocities and violence in Myanmar to Cox's Bazar, Bangladesh. There are now one million Rohingya refugees in Cox's Bazar, comprising about 30 percent of the population. This increase, coupled with immediate needs for fuelwood and shelter, has diminished livelihoods due to deforestation and loss of access to land; soil and slope erosion; fuelwood scarcity and associated risks to safety of people collecting fuelwood; increased encroachment and forest degradation; declining water quality, groundwater reserve depletion, and air pollution; decreasing soil quality; and climate vulnerability. To restore cleared forest areas, and improve human and environmental well-being, international actors must work with the Government of Bangladesh to implement a long-term forest landscape restoration (FLR) plan for Cox's Bazar. This paper provides a number of recommendations which work towards this goal, focused on: improving efficiency and impact of reforestation investments; improving seedling survival and benefits inside and outside camps; improving disaster resilience and nutrition inside camps; and increasing ecological and social benefits out of camps.

Center for Global Development
2055 L Street NW
Fifth Floor
Washington DC 20036
202-416-4000
www.cgdev.org

Center for Global Development
www.cgdev.org

CGD Policy Paper 148
July 2019

Steps Toward Forest Landscape Restoration in the Context of the Rohingya Influx: Creating Opportunities to Advance Environmental, Humanitarian, and Development Progress in Bangladesh

Heather Tallis
The Nature Conservancy

Cindy Huang
Center for Global Development and Refugees International

John Herbohn
University of the Sunshine Coast

Karen Holl
Environmental Studies Department, University of California, Santa Cruz

Sharif A. Mukul
Department of Environmental Management, Independent University Bangladesh and Tropical Forests and People Research Centre, University of the Sunshine Coast

KAM Morshed
BRAC

We wish to offer our deepest gratitude for the distinguished members of our advisory group who provided invaluable input and feedback: Dr Junaid K. Choudhury (World Bank consultant, SUFAL Project), Dr Ainun Nishat (Professor Emeritus, BRAC University), Dr Mohammad Rezaur Rahman (Professor, Institute of Water and Flood Management, Bangladesh University of Engineering and Technology), Dr Nayeem Wahra (Member Secretary, Foundation for Disaster Forum; Humanitarian and Climate Change Issues Advisor, Prothom Alo Newspaper; Adjunct Faculty, Institute of Disaster Management and Vulnerability Studies, University of Dhaka), Mr Farid Uddin Ahmed (Executive Director, Arannyak Foundation). We are grateful for support from Kate Gough (Center for Global Development), Tariq Islam (BRAC), Dr Zulkarin Jahangir (BRAC), Azad Rahman (BRAC), Abu Sadat Moniruzzaman Khan (BRAC) and Liesl Schnabel (Center for Global Development), as well as ideas and input from the stakeholders who attended our workshop in Cox's Bazar in September 2018. We also grateful for feedback provided by Jonah Busch (Earth Innovation Institute), Scott Morris (Center for Global Development), William Savedoff (Center for Global Development), and Jake Zarins (Habitat for Humanity International). All errors are our own.

Center for Global Development
2055 L Street NW
Washington, DC 20036

202.416.4000
(f) 202.416.4050

www.cgdev.org

The Center for Global Development is grateful to the Bridge Collaborative for inspiring this work, and we thank the Margaret A. Cargill Philanthropies for support.

Heather Tallis, Cindy Huang, John Herbohn, Karen Holl, Sharif A. Mukul, and KAM Morshed, 2019. "Steps Toward Forest Landscape Restoration in the Context of the Rohingya Influx: Creating Opportunities to Advance Environmental, Humanitarian, and Development Progress in Bangladesh" CGD Policy Paper 148. Washington, DC: Center for Global Development. https://www.cgdev.org/publication/steps-toward-forest-landscape-restoration

Center for Global Development
2055 L Street NW
Washington, DC 20036

202.416.4000
(f) 202.416.4050

www.cgdev.org

Contents

Executive Summary

Rohingya refugees began arriving in Bangladesh in August 2017, fleeing atrocities deemed serious crimes under international law by United Nations investigators. Over 740,000 new refugees have settled in two camps in Cox's Bazar district of Chittagong: Kutupalong-Bulukhali and Naypara-Leda. The number of Rohingya in Cox's Bazar now stands at around one million, comprising about 30 percent of the population. Kutupalong-Bulukhali is now the largest refugee camp in the world. The influx of Rohingya into Cox's Bazar has exacerbated deforestation, underdevelopment, and climate vulnerability. Combined, these factors create an urgent need for new strategies and resources to address the increasing stress placed on the environment, and the consequences of this stress for refugee and host communities.

Significant environmental and climate challenges in Cox's Bazar associated with the influx of refugees include diminished livelihoods for local populations due to deforestation and loss of access to land; soil and slope erosion; fuelwood scarcity and associated safety risks for people collecting fuelwood; reduced foraging area and movement pathways for elephants, resulting in human-wildlife conflict; increased encroachment and forest degradation; declining water quality, groundwater reserve depletion and air pollution; decreasing soil quality; and climate vulnerability, including along the coastline. While these trends existed before the 2017 refugee influx, they have been greatly accelerated and exacerbated by it. UN agencies and the government of Bangladesh (GOB) are providing liquefied petroleum gas (LPG) for refugees and hosts, but harvest pressure will only be reduced if these efforts are further scaled-up and donors make strategic investments to identify sustainable solutions, preferably from non-fossil sources.

To contribute to a growing base of knowledge in Cox's Bazar – the Bridge Collaborative brought together BRAC, the Center for Global Development and The Nature Conservancy to convene a workshop with global and national experts and stakeholders in September 2018 in Cox's Bazar. The research also included field visits to Kutupalong-Bulukhali camp. Based on desk research, consultations, and these workshops, we developed recommendations to help drive progress for the Rohingya and host communities, and align environmental, humanitarian, and development objectives.

We present **10 core recommendations for forest and landscape restoration (FLR)** in Cox's Bazar to help restore cleared forest areas and improve human and environmental well-being:

To Improve Efficiency and Scale Impact of Reforestation Investments:

1. **Strengthen consultation and coordination among groups involved in FLR through the Energy and Environment Technical Working Group (EETWG) and consider creating a standing alliance for FLR as efforts scale.** All groups conducting, or planning to conduct, FLR and related activities should be engaged through existing coordination

mechanisms, ensuring that Rohingya refugee and host communities are represented in a meaningful and gender-balanced way. In the future, it may be useful to create a standing alliance focused on FLR.

2. **Complete and regularly update a 10-year landscape-scale plan for FLR that aligns efforts across sectors.** Measurable and sustainable restoration progress will require the creation of a multiyear FLR plan, building on the Joint Response Plan, that aligns efforts on fuel and energy, nutrition, security (e.g., elephant-human conflict and safety during informal timber and firewood collection), water management, shelter construction and maintenance, and infrastructure development. It should also include an integrated spatial plan for FLR in and outside camps across Cox's Bazar. FLR plans should be adapted based on the timing and scale of refugee repatriation; however, under all scenarios, FLR planning must be longer-term to yield sustainable results.

To Improve Seedling Survival and Benefits Inside and Outside Camps:

3. **Set clear goals and objectives, and replace activity metrics (such as area planted, number of seedlings planted or distributed, number of projects) with "leading indicators" of success (such as percent or number of seedlings surviving, seedling growth, soil erosion, or percent of population engaged in maintenance activities).**[1] Goals will differ inside and outside camps and should be specified. The goals selected should be paired with measurable, time-bound performance criteria that can guide the level and nature of investment needed and improve program design. Programs focused on activities (plantings, seedling distribution) alone will fail, and use of leading indicators can significantly improve program success. Indicators should be mirrored in the Joint Response Plan and across all implementors.

4. **Build capacity of local communities and ensure seedling survival by prioritizing programs that combine plantings, maintenance, capacity building, and good governance arrangements.** Program adjustments should include a co-development process with individuals or groups who will conduct maintenance and build relevant capacities. Co-development processes should consider agreements on who manages trees; what incentives are received (e.g., vegetable plots, cash payments); who receives which benefits (e.g., vegetable or fruit harvest, fuel wood, shade); and how

[1] We understand that these indicators are included in the EETWG's 2019 plans. The next step should be full adoption of these indicators by all groups involved in plantings, and transparency of any indicators and plans to ensure accountability.

the program is managed (e.g., who keeps records, monitors activities, measures success). This recommendation is especially important for actors focused on social cohesion efforts, including the World Bank.

To Improve Disaster Resilience and Nutrition Inside Camps:

5. **Diversify species mix to emphasize fast-growing native species well adapted to local conditions.** We recommend drawing from EETWG technical guidelines and consulting further with local forestry and wildlife life experts to select a diversity of native species that are adapted to different soil and microclimatic conditions.[2] Planting a diversity of species will help to meet multiple objectives and provide greater resilience, since monocultures of trees are more susceptible to pest outbreaks. We strongly encourage the use of native species for plantings in and around camps when they are compatible with project objectives, since native species are generally better adapted to local conditions and may have a higher rate of establishment success, especially through cyclone conditions.

6. **Explore a pilot project to plant native fruit trees that provide nutrition.** Planting fruit trees in the camp may be an effective way to meet multiple objectives, including improved nutrition for Rohingya and bank stabilization. Some promising species to test include jackfruit (*Artocarpus heterophyllus*), Dhaki jam (*Syzygium* sp.), Amloki (*Phyllanthis emblica*), Guajava (*Psidium guajava*), mango (*Mangifera indica*), Dewa (*Artocarpus lacucha*), and coconut (*Cocos nucifera*). Local authorities could explore options that allow flexibility in the current policy prohibiting homestead fruit species inside the camps in order to support nutrition requirements for refugees without enabling encroachment. If a policy shift does not occur, planting more currently permitted fruit trees should be prioritized. This recommendation should be implemented in close consultation with the nutrition cluster.

To Increase Ecological and Social Benefits Outside of Camps:

7. **Adapt and apply the widely used social forestry model to generate greater livelihoods and environmental benefits.** Valuable lessons can be learned from the various social forestry programs implemented to date in Bangladesh and elsewhere that can be applied and tailored to local conditions to provide livelihoods and incentives for sustained, improved FLR, and forest management.

---

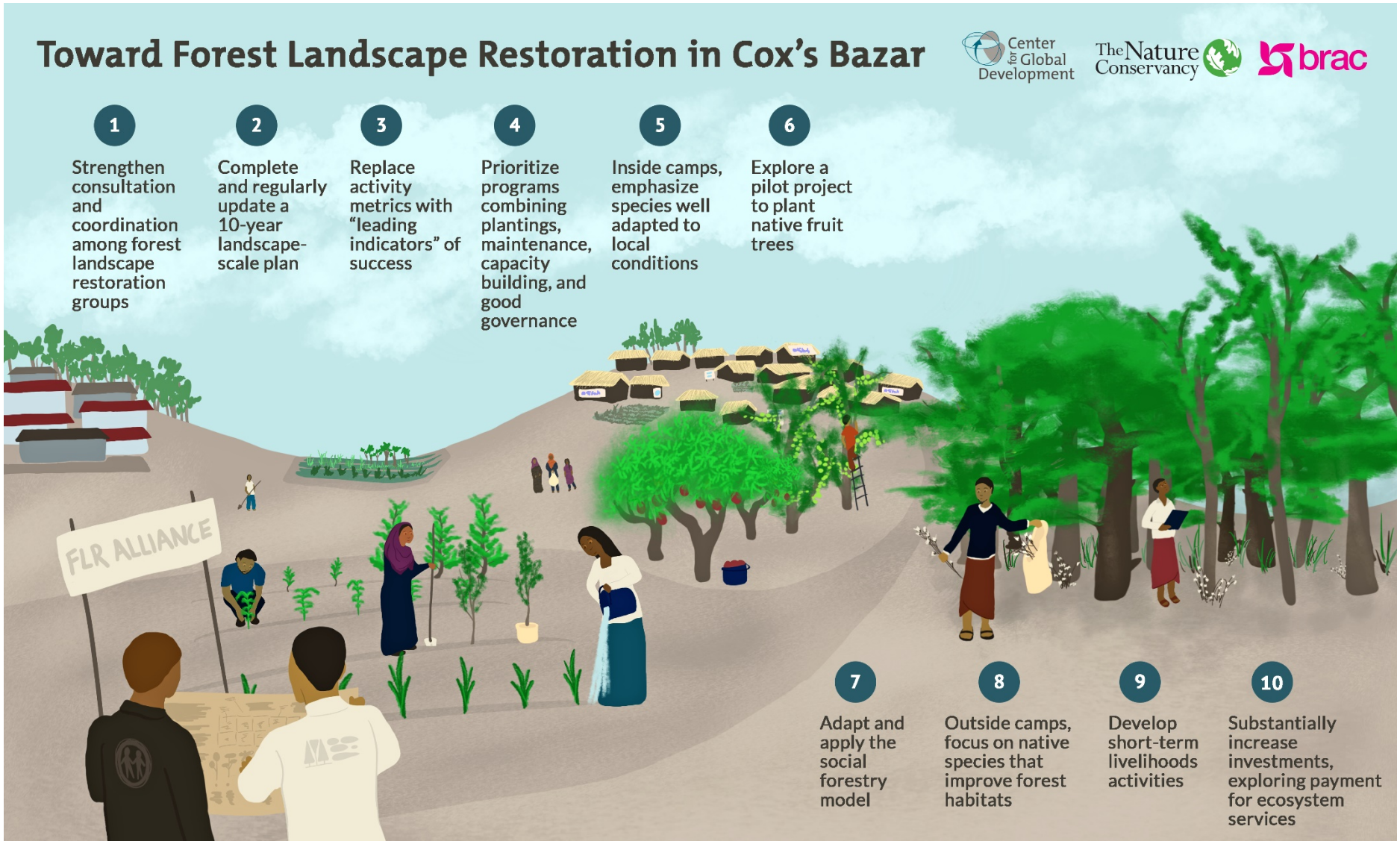
[2] Three species lists were approved by the Bangladesh Forest Department for 2019 planting. The lists follow this recommendation and include only native species. Use of lists now needs to be enforced.

8. **Diversify species mix and improve local nurseries to emphasize native species (such as native Dipterocarp species) that support forest habitat and local livelihoods.** Consult with local restoration and wildlife experts to develop reforestation systems that incorporate a mix of fast-growing species ideal for site capture and stabilization,[3] along with slower-growing native canopy species that can set the trajectory for future forest recovery. Supporting the implementation of basic guidelines, such as seedling quality evaluations, and improving the quality of set-up for the nursery can quickly yield improvements that will support near- and longer-term FLR objectives.

9. **Develop short-term livelihoods activities that can improve environmental outcomes.** Near-term needs for fuelwood and native seedling supplies could be addressed through new livelihood programs with host communities (and Rohingya, if cash-for-work policies shift). Under close supervision of the Bangladesh Forest Department, this two-part program would (1) support nursery business development, and (2) provide incentives to selectively remove woody invasive species and replant native seedlings in buffer areas around the Teknaf Wildlife Sanctuary, Himchari National Park, and Inani National Park. Harvested invasive woody weeds could be used for fuelwood, and replanted native species would contribute to reforestation and possible social forestry initiatives. The proposal would be designed so it is consistent with the current Bangladesh Forest Department policies. This recommendation is especially important for agencies and NGOs that are prioritizing livelihood efforts and women's empowerment.

10. **Substantially increase the scale of FLR investments to realize potential benefits for carbon and economic development in Cox's Bazar, including by exploring payment for ecosystem services.** Bangladesh's REDD+ readiness and the current plans for FLR need to improve and expand to realize potential carbon benefits and livelihood contributions for Cox's Bazar. Multiple financing mechanisms beyond humanitarian aid could catalyze the necessary scale of effort.

[3] The EETWG has made efforts to incorporate a mix of fast-growing species for site capture and stabilization. 2019 plans include a more sophisticated system for promoting collaborative efforts of mixed vegetation and local species strategies.



View online att: https://www.cgdev.org/sites/default/files/steps-toward-forest-landscape-restorationinfographic.png?itok=kRAVnZsS

Introduction

The Cox's Bazar region is home to a diverse range of plants and animals native to Bangladesh. It is also a popular tourist destination for local and international tourists and has the world's longest beach. The region also faces substantial environmental degradation, harsh impacts of natural disasters, and climate vulnerabilities threatening ecological health, human well-being, and overall environmental and economic sustainability. These challenges have affected Cox's Bazar and the region for decades leading up to the 2017 Rohingya influx, and many impacts were exacerbated or accelerated as a result of the population influx.[4]

In August 2017, Rohingya refugees began arriving to Bangladesh, fleeing atrocities which were found to be serious crimes under international law by independent United Nations investigators.[5] Over 740,000 new refugees have settled in two camps in Cox's Bazar district of Chittagong, Kutupalong-Bulukhali and Naypara-Leda. The total number of Rohingya in Cox's Bazar, with the latest influx, is now around 1 million, comprising about 30 percent of the population.[6] Kutupalong-Bulukhali is now the largest refugee camp in the world, and the influx of Rohingya into Cox's Bazar has exacerbated the already-existing trends of deforestation, underdevelopment, and climate vulnerability.[7,8] These factors combined have created an urgent need for new strategies and resources to address the increasing stress placed on the environment, and the harmful consequences of this stress for host communities and refugees.[9]

Top environmental and climate challenges include:

- diminished livelihoods for local populations due to deforestation and loss of access to land;
- soil and slope erosion;
- human-animal conflict and reduced areas for animal feeding and migration pathways;
- fuelwood scarcity and associated risks to people collecting fuelwood;
- increased encroachment and forest degradation;

---

[4] "Report on Environmental Impact of Rohingya Influx," *UNDP Bangladesh and UN Women*, (March 2018): 1-103.

[5] "Myanmar: UN Fact-Finding Mission releases its full acount of massive violations by military in Rakhine, Kachin and Shan States," United Nations Humam Rights Council, accessed June 25, 2019, https://www.ohchr.org/EN/HRBodies/HRC/Pages/NewsDetail.aspx?NewsID=23575&LangID=E.

[6] Estimated from Bangladesh's 2011 census data. http://bbs.portal.gov.bd/sites/default/files/files/bbs.portal.gov.bd/page/7b7b171a_731a_4854_8e0a_f8f7dede4a4a/PHC2011PreliminaryReport.pdf.

[7] "Rohingya Refugee Crisis," United Nations Office for the Coordination of Humanitarian Affairs, accessed June 25, 2019, https://www.unocha.org/rohingya-refugee-crisis.

[8] M. J. Altman, "Rohingya Crisis: A Firsthand Look into the World's Largest Refugee Camp," published February 14, 2018, https://www.wfpusa.org/stories/rohingya-crisis-a-firsthand-look-into-the-worlds-largest-refugee-camp/.

[9] Sharif A. Mukul, Saleemul Huq, John Herbohn, Ainun Nishat, A Atiq Rahman, Raquibul Amin, and Farid Uddin Ahmed, "Rohingya refugees and the environment," *Science* 364, Issue 6436 (April 2019): 138.

- declining water quality and quantity and air quality;
- decreasing soil quality; and
- climate vulnerability, including along the coastline.

While these trends existed before the 2017 refugee influx, they have been greatly accelerated and exacerbated by it.

For example, the influx of Rohingya to the peninsula has accelerated deforestation. The most comprehensive assessment to date estimates a loss of 2283 ha (5640 acres) of forest between December 2016 and December 2017, with a loss of 18 percent of the forest coverage (2,060 ha) in the areas around Kutupalong-Bulukhali, where the refugees have settled.[10] The camp areas expanded by 835 percent between 2016 and 2017. The study draws it conclusions in part by examining the expansion of camp sites housing Rohingyas, and the degradation of surrounding forest cover largely due to fuelwood harvest. There is evidence of significant continued deforestation in the camps and surrounding areas since its conclusion. Beyond the direct economic and environmental consequences, deforestation also poses a threat to stability and social cohesion between the Rohingyas and local Bangladeshis. Tensions are rising as both host communities and Rohingya see a shrinking forest resource pool for fuelwood harvest and other uses.[11] According to the Joint Response Plan (JRP) mid-term review—the vision for a coordinated response to the needs of refugees and host communities by the Inter-Sector Coordination Group (ISCG) in Cox's Bazar and the Strategic Executive Group in Dhaka—approximately 700 metric tons of fuelwood—three to five football fields of forest—is cut down every day.[12,13] In the first year of the influx, demand for fuelwood increased dramatically from 54,451 tons per year in 2016 to 312,807 tons per year in 2018, and an estimated 91 percent of refugee households rely on fuelwood as their main source of cooking fuel.[14]

Recently more of the fuelwood supply has come from purchasing of wood imported from other regions rather than direct local harvest: in March 2018, 30 percent of the Rohingya purchased firewood and 64.1 percent collected it themselves, whereas in July 2018, 43.5 percent purchased it, 27.6 percent collected it, and 24.9 percent received firewood donations.[15] In part this is due to deforestation and subsequent loss of fuelwood supplies in accessible or nearby areas. It appears that local Bangladeshis and Rohingya are increasing

---

[10] Mohammad Mehedy Hassan, Audrey Culver Smith, Katherine Walker, Munshi Khaledur Rahman, and Jane Southworth, "Rohingya Refugee Crisis and Forest Cover Change in Teknaf, Bangladesh," *Remote Sensing* 10, no. 5 (April 2018): 689.

[11] "2018 JRP for Rohingya Humanitarian Crisis," *Inter Sector Coordination Group- Bangladesh*, (March 2018).

[12] "Joint Response Plan for Rohingya Humanitarian Crisis," *Inter Sector Coordination Group- Bangladesh*, (2018).

[13] Andrea Dekrout, "A precarious environment for the Rohingya refugees," published May 14, 2018, https://www.unenvironment.org/news-and-stories/story/precarious-environment-rohingya-refugees.

[14] "Assessment of fuel wood supply and demand in displacement settings and surrounding areas in Cox's Bazaar District," Food and Agriculture Organization of the United Nations and International Organization for Migration, revised November 2017, https://fscluster.org/sites/default/files/documents/iom_fao_wood_fuel_assessment_nov_2017.pdf. 23

[15] "2018 JRP for Rohingya Humanitarian Crisis."

informal buying and selling of fuelwood provided by aid organizations or purchasing wood collected from other areas.

Forest loss in and around the major Kutupalong-Bulukhali camp has taken place in the Teknaf Wildlife Sanctuary (TWS), an area known for housing one of the last remaining population of Asian elephants.[16] The location of the camp and further degradation of forest habitat has led to instances of human-animal conflict.[17] Elephants use a range of hills between TWS and the Himchari National Park as a major migratory pathway between Bangladesh and Myanmar. The natural habitat and corridors for elephants in this region have been further degraded due to the settlements, and movement and cohabitation of elephants and humans put both at risk for conflict and harm.[18] This situation has led to encounters between Rohingya and elephants, with ten Rohingya fatalities reported since the recent Rohingya influx.

The reality is that the displacement of Rohingya will be protracted, increasing the need to address linked environmental and human challenges. Even if voluntary, safe, and dignified return for the Rohingyas started soon, many of the roughly one million Rohingya people in Bangladesh would still be present in the medium-term (approximately seven to 12 years), presuming a daily intake capacity of 300 Rohingya as the government of Myanmar has previously reported.[19] Perhaps more importantly, irrespective of the repatriation timeline, medium-term solutions are needed to respond to the scale of deforestation and other environmental damage that has already occurred. The challenge now is to determine the best path forward, especially how to mobilize existing and new resources toward sustainable solutions, including humanitarian aid investments and the $175 million Sustainable Forests & Livelihoods Project (SUFAL) program recently launched by the World Bank.[20] With adequate resources, leadership, and coordination, there is a compelling opportunity to jointly advance humanitarian, development, and environmental objectives.

Extensive environmental analysis has already been completed or is underway, including assessments, planning, and monitoring projects related to the environmental impacts of refugees in the Cox's Bazar region. Publicly available reports include those by the United Nations Development Programme (UNDP) and UN Women and Food and Agriculture Organization of the United Nations (FAO) and International Organization for Migration

---

[16] Mohammad Abdul Motaleb and Mohammad Sultan Ahmed, *Status of Asian Elephants in Bangladesh* (Dhaka: International Union for Conservation of Nature, 2016), xii + 102.

[17] Haseeb Md. Irfanullah, "Elephant Conservation in Bangladesh – Bringing Conservation Effort and Humanitarian Response Together," *Asian Elephant Specialist Group*, n.d., 33-35.

[18] "Report on Environmental Impact of Rohingya Influx," *UNDP Bangladesh and UN Women Bangladesh*, (2018).

[19] Fahmida Khatun, "Economic Implications of the Rohingya Crisis for Bangladesh and National Budget FY2019," Center for Policy Dialogue, published May 13, 2018, https://cpd.org.bd/wp-content/uploads/2018/05/Presentation-on-Economic-Implications-of-the-Rohingya-Crisis-for-Bangladesh-and-National-Budget-FY2019.pdf; https://www.dhakatribune.com/world/south-asia/2017/10/31/myanmar-govt-suggests-possible-daily-repatriation-300-rohingyas/.

[20] "Sustainable Forests & Livelihoods (SUFAL) Project," The World Bank Group, published 2019, http://projects.worldbank.org/P161996?lang=en.

(IOM).[21,22] There is a monitoring program from the International Centre for Climate Change and Development, and IOM has focused on the environmental impacts of the Rohingya influx.[23] In addition, there are multiple analyses and planning documents that have not yet been published.

To build upon and contribute to this growing base of knowledge and expertise, a Bridge Collaborative[24] effort by Bangladesh Rural Advancement Committee (BRAC), the Center for Global Development (CGD) and The Nature Conservancy (TNC) convened workshops with experts and stakeholders in September 2018 in Cox's Bazar. The research also included a field visit to Kutupalong-Bulukhali camp. Based on background research, consultations, and these workshops, we have developed recommendations that can drive progress for the Rohingya and host communities, and align environmental, humanitarian, and development objectives.

Here, we present **ten core recommendations for forest landscape restoration** in Cox's Bazar as a means to help alleviate resource strain and improve conditions. Additional efforts are needed to address several closely related issues including liquified petroleum gas (LPG) and other fuelwood alternatives, water quality, coastal preservation, and soil quality and ground stability. **The need to find an alternative to fuelwood is critical for the success of our recommendations regarding forest landscape restoration given that fuelwood collection is a primary driver of deforestation in the region.** Rohingya refugees and Bangladeshi hosts alike rely on fuelwood as their primary fuel source. Without alternative fuel, deforestation will continue, and any new plantings will likely be cut prematurely. Currently, UN agencies and the government of Bangladesh (GOB) are scaling a project to provide 240,000 Rohingya households with liquefied petroleum gas (LPG), with extension of the program to host communities underway.[25,26] Fuelwood harvest pressure will only be reduced if these efforts are further scaled-up, and donors make strategic investments to identify sustainable solutions, preferably from non-fossil sources.

We focus on what can be achieved through improved **forest and landscape restoration (FLR),** an approach with the ultimate goal to reshape highly deforested landscapes to offer multiple benefits, better meeting present and future human and ecological needs;[27] it

---

[21] "Report on Environmental Impact of Rohingya Influx."

[22] "Assessment of fuel wood supply," FAO, 2017.

[23] "IOM Bangladesh: Rohingya Humanitarian Crisis Respose," IOM UN Migration, published August 3, 2018, https://www.iom.int/sites/default/files/situation_reports/file/bangladesh_sr_20180727-0802.pdf.

[24] The Bridge Collaborative is a partnership among The Nature Conservancy, PATH, International Food Policy Research Institute and Duke University aiming to create the evidence and opportunity to drive bigger change faster for people and the planet.

[25] 2019 JRP.

[26] According to the EETWG, 140,000 households currently have LPG and expansion to host communities is underway.

[27] "Forest Landscape Restoration," International Union for Conservation of Nature, accessed June 26, 2019, https://www.iucn.org/theme/forests/our-work/forest-landscape-restoration.

includes—but is not restricted to—ecological restoration.[28] We acknowledge the challenges associated with implementing FLR in a displacement context, but we feel that an integrated landscape planning approach is essential to make the most efficient use of current and future funding to meet the needs of both the residents and Rohingya refugees, while restoring and conserving some of the forests and ecosystem services they provide. FLR can include commercial monoculture tree plantations, smallholder woodlots, shifting cultivation, agroforests, restoration plantations and assisted or unassisted natural regeneration, each of which provide specific outcomes for generating forest products, conserving biodiversity, supplying environmental goods and services, and safeguarding cultural, religious and aesthetic values of human groups.[29] As such, this approach can be designed in a way that benefits both Rohingya and host communities through replanting, maintenance, and harvest schemes. It is also a relevant approach for helping the GOB meet its goals for forest management in the region, which include sustainably expanding forest-related livelihoods, increasing climate resilience, conserving wildlife and biodiversity, and providing economic benefits.[30]

Across our recommendations, we consider best practices as well as the distinctive circumstances of the Rohingya situation (e.g. pace and scale of recent change, stateless status of Rohingya, heightened concerns surrounding safety, restrictions on Rohingya movements and livelihood options, and the goal of voluntary, sustainable return to Myanmar). Despite the unique context, this report identifies potential opportunities for progress, including both those that do and do not require policy changes. Similar to the phased approach outlined by FAO and IOM,[31] some of our recommendations can be implemented in the near-term while others will take time to develop and deliver benefits.

The extensive demands being placed on stakeholders engaged in the response means that it will be critical to draw on existing guidance and best practices, including the FAO-UNHCR guidance on *Managing Forests in Displacement Settings*, and prioritizing effort. In providing recommendations, we aim to understand and build upon additional technical guidance from the EETWG.[32] As the GOB, UN agencies, NGOs, and other partners further develop plans,

---

[28] Pedro H.S. Brancalion, David Lamb, Elaine Ceccon, Doug Boucher, John Herbohn, Bernardo Strassburg, and David P. Edwards, "Using markets to leverage investment in forest and landscape restoration in the tropics." *Forest Policy and Economics* 85:103-113.

[29] Robin L. Chazdon, Pedro H.S. Brancalion, Lars Laestadius, Aoife Bennett-Curry, Kathleen Buckingham, Chetan Kumar, Julian Moll-Rocek, Ima C.G. Vieira, Sarah J. Wilson, "When is a forest a forest? Forest concepts and definitions in the era of forest and landscape restoration," Ambio 45 (September 2016): 538.

[30] "Bangladesh Forest Master Plan 2017-2036," Agriconsulting Europe S.A. and Sodev Consult International Ltd., drafted December 2016, http://pubdocs.worldbank.org/en/848671521827530395/FMP-Full-report-final.pdf.

[31] "Assessment of fuel wood supply and demand in displacement settings and surrounding areas in Cox's Bazaar District."

[32] The technical documents we have reviewed include: "Field Protocol for Land Stabilization and Plantation Activities Inside the Camp Area," from the Bangladesh Forestry Department; "Plantation and Management Plan for Camp 4, Cox's Bazar," from UNHCR and IUCN; "Regional Site-Specific Plan for Landscape Restoration In and Around Refugee Camps in Cox's Bazar, Bangladesh," (Technical Planting Protocols) from Bangladesh Forest Department and RRRC; "Landscape Restoration Inside the Camps of Cox's Bazar South Forest Division,"

we hope these recommendations can serve as helpful input toward improving human and environmental well-being.

Recommendations

We provide ten recommendations that aim to improve efficiency and scale the impact of reforestation investments, improve seedling survival and benefits inside and outside camps, improve disaster resilience and nutrition inside camps, reduce area fuelwood shortage and increase benefits outside camps.

To Improve Efficiency and Scale Impact of Reforestation Investments:

1. Strengthen consultation and coordination among groups involved in FLR through the Energy and Environment Technical Working Group (EETWG) and consider creating a standing alliance for FLR as efforts scale. All groups conducting, or planning to conduct, FLR and related activities should be engaged through existing coordination mechanisms, ensuring that Rohingya refugee and host communities are represented in a meaningful and gender-balanced way. In the future, it may be useful to create a standing alliance focused on FLR.

Numerous local and international groups are already working on a range of reforestation efforts in the region. These include but are not limited to the Bangladesh Forest Department (BFD), the Office of Refugee Relief and Repatriation, the United Nations High Commission for Refugees (UNHCR), IOM, FAO, the World Food Programme (WFP), the International Union for Conservation of Nature (IUCN), Danish Refugee Committee, BRAC, and other NGOs. The main coordinating mechanism for reforestation is the Energy and Environment Technical Working Group (EETWG), which is a cross-cutting group hosted under the Site Management and Site Development, Shelter, and Food Security Sectors of the Inter Sector Coordination Group (ISCG). The EETWG creates technical guidance and fosters communication and coordination on issues such as disaster risk mitigation, reforestation, waste management, and water quality. The EETWG tries to ensure that groups working on reforestation are in regular communication and closely coordinated, but the number of groups engaged and the scale and range of FLR and related efforts makes this difficult. Lack of communication and coordination can result in redundancy and inefficient use of resources. Greater investment in the EETWG, including its FLR-focused activities, could increase its capacity to consult, coordinate, and support implementation of technical guidance.

Bangladesh Forestry Department, IOM, FAO, UNHCR; "Assessment of fuel wood supply and demand in displacement settings and surrounding areas in Cox's Bazar District," from FAO and IOM; "Elephant Movement and Possible Intervention Sites in and around Nayapara, Leda, Chakmarkul, Shamlapur, Unchiprang, Jadimura, and Eastern side of Kutupalong Camps, Cox's Bazar," from UNHCR and IOM.

Recent large-scale forest landscape efforts have shown the need for—and potential success of—stakeholder coordination from the onset, especially in landscape scale reforestation programs. For example, to address twenty years of little environmental progress in restoring Brazil's Atlantic Forest due in part to "disaggregated" efforts by stakeholders,[33] the Atlantic Forest Restoration Pact[34] has been successful in coordinating priorities and restoration activities among more than 260 actors. The Pact has made significant progress towards its goal of restoring 15 million hectares of the forest by 2050 and one million hectares of forest by 2020 (as a Bonn Challenge target). This coordination was enabled by the establishment of clear goals, a management structure for the Pact Members (e.g. coordinating board of 20 institutions and an overall coordinator),[35] the development of a best practices manual, and practical measures such as creating regional maps and activity coordination networks.

Coordination efforts should not only include the organizations investing in or leading FLR efforts, but also Rohingya and local community members or their representatives. The key to the long-term success of restoration efforts in Cox's Bazar will be consistent support for local agency and engagement. Many successful projects begin with a year or so of consultations, design, and developing coordination mechanisms. For example, a reforestation project in Biliran, Philippines that began with a year of community engagement and social preparation has seen a wide array of successful outcomes, including increased planting and nursery capacity at the local level, effective community governance and high seedling survival rates, and research findings that helped shape a national policy initiative around reforestation.[36] These examples have succeeded because there was a formal structure for communication and a leader specifically tasked with coordination.

It is also essential to formally consider gender issues in the planning and implementation of FLR as a matter of justice, agency, and program effectiveness. Women are disproportionately affected by deforestation (for example, vulnerability to sexual and gender-based violence when traveling farther and farther to collect fuelwood). The UNDP and UN Women environmental assessment in Cox's Bazar highlights the severe safety risks that Rohingya women and girls face when

---

[33] "Combined efforts amplifies restoration in Brazil's Atlantic Forest," IUCN, published November 30, 2016, https://www.iucn.org/news/forests/201611/combined-effort-amplifies-restoration-brazil's-atlantic-forest.

[34] "Brazil's Atlantic Forest Restoration Pact, Bonn Challenge, accessed June 26, 2019, http://www.bonnchallenge.org/content/brazils-atlantic-forest-restoration-pact.

[35] Pedro H. S. Brancalion, Ricardo A. G. Viani, Miguel Calmon, Helena Carrascosa, and Ricardo R. Rodrigues, "How to Organize a Large-Scale Ecological Restoration Program? The Framework Developed by the Atlantic Forest Restoration Pact in Brazil, Journal of Sustainable Forestry," *Journal of Sustainable Forestry* 32:7(September 2013): 728-744, DOI: 10.1080/10549811.2013.817339.

[36] "Biliran Reforestration and Regreening," USC: University of the Sunshine Coast, Youtube, uploaded August 8, 2017, https://www.youtube.com/watch?v=Nl_i3gfJrOQ.

collecting fuelwood.[37] When women are not engaged early in FLR design, and gender is not considered in planning and implementation, women and girls often receive a smaller share of the benefits of FLR, as has been the case with REDD+.[38] It is critical to ensure that women and girls of various groups and status (including in both refugee and host communities) are consulted and participate in governance of FLR efforts, and doing so would contribute to stated protection goals. Women have insight that can inform planning and decisions around where and what to plant, what the priority species might be for livelihoods and food security, how compensation and benefits sharing should be designed for greater equity,[39] and how to best disseminate best practice technologies, manage funds, keep records and monitor program impacts.

We recommend strengthening and/or expanding the role of the EETWG by including all groups engaged in reforestation and planting efforts, including representatives of Rohingya and local communities. As efforts scale, it may be helpful to create an EETWG subgroup focused on FLR with a full-time coordinator at a minimum. We recommend that this extended group design and commit to an inclusive process that engages women so as to better reflect their contributions in the design and implementation of FLR. The 2019 JRP outlines important objectives and targets around creating more inclusive community representation systems, including through new youth, women, and men's committees. FLR consultation can build on these and existing mechanisms in host communities. Additionally, the relevant GOB representatives—including the BFD, the Department of Environment, Institute of Forestry and Environmental Sciences, Chittagong University (IFESCU), Department of Forestry and Environmental Science, Shahjalal University of Science and Technology (SUST) and Forestry and Wood Technology Discipline, Khulna University—should also be engaged. As the FLR efforts are aimed at and beyond the immediate displacement impacts and to the broader Bangladesh environmental health, inclusion of Bangladesh officials where relevant will be essential.

Over time, we suggest that relevant groups consider creating a standing FLR alliance as in the case of the Atlantic Forest Restoration Pact. Such a mechanism should convene a wide range of stakeholders, support deep community engagement, and help mobilize and coordinate the resources needed to implement. An alliance, under the leadership of the BFD, can support the work of local government offices, NGOs, and others to ensure alignment of incentives and objectives with landscape-scale, system-wide plans described in the next recommendation.

---

[37] "Report on Environmental Impact of Rohingya Influx."

[38] Jessica Campese, "Equitable Benefit Sharing: Exploring Experiences and Lessons for REDD+ in Tanzania," Tanzania Natural Resource Forum, (October 2012).

[39] Bimbika Sijapati Basnett, Marlene Elias, Markus Ihalainen, and Ana Maria Paez Valencia, "Gender matters in Forest Landscape Restoration: A framework for design and evaluation," Center for International Forestry Research, published December 2017, https://www.cifor.org/library/6685/.

2. Complete and regularly update a 10-year landscape-scale plan for FLR that aligns efforts across sectors. Measurable and sustainable restoration progress will require the creation of a multi-year FLR plan, building on the JRP, that aligns efforts on fuel and energy, nutrition, security (e.g. elephant-human conflict and safety during informal timber and firewood collection), water management, shelter construction and maintenance, and infrastructure development. It should also include an integrated spatial plan for FLR in and outside camps across Cox's Bazar. FLR plans should be adapted based on the timing and scale of refugee repatriation; however, under all scenarios, FLR planning must be longer-term to yield sustainable results.

To date, the response in Cox's Bazar to the Rohingya influx has been predominantly focused on meeting basic needs. While there is recognition of the importance of exploring a landscape scale approach to the environmental aspects of the crisis, including some initial analysis, the policy and practical space to do so has been limited. In conjunction with major progress on camp infrastructure and programming, as well as growing recognition of the impact of deforestation on host communities and social cohesion, the time is ripe to accelerate and support planning for FLR that emphasizes the connections across sectors, and with the rest of the Cox's Bazar landscape. This effort will depend heavily on better communication and coordination across groups (recommendation 1), including in the planning and development stages.

We recommend creation of an FLR plan that includes the camps and the larger Cox's Bazar region. It will be impossible to address the challenges exacerbated by the Rohingya influx by focusing on the camps in isolation. For example, even prior to August 2017, the demand for fuelwood outpaced the available biomass supply.[40] Fuelwood supply (planting, importing) or demand reduction (LPG program) that focus only on the camps are unlikely to sufficiently resolve the situation, as approximately 85 percent of the local population relies on biomass fuels in the Cox's Bazar region.[41] In addition, human-elephant conflict existed in local communities before the influx,[42] and conflict in the camps is due in part to the fact that elephant movement is limited across the larger Cox's Bazar landscape by other existing settlements, infrastructure, degraded habitat, and international border impediments. Plantings in and around camps need to be designed with a view to the larger landscape, including elephant habitat areas and host communities. Experience from other countries illustrates the importance of connected elements of habitat

[40] "Assessment of fuel wood supply and demand in displacement settings and surrounding areas in Cox's Bazar."
[41] Sayma Akhter, Sohel, & Alamgir, "Impact of forest and non-forest villagers on Ukhia and Inani forest Range under Cox's Bazar (South) Forest Division, Bangladesh," *Proc. Pakistan Acad. Sci*, *46*(1), 13-22.
[42] Raihan Sarker, Amr Hossen, and Elvin Røskaft, "Fatal Elephant Encounters on Humans in Bangladesh: Context and Incidences," *Environment and Natural Resources Research* 5, no.2 (2015): 10.5539/enrr.v5n2p99.

across a large landscape for wide-ranging animals like elephants.[43] Many less visible animals would be helped similarly by restoration efforts that consider the larger landscape and habitat connectivity therein.[44]

A landscape scale view can also help ensure that programs undertaken within the camps are aligned with, and not hampered by, development plans for the larger Cox's Bazar region. For example, planned roads or other infrastructure development may change access to and cost of products (e.g. fuelwood, LPG, fruits, and vegetables), elephant movements, and resource access (e.g. opening or closing access to fuelwood, water, etc.), among other factors. Having a view of planned activities in the wider region can ensure that locations chosen for plantings inside and outside camps are complementary to each other and to other planned development activities.

Another key driver of the need to address challenges at a larger spatial scale is the weather and climate. The region is very prone to flooding and landslides during monsoon season, and climate change is expected to worsen tropical storms.[45] The Rohingya, host communities, wildlife, and restoration plantings are at greater risk as a result. FLR planning that considers these large-scale changes will have increased probability of success.

In addition, we recommend that the landscape scale FLR plan adopt a system wide view across sectors. As discussed above, alternative energy supplies must be developed, or any efforts to rehabilitate and restore forests will fail. Likewise, the need for food and livelihoods should be considered when choosing species for planting (see Recommendation 8) and water availability must be taken into account when designing schemes to maintain plantings. Recommendations and guidance for how to create landscape scale, system-wide plans in a humanitarian context exist and are highly relevant here.[46]

It is clear that the EETWG recognizes that critical actions, including plantings, will not be sustainable without systems and landscape-scale analysis and planning. It will be important to consider different scenarios that account for uncertainty around when Rohingya return to Myanmar, including at what scale and pace. The

---

[43] Philip D. Taylor, Lenore Fahrig, Kringen Henein, and Gray Merriam, "Connectivity is a vital element of landscape structure," *Oikos* 68, no. 3 (December 1993): 571-573.
[44] Nick M. Haddad, David R. Bowne, Alan Cunningham, Brent J. Danielson, Douglas Levey, Sarah Sargent, and Tim Spira, "Corridor use by diverse taxa," *Ecology* 84, issue 3 (2003): 609-615.
[45] Akiko Nakagawa, "How will Bangladesh be affected by climate change?," World Economic Forum, published March 4, 2015, https://www.weforum.org/agenda/2015/03/how-will-bangladesh-be-affected-by-climate-change/.
[46] "Field Protocol for Land Stabilization and Plantation Activities Inside the Camp Area," FAO-UNHCR-IOM, 2018; IASC, "Multi-Sector Initial Rapid Assessment Guidance," 2015, https://www.humanitarianresponse.info/en/programme-cycle/space/document/multi-sector-initial-rapid-assessment-guidance-revision-july-2015.

effectiveness of steps toward FLR will depend on a deep understanding of the pressures on forests, which are directly linked to the size of the population they are supporting, and a commitment to the challenging but necessary ongoing communication and coordination between the various groups working in the region.

We recommend that the GOB, donors, and other stakeholders fully support the EETWG's activities, including with additional resources, access to data, and expertise as needed to create a landscape scale and system wide plan for FLR and related activities. The plan would not be static, but rather periodically updated based on emerging data (including monitoring and evaluation of early efforts), research, and policy developments. The extended coordination mechanism recommended above could provide essential support to both creating and updating the plan.

To Improve Seedling Survival and Benefits Inside and Outside Camps:

3. Set clear goals and objectives, and replace activity metrics (such as area planted, number of seedlings planted or distributed, number of projects) with "leading indicators" of success (such as percent or number of seedlings surviving, seedling growth, soil erosion, or percent population engaged in maintenance activities).[47] Goals will differ inside and outside camps and should be specified. The goals selected should be paired with measurable, time-bound performance criteria that can guide the level and nature of investment needed and improve program design. Programs focused on activities (plantings, seedling distribution) alone will fail, and use of leading indicators can significantly improve program success. Indicators should be mirrored in the JRP and across all implementors.

As noted in best practice guidance, clear goals and objectives (i.e. performance criteria) for planting outcomes are necessary for effective program design.[48] In Cox's Bazar, different goals will be emphasized in the camp versus other deforested and degraded areas outside the camps. Within the camps, the primary goals are likely soil and bank stabilization, improved health and nutrition (e.g. gardens for fruits and vegetables and shade cover), and reducing climate vulnerability (e.g. heat stress, storm impacts). Some modest amounts of fuel (e.g. fast-growing species) may be provided through plantings within camps, but restricted space will not allow sufficient plantings to meet fuelwood needs. Outside the camps, goals likely include providing fuelwood, protecting remaining forests, supporting local livelihoods, disaster risk reduction, and contribution to climate goals. Not all these goals can be

[47] Our understanding from the EETWG is that these indicators are included in the EETWG's 2019 plans. The next step should be full adoption of these indicators by all groups involved in plantings, and transparency of any indicators and plans to ensure accountability.

[48] FAO et al., 2018.

met simultaneously in individual projects, so it is important to clearly articulate the priorities for individual projects and balance different goals across the landscape (see Recommendation 2).

Chosen goals should be paired with measurable, time-bound objectives that can guide the level of investment needed, improve program design (e.g. species selection, placement, incentives, maintenance strategies) and set up the program for easy evaluation and adjustment. Use of SMART (Specific, Measurable, Achievable, Relevant and Time bound) objectives is recommended best practice.[49,50] For example, a SMART objective for the goal of reducing heat stress through shading by trees would be to "Achieve 10 percent tree canopy cover within two years, and 25 percent tree canopy cover within 5 years." Canopy cover is a reasonable proxy measure for changing temperature through shading and is easier to measure than actual temperature change. For a goal of improving nutrition, a SMART objective might be to have "Within one year, all members of 10,000 households consume self-grown fruit or vegetables at least once a week." Use of SMART objectives can also help in the selection of useful metrics for success. For example, the shade objective given here suggests that canopy cover over households should be measured, and the nutrition objective suggests that vegetable consumption and origin of diet components should be measured.

As some benefits (e.g. shading, nutrition, fuelwood, fruit) take several years to be realized, FLR efforts often monitor faster responding 'activity' metrics in the near term to ensure programs are advancing. For instance, some programs in the camps are reporting number of seedlings distributed to households, or number of seedlings planted. These are activity metrics that aim to track program advances in the near term. However, restoration efforts elsewhere have shown that many seedling plantings fail because of poor maintenance, unclear governance (see Recommendation 4), unsuitable conditions and other factors. This known high failure rate suggests that these activity metrics are often not relevant to eventual seedling survival and programmatic success.

Instead, experience has shown that metrics called 'leading indicators' are better suited as near-term metrics of longer-term success. In this context, appropriate leading indicators may include survival and growth of seedlings at pre-specified time intervals after planting, appropriate timing of seedling outplanting such as in the rainy season (and not in the dry season simply to meet planting targets), soil erosion or lack thereof, demonstration of maintenance activities in camps (e.g. percent of seedlings that are being actively maintained such as seedling watering, frequency of

---

[49] Stuart H.M. Butchart, Moreno Di Marco, and James E.M. Watson, "Formulating Smart Commitments on Biodiversity: Lessons from the Aichi Targets." *Conservation Letters* 9, no. 6 (2016): 457–468., doi:10.1111/conl.12278.

[50] Maxwell, S. L., et al. "Being Smart about SMART Environmental Targets." *Science* 347, no. 6226 (May 2015): 1075–1076., doi:10.1126/science.aaa1451.

weeding or other activities that are known to contribute to seedling survival), visible indicators that maintenance is happening (e.g. presence/absence of weeds, number of seedlings surviving) or adoption rates of good nursery practices (such as percent seedlings with j-root or appropriate root to shoot ratio at outplanting, which have been shown to correlate strongly with seedling survival after outplanting). A leading indicator of good governance arrangements could be the existence of a benefit sharing arrangement.

FAO has drafted a plan to support the BFD in rehabilitating the degraded and deforested landscape. The plans include stabilizing 1196 ha of land, restoring 107 ha of forest, reforestation of 313 ha, and 980 ha of seedling distribution within the camps. In addition, approximately 10,000 ha would be rehabilitated in the 1 to 5 km buffer area surrounding the camps.[51] The 2019 JRP for the Rohingya crisis has also established targets for addressing the environmental impacts of the crisis. The targets aim to mitigate the effects on the environment while increasing social cohesion and the restoration of resources (note that the targets cover rehabilitation of which reforestation is only one portion). The population in need identified in the JRP is the approximately 336,000 host community members in need of livelihoods support (approximately 60 percent of hosts in the immediate area). In addition to the targets outlined below, the JRP seeks to reach refugees and host community members with livelihoods and self-reliance packages that will include micro-gardens, tree-planting, and cash for work in reforestation.[52]

The high-level indicators and targets in the JRP are difficult to interpret. For example, it is unclear if the target for "No. of hectares covered/rehabilitated through environmental restoration activities" is referring to 100 hectares (which would seem quite low given the affected area) and/or engaging 50 percent of the population in need, or if 50 percent of affected hectares will have rehabilitation activities. (Note that the JRP has 150 percent, rather than 50 percent, but that would appear to be a typo.) Nor is it clear how the target of 200 sites for rehabilitation initiatives was selected, or what will qualify as a successful initiative and over what time period this will be evaluated. These indicators are unlikely to be useful in program management and identification of restoration success, unless they are underpinned by the kinds of specific objectives and associated monitoring over multiple years discussed above. Current indicators focus on the number of hectares covered, but without accompanying indicators on seedling survival, maintenance, or growth, efforts are likely to fail.

In addition, while community participation is essential, it is only the first step

[51] FAO/UNHCR/IOM Powerpoint

[52] For reviewer reference (not inclusion in the report), this is referenced on p 15 of the JRP sector strategies.

towards action. Awareness and planning alone seldom lead to restoration success.[53] It would be more effective to monitor percent of the population engaged in active maintenance (a critical element for success), versus those touched or engaged through planning and awareness activities. At a minimum, a metric is needed that reflects how environmental planning and awareness translate into community action. We recommend that the EETWG and GoB improve FLR success by establishing clear goals and objectives and refining the JRP indicators (as well as any others from the underlying results framework) to more appropriate and informative leading indicators of success.

4. Build capacity of local communities and ensure seedling survival by prioritizing programs that combine plantings, maintenance, capacity building, and good governance arrangements. Program adjustments should include a co-development process with individuals or groups who will conduct maintenance and build relevant capacities. Co-development processes should consider agreements on who manages trees, what incentives are received (e.g. vegetable plots, cash payments), who receives which benefits (e.g. vegetable or fruit harvest, fuel wood, shade), and how the program is managed (e.g. who keeps records, monitors activities, measures success). This recommendation is especially important for actors focused on social cohesion efforts, including the World Bank. Restoration programs that distribute seedlings and provide short-term cash for plantings have a low rate of success unless accompanied by ongoing program management, capacitation and support.[54] Maintenance activities, capacity building, clear governance, and local engagement are absolutely essential for seedling survival and restoration success. While many planting programs are already underway in and around the camps, additional programs will do best if time is taken to design programs in partnership with Rohingya and host communities.[55,56] Plans in the 2019 JRP to enhance a community representation system (e.g. for efforts on site management, protection, gender and communication with communities working groups) could be expanded to include FLR activities, as already envisioned through the food security strategy.

---

[53] Sheila M.W. Reddy, Jensen Montambault, Yuta J. Masuda, Elizabeth Keenan, William Butler, Jonathan R.B. Fisher, ... & Ayelet Gneezy, "Advancing conservation by understanding and influencing human behavior," *Conservation Letters* 10, issue 2 (May 2016): 248-256.

[54] Rebecca J. Cole, "Social and environmental impacts of payments for environmental services for agroforestry on small-scale farms, southern Costa Rica." *International Journal of Sustainable Development & World Ecology* 17, issue 3 (May 2010): 208-216.

[55] Nestor Gregorio et al., "Evidence-based Best Practice Community-based Forest Restoration in Biliran: Integrating Food Security and Livelihood Improvements into Watershed Rehabilitation in the Philippines," published January 2015, https://www.researchgate.net/publication/289904821_Evidence-based_Best_Practice_Community-based_Forest_Restoration_in_Biliran_Integrating_Food_Security_and_Livelihood_Improvements_into_Watershed_Rehabilitation_in_the_Philippines.

[56] Field Protocol for Land Stabilization and Plantation Activities Inside the Camp Area," FAO-UNHCR-IOM, 2018.

Any ongoing programs should include maintenance plans linked to relevant incentives, approaches to build the full range of necessary capacities, and clarity on all relevant aspects of governance. The programs implemented to date should be evaluated as part of this process to learn what has and has not worked thus far and hence improve future efforts. Without inclusion of these aspects, plantings will fail and waste funds, and in a worst-case scenario, well-meaning planting programs could amplify inequities and increase social conflict in and around camps. For example, lack of clear governance can lead to benefits from plantings going to select individuals, rather than those intended by the program.

Maintenance is essential for restoration, so it is critical to have a clear plan at the outset for who is responsible for paying for and carrying out maintenance of planting. Too often, maintenance (e.g. weeding, watering, replanting to account for seed or seedling mortality) of forest landscape restoration efforts is overlooked entirely or consideration is left until after the plantings begin. For example, in a $13 million effort to restore mangroves after the 2004 tsunami in Sri Lanka, only approximately 200-250 of 2000 ha of mangrove forest were successfully restored.[57] Of planting sites that were monitored five or more years after planting, nearly 80 percent of sites had less than 10 percent survival. Poor maintenance accounted for some of this loss, as plants were trampled (not maintained well through fences or other means of protection) and suffered insect attacks (plants not protected from insects, and no replanting after seedling loss).

Important basic maintenance activities to plan for in the camps include:

- watering seedlings (even drought tolerant species can need watering during dry periods of the first year after planting),
- weeding (seedling establishment can be dramatically lowered by competition with grasses or other weedy species),
- ensuring that seedlings are protected from domestic animals (e.g. livestock) trampling or consumption,
- monitoring survival and
- re-seeding or re-planting of seedlings that die.

If maintenance is to be done by Rohingya and host communities, a range of models to link planting and maintenance with incentives including sustainable livelihoods will be needed.[58] Providing a cash incentive for planting and maintaining plots is an important near-term strategy already being piloted in the Rohingya camps and among host communities. The 2019 JRP seeks to expand these activities, including

[57] Kodikara, Kodikara Arachchilage Sunanda et al., "Have mangrove restoration projects worked? An in-depth study in Sri Lanka," *Restoration Ecology* 25, 5 (January 2017): 705-716.
[58] "Report on Environmental Impact of Rohingya Influx."

through joint learning and tree-planting with Rohingya and hosts to promote social cohesion.

In-kind support for vegetable planting (training, seeds, land plots) is also being provided to some Rohingya as an incentive to conduct maintenance for newly planted seedlings. This approach can provide a means to diversify diets and improve nutrition, while also ensuring that tree seedlings have a higher rate of survival. Such programs, if scaled within the camps and host communities, should ensure they include sufficient training for essential maintenance activities, and clear governance (see below) regarding who has access to harvest vegetables, and later tree products as plantings mature.

Any financial or in-kind incentives *must* be combined with technical assistance and clear governance to ensure the success of reforestation projects. Community-led restoration efforts in other developing country contexts emphasize the need to include capacitation on basic project management, record keeping, and group decision making in addition to technical capacities needed for planting and maintenance.[59] For example, agroforestry projects in Colombia show that ongoing capacitation and technical support to local people involved in tree planting are equally important to project success as providing landowners with financial incentives.[60]

In addition to maintenance and capacity, good governance is fundamental to the success of forest landscape restoration, but is often overlooked in planning and practice.[61,62] Governance is the way rules, norms, and actions are structured to regulate behavior and hold individuals and groups accountable, including informal (non-legally binding) agreements over the power to access and use resources (such

---

[59] Nestor Gregorio et al., "Evidence-based Best Practice Community-based Forest Restoration in Biliran: Integrating Food Security and Livelihood Improvements into Watershed Rehabilitation in the Philippines," International Forestry Review 14, 4 (December 2012): 492-501.; Melo, FPL, SRR Pinto, PHS Brancalion, PS Castro, RR Rodrigues, J Aronson, and M Tabarelli, "Priority setting for scaling-up tropical forest restoration projects: Early lessons from the Atlantic Forest Restoration Pact." *Environmental Science & Policy* 33 (2012): 395-404; Wickramasinghe, D. 2017. "Regreening the coast: Community-based mangrove conservation and restoration in Sri Lanka," in *Participatory Mangrove Management in a Changing Climate: Perspectives from the Asia-Pacific*, ed. R DasGupta and R Shaw (Tokyo: Springer Japan):161-171.

[60] Calle, Z, E Murgueitio, J Chará, CH Molina, AF Zuluaga, and A Calle, "A strategy for scaling-up intensive silvopastoral systems in Colombia." *Journal of Sustainable Forestry* 32 (September 2013): 677-693.

[61] Jack Baynes, John Herbohn, and Wolfam Dressler, "Power Relationships: Their Effect on the governance of community forestry in the Philippines," *Land Use Policy* 54 (2016): 169-176.

[62] S.A. Rahman, T. Sunderland, J.M. Roshetko, and J.R. Healey, "Facilitating smallholder tree farming in fragmented tropical landscapes: Challenges and potentials for sustainable land management," *Journal of Environmental Management* 198, pt. 1 (2017): 110-121.

as trees) and to make, implement and enforce decisions.[63,64] In the context of FLR, lower-tier governance issues include who is responsible for planting and maintenance of trees, and who can access and harvest (receive benefits from) trees and when. Higher tier governance issues include national and provincial policy and how this may impact the local communities involved in FLR.[65]

Without clear governance agreements, inter- and intra-community conflict can break out over use of resources, land management, and benefits. Prior experience in other contexts has shown that when clear benefit sharing is not established, equitable benefit sharing is not common, further marginalizing already vulnerable populations. For example, a primary lesson learned from REDD+ pilot programs in Tanzania was the need to be specific about the role of the most marginalized or disproportionately affected groups within a population--in this case, women and widows--to ensure benefits were shared equitably and reflective of their contributions.[66] Studies of a harvesting and reforestation project in the Philippines found adverse effects of poor governance both at an upper level between the government and community forestry groups, and at a lower level between community groups and local individuals.[67] Poor governance at upper levels triggered both symbolic and physical violence on and from people who received few benefits of harvesting and reforestation. The authors concluded that a key requirement for sustainable community-managed forests is to expand benefit sharing to local people outside of the formal community forestry groups.

Initial steps to clarify governance at lower tiers can often be advanced through well-facilitated, informal processes that do not require official policy change. For example, a critical, challenging area of governance that could improve FLR outcomes relates to governance of Rohingya participation and livelihood options. Before national policies are put into place, considerable progress can be made in practice through effective consultation with stakeholders and refugee/host communities and the establishment of practical, informal governance mechanisms (non-legally binding agreements) to facilitate cooperation. For example, TNC launched funds across Latin America that provide financing for watersheds and reforestation, including funding support for community reforestation projects.[68] The

---

[63] J. Mayers, E. Morrison, and L. Rolington, "Improving governance of forest tenure: A practical guide." *Governance of Tenure* 2 (2013): 144.

[64] Robert J. Fisher, 2003. "Innovations, persistence and change: Reflections on the state of community forestry," Food and Agricultural Organization of the United Nations, published 2003, pp. 16–29.

[65] Jack Baynes, John Herbohn, Carl Smith, Robert Fisher, and David Bray, "Key Drivers Affecting the Success of Community Forestry in Developing Countries," *Global Environmental Change* 35, (2015): 226-238.

[66] "Equitable Benefit Sharing: Exploring Experiences and Lessons for REDD+ in Tanzania."

[67] "Power Relationships: Their Effect on the governance of community forestry in the Philippines."

[68] Alejandro Calvache, "Latin America: Creating water funds for people and nature. Water funds help to provide fresh water today & into the future," The Nature Conservancy, accessed June 26, 2019, https://www.nature.org/en-us/about-us/where-we-work/latin-america/stories-in-latin-america/water-funds-of-south-america/.

funds have been successful in large part due to early consultations between stakeholders that established informal governance agreements regarding strategies and plans for the funds prior to the formal implementation of policies. Similarly, in Bangladesh, this is the ideal time to bring key individuals to the table for initial discussions, as the need for increased livelihoods and environmental progress hold great urgency—but the time may not be right for considering and formalizing new national policies. Lessons can be learned from other experiences where practical, on-the-ground collaboration and progress laid the foundation for eventual shifts in policy.

To Improve Disaster Resilience and Nutrition Inside Camps:

5. Diversify species mix to emphasize fast growing native species well adapted to local conditions. We recommend drawing from EETWG technical guidelines and consulting further with local forestry and wildlife life experts to select a diversity of native species that are adapted to different soil and microclimatic conditions.[69] Planting a diversity of species will help to meet multiple objectives and provide greater resilience, since monocultures of trees are more susceptible to pest outbreaks. We strongly encourage the use of native species for plantings in and around camps when they are compatible with project objectives, since native species are generally better adapted to local conditions and may have a higher rate of establishment success, especially through cyclone conditions.

Incorporation of a diversity of native species should be emphasized for sustained success. Importantly, native species are well-adapted to the local growing conditions and climate, including resilience to heavy winds. Experience in other cyclone-prone regions has shown that some popular reforestation species (e.g. acacia, teak, mahogany) are highly susceptible to tree fall and death during the high winds of cyclones, while locally or regionally adapted species drop their leaves during high winds and regrown them afterwards, allowing them to survive cyclone impacts.70 Given settlement density within the camps, use of species vulnerable to cyclones also introduces a high tree fall injury or infrastructure damage risk that contradicts one of the purposes of restoration investments. Beyond the immediate benefits to camps, inclusion of native tree species (especially a few canopy species such as Dipterocarpus spp.) in plantings can also lay an early foundation for restoration if

---

[69] Three species lists were approved by the Bangladesh Forest Department for 2019 planting. The lists follow this recommendation and include only native species. Use of lists now needs to be enforced.

[70] John Herbohn, Nester Gregorio, et al., "Evidence-Based Best Practice Community-Based Forest Restoration in Biliran: Integrating Food Security and Livelihood Improvements into Watershed Rehabilitation in the Philippines," in *Enhancing Food Security Through Forest Landscape Restoration: Lessons from Burkina Faso, Brazil, Guatemala, Viet Nam, Ghana, Ethiopia and Philippines*, ed. C. Kumur, et al., 174-217.

and when Rohingya move to other locations or return to Myanmar.

Examples of native species for planting include Gamar (Gmelina arborea), Kadam (Neolamarckia cadamba), Champa (Michelia champaca), Shimul (Bombax ceiba), Chapalish (Artocarpus chaplasha), Jarul (Lagerstroemia speciosa), and Garjan (Dipterocarpus turbinatus). This list includes one species, Jarul, that is not on the EETWG list. Plantings in the camps can provide many benefits including disaster risk reduction (e.g. bank stabilization, avoided damage from tree fall s during storms), basic nutrition (e.g. fruits and vegetables), and health (e.g. reducing contaminated water runoff and shade cover to reduce heat stress). Meeting these varied goals will require using a mix of species rather than planting one or two species throughout the camps, which was initially the dominant practice.

There has been movement in the right direction in increasing diversity in plantings, but efforts must be consistent across all actors, and they must be sustained. The recent 2019 JRP, in line with the technical recommendations of the EETWG and government policies, presents specific plans for plantings within camps, including the intention to plant Jarul, Rattan, Kadam, Gamar, and Acacia species (Acacia auriculiformis, A. mangium), which will support land stabilization and lessen degradation. These are all native species, except Akashmoni (Acacia sp.), which has been shown to be resilient to cyclones and harsh conditions (including imbalanced nutrient soil) in other regions.

While improvements in species lists have been made, additional improvements in planting plans are needed. For example, FAO's plantation protocol for the camps recommends planting grasses one year prior to trees to increase soil stability. Our experience in reforestation elsewhere in the tropics shows that tree seedlings planted into well-established grasses will fail due to competition for resources. Instead, trees and grasses should be inter-planted simultaneously in order to avoid competition. Furthermore, while grasses and trees can be successfully interplanted, bamboo and tree interplanting often fails (due to more direct competition). Bamboo should be planted in a row at the top or bottom of a slope rather than interplanted with other tree species.

Whereas in some cases, exotic species may be appropriate to meet planting objectives, the Cox's Bazar region has a nursery stock of most recommended native species that can equally or better serve multiple restoration goals. Further development of the native species nursery sector will help scale up their use as part of reforestation and restoration efforts. While some native species are currently being produced, this range of species will need to be expanded following the recommendations of local forestry and wildlife experts. Importantly, sources of germplasm, including the identification of mother trees and in some cases

wildlings[71] need to be identified to increase the diversity of species available. In addition, training and capacity building will be required to improve nursery practices, especially when wildlings and hard to propagate species are being raised.

6. Explore a pilot project to plant native fruit trees that provides nutrition. Planting fruit trees in the camp may be an effective way to meet multiple objectives, including improved nutrition for Rohingya and bank stabilization. Some promising species to test include jackfruit (Artocarpus heterophyllus), Dhaki jam (Syzygium sp.), Amloki (Phyllanthis emblica), Guajava (Psidium guajava), mango (Mangifera indica), Dewa (Artocarpus lacucha), and coconut (Cocos nucifera). Local authorities could explore options that allow flexibility in the current policy prohibiting homestead fruit species inside the camps in order to support nutrition requirements for refugees without enabling encroachment. If a policy shift does not occur, planting more currently permitted fruit trees should be prioritized. This recommendation should be implemented in close consultation with the nutrition cluster.

Several native fruit species are permitted in camps now (e.g. Dhak jam, Amloki, Dewa), but several types of homestead fruit trees (e.g. mango, jackfruit, and coconut) are not permitted. Restrictions stem from concerns that presence of these trees could increase inequality and tensions within the camps and with host communities, create the perception that Rohingya are staying for a long period, and attract elephants to the camps. These concerns are not fully substantiated and could be mitigated, for example, by community-based orchards among Rohingya that create shared benefits and target the most vulnerable (see governance recommendations above). Careful placement within the camp could help reduce potential human-elephant conflict and use of border plantings of other species to deter elephants could be explored. Any policy shift should be accompanied by new programs to improve and expand fruit cultivation among host communities. Importantly, this policy change need not imply that Rohingya will remain in Cox's Bazar over the medium- or long-term. Rather, it could be a way of meeting the needs of Rohingya and host communities, while contributing to the overall restoration efforts that will benefit any longer-term plan, including after the Rohingya return. Any efforts to plant fruit trees in the camps should be developed through intensive engagement with stakeholders, carefully piloted, and rigorously tracked.

While the EETWG is working toward greater coordination and standardized practices, the proliferation of responders and differences in organizational capacity make it difficult to ensure compliance with protocols. Recommended improvements in coordination (recommendation 1) could help with this challenge. The current

[71] Wildlings are seedlings that have germinated naturally in forests and are often used in native tree nurseries when seed is not available, particularly for species such as Dipterocarps which fruit on very irregular occasions

planting guidance could benefit from further refinement and we suggest that local experts be quickly convened or consulted to create an improved species list that emphasizes fast growing, cyclone-tolerant, multi benefit native species and fruit trees. This list should be used as a basis to then select the most appropriate mix of native species tailored to meet specific project objectives. Exotic species should be included as part of the mix only when suitable native species cannot be identified to meet project objectives.

To Increase Ecological and Social Benefits Outside of Camps:

7. Adapt and apply the widely used social forestry model to generate greater livelihoods and environmental benefits. Valuable lessons can be learned from the various social forestry programs implemented to date in Bangladesh and elsewhere that can be applied and tailored to local conditions to provide livelihoods and incentives for sustained, improved FLR, and forest management.
Longer term solutions are also needed that address the broad extent of local community and refugee reliance on forest products (e.g. structure materials, livelihoods) and agricultural land. Agriculture is the second largest sector in Cox's Bazar, contributing 28.4 percent of local GDP (second only to services at 46.8 percent), and employing 32 percent of its residents.[72] FLR offers opportunities to balance land use among multiple objectives, including agriculture, forest products, and habitat restoration.

Social forestry is a type of forest management that has been used in Bangladesh to ensure economic, ecological and social benefits especially to the rural poor.[73] This approach has shown some success as for example, 40,387 ha of new forest cover can be attributed to social forestry activities from the early 1980s–2005. Between 2000–2004, social forestry generated $5.6 million for the government and $5.3 million for individuals engaged in social forestry programs.[74] This model will be scaled in the region through the planned SUFAL program; however, IOM and FAO have noted that afforestation programs that utilize social forestry will have low feasibility in the current context given the strict social forestry regulations that may not allow the inclusion of refugees. The social forestry regulations also have specific planting and thinning guidelines that allow limited flexibility, such as the stipulation that 2,500 trees be planted per hectare, 50 percent thinned after four years, 50

---

[72] While this information is dated, it is informative for understanding the broad composition of the Cox's Bazar economy. Deb, Uttam & Hoque, Zobdul & Khaled, Nafisa & Bairagi, Subir, "Growth, Income Inequality and Poverty Trends in Bangladesh: Implications for Development Strategy 1," (2018).
[73] F.U. Ahmed, "Social Forestry," in *Agricultural Research in Bangladesh in the 20th Century*, ed. M.A. Wadud Mian, F.M. Maniruzzaman, M.A. Sattar, M.A. Aziz Miah, S.K. Paul and K.R. Haque (Bangladesh Agricultural Research Council & Bangladesh Academy of Agriculture,2001), 407-415.
[74] Nur Muhammed, Masao Koike, Md. Sajjaduzzaman, and Kim Sophanarith, "Reckoning social forestry in Bangladesh: policy and plan versus implementation," *Forestry: An International Journal of Forest Research* 78, issue 4 (October 1 2005): 373–383, https://doi.org/10.1093/forestry/cpi045.

percent of the remaining after seven years, and all trees harvested after ten years.[75] Experimentation with allowed agroforestry models (including homestead agriculture/garden projects with mixed vegetation), benefit sharing agreements, harvest models, and other elements of traditional social forestry could bring more benefits to the area. For example, agroforestry trials in other regions of Bangladesh have shown that planting and maintenance of diverse species mixes can yield higher household income than traditional shifting cultivation,[76] and some aspects of multi-level and conservation agroforestry could be trialed through social forestry in Cox's Bazar. Adjustments could include diversifying the species mix (see below), and trialing different benefit sharing models that better incentivize host communities. These models should be developed and led in partnership by the GoB and the World Bank, in close consultation with IOM and other relevant stakeholders. It will be important to review past successes and failures in social forestry, in Bangladesh particularly and also elsewhere, and tailor the approach to local conditions.

8. Diversify species mix and improve local nurseries to emphasize native species (such as native Dipterocarp species) that support forest habitat and local livelihoods. Consult with local restoration and wildlife experts to develop reforestation systems that incorporate a mix of fast-growing species ideal for site capture and stabilization,[77] along with slower growing native canopy species that can set the trajectory for future forest recovery. Supporting the implementation of basic guidelines, such as seedling quality evaluations, and improving the quality of set-up for the nursery can quickly yield improvements that will support near and longer-term FLR objectives.

The forest and working landscape surrounding the camps are highly degraded and shrub dense. Many different reforestation techniques can be used as part of FLR initiatives in the Cox's Bazar area including mixed species plantings, assisted natural regeneration, and plantings designed to provide specific wood products such as timber and fuelwood. In all of these, we recommend the use of mostly native species. For instance, Rahman et al. (2014) has recommended a strategic selection of a mix of fast-growing species, and slower maturing native canopy species as part of mixed-species reforestation systems.[78] The use of fast-growing species with early canopy closure means that weeds and grasses are quickly shaded-out thus reducing the need for expensive ongoing site maintenance as well as reducing the risk of fires.

---

[75] "Assessment of fuel wood supply and demand in displacement settings and surrounding areas in Cox's Bazar District."

[76] S.A. Rahman, M.F. Rahman, and T.C.H. Sunderland, "Increasing Tree Cover in Degrading Landscapes: 'Integration' and 'Intensification' of Smallholder Forest Culture in the Alutilla Valley, Matiranga, Bangladesh," Springer, published in 2014, https://www.cifor.org/library/4237/.

[77] The EETWG has made efforts to towards incorporating a mix of fast-growing species for site capture and stabilization. 2019 plans include a more sophisticated system for promoting collaborative efforts of mixed vegetation and local species strategies.

[78] "Increasing Tree Cover in Degrading Landscapes: 'Integration' and 'Intensification' of Smallholder Forest Culture in the Alutilla Valley, Matiranga, Bangladesh."

Fast growing species can also help to quickly stabilize a site, avoiding damaging erosion that undermines forest growth and pollutes downsteam waterways. The use of native species with fruit that is attractive to birds can help in the recruitment of additional native species from surrounding forest areas.

Emphasis should be placed on native Dipterocarp species (e.g. *Dipterocarpus turbinatus, Dipterocarpus alatus, Dipterocarpus scaber)* several of which are commonly used in plantation forestry, and which could contribute to larger landscape scale forest habitat.[79] Among other native species, *Dipterocarpus turbniatus* is included in the EETWG technical guidelines, but the other two subspecies are not.[80] Both native fast growing species and native canopy species can also aid in carbon sequestration, as reforestation has been shown to have carbon offsetting effects.[81] These should be species that are tolerant of local soil and microclimatic conditions (e.g. high winds). Additional improvements in local nurseries would further advance this type of approach. Unlike many other contexts, Bangladesh has a strong system of nurseries and supply of various species, including natives.[82] Supporting the implementation of basic guidelines, such as seedling quality evaluations (e.g. examining stem and root form at the time of outplanting) and improving the quality of set-up for the nursery (e.g. ensuring a hardening bed that is elevated), can quickly yield improvements that will support near and longer-term FLR objectives.[83] For example, even native species that are cyclone-tolerant will not withstand high winds if their initial root system is not cultivated well in the nursery, leading to high windfall risk after outplanting. Guidance for cost-effective nursery improvements exist and should be applied to ongoing activities in Cox's Bazar.[84]

9. Develop short-term livelihoods activities that can improve environmental outcomes. Near-term needs for fuelwood and native seedling supplies could be addressed through new livelihood programs with host communities (and Rohingya, if cash-for-work policies shift). Under close supervision of the Bangladesh Forest Department, this two-part program would (1) support nursery business development, and (2) provide incentives to selectively remove woody invasive species and replant native seedlings in buffer areas around the Teknaf Wildlife Sanctuary, Himchari National Park, and Inani National Park. Harvested invasive woody weeds could be used for fuelwood, and replanted native species would

---

[79] Mohammed S. Uddin, and Mohammed A.S.A. Khan, "Comparing the impacts of local people and Rohingya refugees on Teknaf Game Reserve," in *Making Conservation Work*, ed. Fox J, Bushley BR, Dutt S, and Quazi SA. (East-West Center and Nishorgo Program of Bengladesh Forest Department, 2007).

[80] As with recommendation 5, we also suggest considering Jarul, which is not included in the EETWG guidelines, for out-of-camp planting.

[81] Man Yong Shin, et al. "Potential Contribution of the Forestry Sector in Bangladesh to Carbon Sequestration," *Journal of Environmental Management* 82, no. 2 (2007): 260–276, doi:10.1016/j.jenvman.2005.12.025.

[82] According to the EETWG, there were 16 nurseries in 2018, with two nursery associations formed in 2019, and more in process.

[83] Aciar Watershed, "Assessing the Nursery and Seedling for Nursery Accreditation." (via John)

[84] "Assessing the Nursery and Seedling for Nursery Accreditation."

contribute to reforestation and possible social forestry initiatives. The proposal would be designed so it is consistent with the current Bangladesh Forest Department policies. This recommendation is especially important for agencies and NGOs that are prioritizing livelihood efforts and women's empowerment.
As discussed above, the demand for fuelwood vastly outweighs its existing supply, and projections show that if the current rate of deforestation continues, the fuelwood supply will be gone by 2019.[85] Any species that are planted from this time onward, both in or out of camps, will take at least four years to yield substantive fuelwood for harvest and the scale-up of LPG programs will take significant time.[86] In combination, these factors will lead to a gap in fuel supply for refugee and local communities. In order to generate some near-term supply, a social forestry (see Recommendation 7) or other model could be developed and tailored to the specific needs of communities outside of the camps.

The shrub-dense forest lands dominant in Cox's Bazar are species poor, and not representative of native forest communities. The dominance of aggressive invasive and early-successional shrubs can inhibit the establishment of native trees[87]. A stop-gap pilot project could improve the near-term fuelwood supply and improve environmental integrity of the buffer areas surrounding the Teknaf Wildlife Sanctuary, Himchari National Park, and Inani National Park by employing host community members to remove woody weeds and replace these with seedlings of native species. This pilot would intentionally harvest species from forest areas that have not been affected substantially by the population influx, thereby transferring harvest pressure relatively locally. Currently, fuelwood is shipped in, but this program could provide more local sources. Relying on a well-managed shift in harvesting within regional forest has benefits, readying the forest for SUFAL investment (discussed below), providing local employed, and reducing shipping needs. Studies suggest that community-managed Protected Areas can have better outcomes than strict conservation areas,[88] and this kind of program could deliver improved protected area outcomes. Communities in nearby regions of Bangladesh harvest invasive woody weeds for fuelwood use, suggesting there would be demand for such a program.[89]Harvested woody weed fuelwood could be sold as a stop-gap

---

[85] "A Precarious Environment for the Rohingya Refugees."
[86] "Assessment of fuel wood supply and demand in displacement settings and surrounding areas in Cox's Bazaar District, Dhaka, Bangladesh."
[87] Lindsey M. Wieland, Rita C.G. Mesquita, Paulo E.D. Bobrowiec, Tony V. Bentos, and G. Bruce Williamson, "Seed rain and advance regeneration in secondary succession in the Brazilian Amazon," *Tropical Conservation Science* 4 (2011): 300-316; R.A. Zahawi, and C.K. Augspurger, "Early plant succession in abandoned pastures in Ecuador," *Biotropica* 31 (1999): 540-552.
[88] Luciana Porter-Bolland et al, "Community Managed Forests and Forest Protected Areas – An Assessment of Their Conservation Effectiveness Across the Tropics," *Forest Ecology* 268 (2012): 6-17.
[89] Sharif Ahmed Mukul, Mohammad Belal Uddin, and Mashiur Rahman Tito, "Study on the status and various uses if invasive alien plan species in and around Satchari national park, Sylhet, Bangladesh." *Tiger Paper* 33, no. 4 (2006).

fuel supply while LPG programs scale up.

Incentivizing replanting in buffer or park areas with native species could provide additional livelihoods and further improve forest health and benefits. A local study of the Teknaf Game Reserve in 2006 identified many desirable native species in low abundance that could be increased through a targeted planting program (e.g. elia garjan (*Dipterocarpus turbinatus*), jam (*Syzygium* spp), dhuila garjan (*Diptercarpus alatus*), koroi (*Albizia lebbeck*), gamar (*Gmelina arborea*), chapalish (*Artocarpus chaplasha*), bahera (*Terminalia beleric*) and others).[90] The seedlings used for replanting in such a program could be sourced from nurseries run by the host communities under the guidance of BFD experts. Good practices could be ensured through a nursery accreditation system and could be tailored to be consistent with the current BFD policies. In the future, it may also be possible to engage Rohingya in these activities to support their livelihoods and facilitate positive social interaction between Rohingya and hosts. This kind of program would increase the supply of fuel, improve forest health, and ready the land for Sustainable Forests and Livelihoods Project (SUFAL). SUFAL is a $175 million program to finance tree planting in 79,000 hectares of forest across Bangladesh, while also enhancing livelihoods for 40,000 households through income generation efforts and improving climate resilience. Cox's Bazar is one of SUFAL's program areas, and selective removal and planting activities could help ready the region for SUFAL investments while generating diverse income streams and improving forest condition at the landscape scale.

10. Substantially increase the scale of FLR investments to realize potential benefits for carbon and economic development in Cox's Bazar, including by exploring payment for ecosystem services. Bangladesh's REDD+ readiness and the current plans for FLR need to improve and expand to realize potential carbon benefits and livelihood contributions for Cox's Bazar. Multiple financing mechanisms beyond humanitarian aid could catalyze the necessary scale of effort.

Well-managed FLR can provide benefits for local livelihoods and economic development (discussed above), as well as contribute to climate goals. Forest protection and restoration pathways hold some of the highest potential of all-natural systems for drawing down and storing greenhouse gasses.[91] Well-managed production forests and well protected and maintained natural forests can contribute to climate gains while also providing sustainable revenue streams (e.g. commercial timber harvest, local timber harvest and product development, ecotourism in natural forests). There is room for growth in sustainable forestry in Bangladesh, with one estimate finding that sustainable forestry accounts for only 4 percent of direct

[90] "Comparing the impacts of local people and Rohingya refugees on Teknaf Game Reserve."
[91] Bronson W. Griscom, et al. "Natural Climate Solutions," *Proceedings of the National Academy of Sciences* 114, no. 44 (2017): 11645–11650., doi:10.1073/pnas.1710465114.

forestry jobs.[92] While trade-offs and difficult decisions about land use are inevitable, aligning priorities in the Cox's Bazar region offers opportunities to improve conditions of degraded forests and advance progress toward multiple goals, such as reducing soil erosion, protecting water sources, and adapting to and mitigating climate change.

While Bangladesh does not emit large amounts of carbon, it is one of the countries most affected by climate change and also holds potential resources to mitigate it.[93] The country has made significant commitments to climate action, including committing to restore 750,000 hectares of degraded forest by 2020 under the Bonn Challenge and signing the Paris agreement to mitigate and adapt to climate change. The Bangladesh Forestry Master Plan (2017-2036) identifies 300,000 hectares of land in urgent need of reforestation and restoration, highlights the importance of forest restoration that also enhances local livelihoods, and calls for the creation of a mechanism to help the country benefit from climate change funds (such as funds for REDD+). In addition, the Bangladesh Delta Plan focuses on forests and biodiversity as key to sustainable development in the delta region.[94] Cox's Bazar region is one of the priority areas of the Delta Plan 2100 and enhancing forest conditions of this region will ultimately contribute to the Plan's long-term goals and objective.

Using a highly simplified method and the Bangladesh Forestry Department estimate of forest carbon storage in the Teknaf area (43.08 tonnes C ha^{-1} yr^{-1}),[95] an estimated 98,350 tonnes C ha^{-1} yr^{-1} have been lost to direct forest clearing for the camps, and additional losses due to forest degradation from fuelwood collection remain unquantified.[96] Currently planned restoration efforts (including restoration, reforestation and rehabilitation) by FAO aim to improve 10,420 ha of land, providing a maximum carbon benefit of 448,900 tonnes C ha^{-1} yr^{-1}. Additional benefits could be gained through larger scale restoration activities that could, at a minimum, improve forest conditions and associated carbon storage on the additional ~10,000 ha in existing protected (but degraded) forest land in the Inani Protected Area (~7,700 ha) and Himchari National Park (~1,729 ha). These advances are small relative to Bangladesh's national commitment to restore 750,000 ha of forest by 2020, and further benefits could be gained by forest planting and improvement activities outside park areas across Cox's Bazar and beyond.

The international community should seize the opportunity to recognize the global public good Bangladesh is providing by hosting Rohingya refugees and to protect

---

[92] "Estimating Green Jobs in Bangladesh: A GHK Report for the ILO," ICF, published June 2010, 25, http://www.greengrowthknowledge.org/sites/default/files/downloads/resource/Estimating_Green_Jobs_in_Bangladesh_ILO.pdf.

[93] "Climate Resilient Participatory Afforestation and Restoration Project," Bangladesh Forest Department, published December 2016, http://pubdocs.worldbank.org/en/848671521827530395/FMP-Full-report-final.pdf.

[94] http://www.bangladeshdeltaplan2100.org/.

[95] S.M. Labib, N. Hossain, and S.H. Patwary, "Environmental Cost of Refugee Crisis: Case Study of Kutupalong-Balukhali Rohingya Camp Site A Remote Sensing Approach," *GIScience Research UK* (2018).

[96] FAO is working with a Bangladesh Forest Inventory project to confirm these rough calculations.

and enhance other global public goods, including its forests and their contribution to climate mitigation. Humanitarian funding is unsustainable and will decline substantially over the years as global attention shifts to the next crisis. Now is the time to conduct the coordinated planning necessary to harness new public and private resources that can sustainably meet environment and development goals in Cox's Bazar.

International partners and the GOB should pursue discussions about additional financing opportunities for FLR and related activities in Cox's Bazar. This goal is not only to meet the needs of refugees and hosts and mitigate the impact of the Rohingya influx, but to also create sustainable and inclusive growth opportunities that are critical to meet local development goals and improve social cohesion. While most of the potential funding sources do not have special provisions for responding to displacement effects, we believe the case for additional need would be strong, especially given the prominence the GOB, donors, and other stakeholders have placed on addressing host community priorities. Implementing some of the recommendations above, in particular stronger coordination, creation of a landscape-scale plan for FLR that takes into account other sectors and use of improved indicators would assist in mobilizing resources. In addition, policy changes, in particular the ability to include some Rohingya refugees in programming, may also increase the ability to secure funds.

Areas to explore include:

- **Climate change and environment:** As noted in Bangladesh's National Forestry Policy (2016), Bangladesh is focusing on creating the enabling conditions to access climate change funds, including those for REDD+.[97] REDD+ programs that reduce emissions from deforestation and enhance carbon stocks can also be a simultaneous livelihoods opportunity and conservation effort. Like other benefit sharing models, there will need to be a formal system of governance to ensure the benefits are shared and not monopolized, particularly to ensure the most vulnerable also share in resource outputs and incomes. REDD+ focuses on the carbon sequestration services that are provided by forests and hence potential funding sources include the Green Climate Fund and Forest Carbon Partnership Facility.[98] PES programs can also provide funding for benefits

[97] Bangladesh was recently awarded Green Climate Fund programs, including the Climate-Resilient Infrastructure Mainstreaming project, with 10.5 million anticipated beneficiaries. https://www.greenclimate.fund/projects/fp004. Bangladesh has also received Green Climate Fund support for the Global Clean Cooking Program, with 2.9 million anticipated beneficiaries. https://www.greenclimate.fund/projects/fp070.

[98] A national or jurisdictional REDD+ program could also be implemented. These are typically arranged with large forest countries (such as Guyana and Indonesia) and could likely be adapted to Bangladesh. Seymour, Frances and Jonah Busch, "Why Forests? Why Now?" Center for Global Development, 2017, https://www.amazon.com/Why-Forests-Now-Economics-Politics/dp/1933286857.

beyond carbon such as slope and soil stabilization, sea level rise reduction, water quality improvement, or agricultural benefits (e.g. pollination, natural pest control),[99] [100] and may receive funding from public or private sources interested in these benefits. The World Bank can also be an additional source in the future, especially to build on the SUFAL program, a portion of which is directed to better meet climate and livelihoods goals in Cox's Bazar.

- **Agriculture, fisheries, and forestry, including related manufacturing:** Given the reliance of Cox's Bazar residents on agriculture, fisheries and forests for their livelihoods, investments in agroforestry and forestry can contribute to overall economic development if planned and managed well. Investments aimed at rural livelihood development could be directed to include FLR as part of an integrated landscape scale plan as recommended above. Potential areas for exploration include sustainable agroforestry with betel leaf and betel nut and sustainable production of forest resources, including timber wood, honey, and rubber. In addition to domestic markets, there may be opportunities for growth in exports, especially as processing and manufacturing related to these goods develop further. Fisheries-related opportunities could include mangrove forest improvements as part of FLR in the region (albeit not in the camps) that could improve sustainable harvests of fish, shrimp, and crab. FLR within and around the camps that is successful in reducing erosion will improve water quality of rivers draining into estuaries which will benefit fisheries production particularly through improved fish nursery areas. A range of multilateral and bilateral donors invest in agriculture, fisheries, and forestry in Bangladesh—including the World Bank, USAID, DFID, and DFAT—and could be engaged to scale and/or invest in such efforts in Cox's Bazar. Development finance institutions, such as UK's CDC and the WB's IFC, could offer risk mitigation tools (e.g. insurance, first loss capital) to help attract private investment.

- **Tourism:** With its beautiful and long sea beach, Cox's Bazar has the potential to grow as a tourist destination. It is important to coordinate tourism development and FLR plans so that new construction does not create additional pressure for deforestation or divert water resources. There may also be an opportunity for FLR to support tourism development through ecotourism (including educating and engaging visitors on the forest landscape restoration efforts in the context of a refugee crisis) and stays on working farms or fruit plantations. A suitability analysis for additional

[99] "Payments for ecosystem services," UNDP, https://www.sdfinance.undp.org/content/sdfinance/en/home/solutions/payments-for-ecosystem-services/.
[100] Seema Jayachandran, et al. "Cash for Carbon: A Randomized Controlled Trial of Payments for Ecosystem Services to Reduce Deforestation," *Science* 357, issue 6348 (2016): 267-273, doi:10.3386/w22378.

tourism development sites on the Teknaf Peninsula has been done,[101] but there has been no systematic evaluation of the additional income generating potential of tourism in the region. Already a top destination for Bangladeshi tourists, and with the refugee influx, there is a large group of international aid workers and visitors who may help drive additional demand in the near term. An important next step would be a rigorous evaluation of the real potential for tourism growth given the various opportunities and constraints in the region. Such an analysis would strengthen opportunities to secure funding from bilateral and multilateral donors, development finance institutions and private investors.

Conclusion

We make ten recommendations for forest landscape restoration in Cox's Bazar as a means to substantially reduce resource constraints and improve conditions for both the Rohingya refugees and their host communities. These recommendations fall under four main areas: improving the efficiency and scale impact of reforestation investments; improving seedling survival and benefits inside and outside camps; improving disaster resilience and nutrition inside camps; and increasing social and environmental benefits outside camps.

The coming months will be critical for coordinating FLR actors that can begin to implement the ten recommendations discussed above. As new strategies and plans become actionable, FLR policy makers and implementers must prioritize efficiency and effectiveness in programs. A significant amount of funding has already been spent in the short-term to address rapid deforestation, but donor fatigue for the humanitarian response is likely and the potential to secure more FLR funding in the medium and long-term will be much higher if the current financing is well allocated and leads to successful restoration. If, on the other hand, the current funding does not exhibit clear progress towards development, environment, and climate goals and targets, initial investments will have been wasted and it is less likely that projects in the region will receive support in the longer term. Some existing environmental investments are not well positioned for success, and the continuation of activities that do not align with the actions recommended in this paper could potentially hinder near term benefits and long-term environmental efforts, both in and out of camps. Strategies and investments in FLR hold the potential to either negatively or positively impact the health and livelihoods of over a million Rohingya and hosts, depending on their effectiveness. Regardless of the Rohingyas length of stay in the Cox's Bazar region, Bangladesh will face FLR challenges for years to come, and the time is now to agree upon and implement shared strategies for long-term improvements. Assessments that utilize rigorous and evidence-based methodologies to track progress towards targets and goals should be designed at the onset of projects and programs, and data should be shared publicly by the GOB, funders, UN agencies, and other actors. The recommendations we

[101] K.M. Ullah, and R. Hafiz,"Finding suitable locations for ecotourism development in Cox's Bazar using geographical information system and analytical hierarchy process," *Geocarto International* 29, 3 (2014): 256-267.

offer above are designed to lay the groundwork for securing funding for successful long-term and large-scale FLR efforts in the region.

Appendix

Consultations and Meetings

Consultations with key stakeholders were held throughout the scoping, research, and writing process of this paper. CGD, TNC, and BRAC held a workshop in Cox's Bazar, Bangladesh in September 2018 with approximately 50 individuals from relevant UN agencies, I/NGOs, and governments. Environmental experts (acknowledged above) contributed to the workshop and provided feedback on multiple drafts of the paper from November 2018–June 2019. CGD completed two missions to Bangladesh (September 2018 and March 2019) which included meetings with EETWG leadership and field visits to gather information on environmental activities in the camps.