

Environmental impact of Shelter/NFI in a protracted crisis





The Rohingya crisis enters its fifth year.

899,239 refugees are living in 33 camps located in a hilly terrain.



Shelters are exposed to cyclic monsoons and face risk of floods, landslides, fire and cyclones.





Temporary materials such as bamboo and tarpaulin have a limited capacity to resist weather impacts, and thus require regular repairs and replacement. Use of limited number of materials have an impact on the environment.

Mitigation



Betterment



Do no harm



Mitigation



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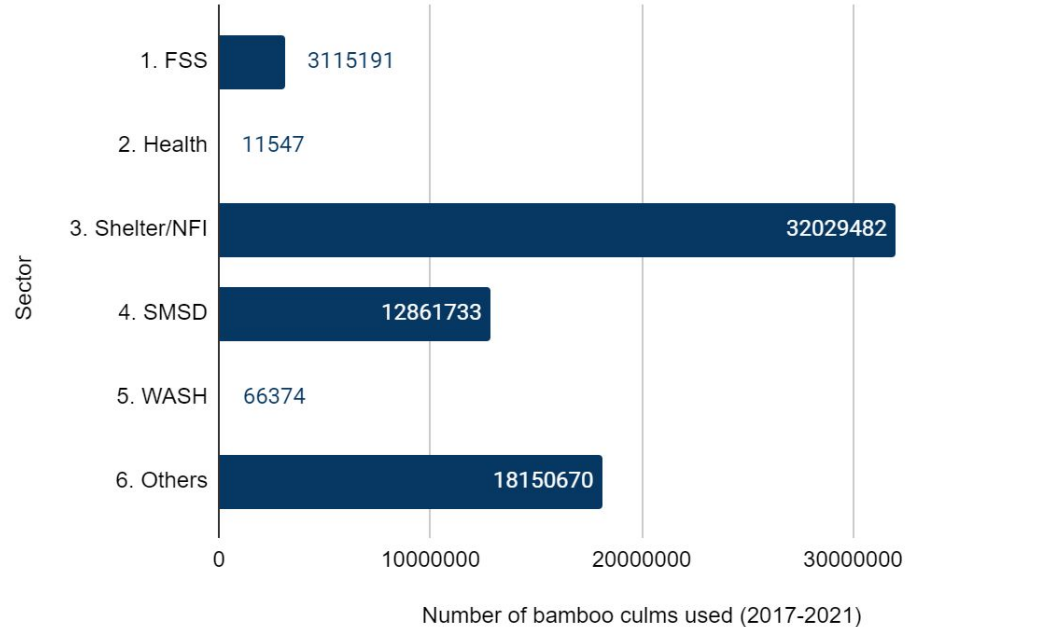


Do no harm



BAMBOO

Species and numbers of Bamboo used by different sectors in the Rohingya Camps starting from 2017 up to December 2021



Source: Energy and Environment WG, Cox's Bazar, 2022.

BAMBOO

Annual Demand for bamboo in Rohingya Refugee Camps

Source	Total (Nos.)
NGOs/iNGOs /UN	15,016,027
Self-sourced by the Rohingya families	4,489,973
Grand Total	19,506,000 (19.5 M)

Source: Energy and Environment WG, Cox's Bazar, 2022.



Source: UNHCR, Cox's Bazar, 2022



BAMBOO

- Bamboo, in its natural state, is not a durable material. It is easily attacked by insects and fungi due to the presence of starch and sugar in the culms.
- With the increasing demand, traditional harvesting knowledge and practices are lost
- Preservation treatment is essential to enhance durability of culms during storage and of finished products.

Mitigation – efforts to reduce impact on the environment

Bamboo treatment

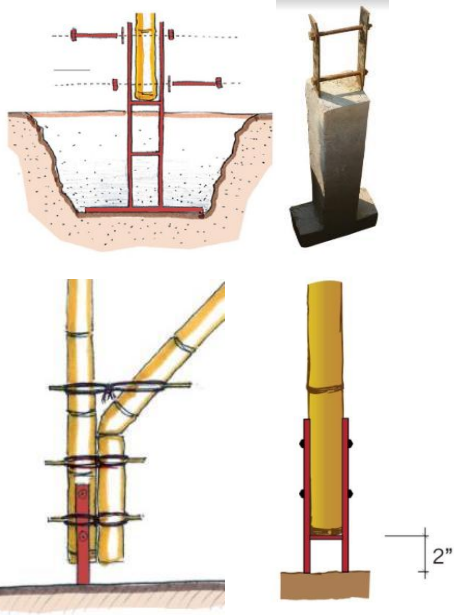
- 5 Bamboo Treatment Facilities run by UN, INGO, NGO
- 2 Bamboo Treatment Facilities run by the local vendor
- Total capacity for treatment: 1,200,000 bamboo culms per year
- Used chemical solution: Borax and Boric Acid
- Time of culms immersion- 7-14 days
- Treatment can extend bamboo lifespan for 3-5 years



Source: IOM, Cox's Bazar

Mitigation – efforts to reduce impact on the environment

Isolation of bamboo from the ground

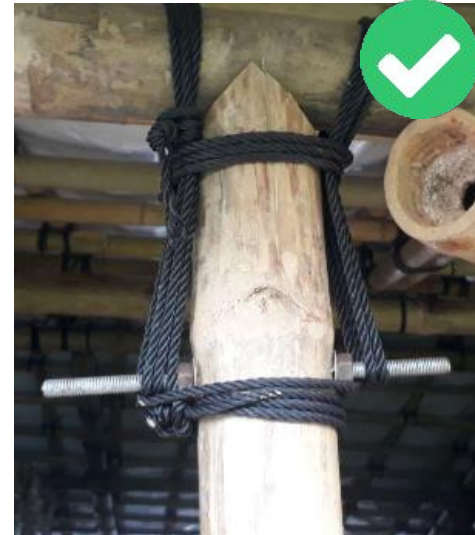


Source: SNFI Sector

Use of metal/RCC footing for bamboo posts **improves longevity** of bamboo and therefore reduce impact on Bangladeshi bamboo reserves.

- The footing is used to provide proper support for the structure, to make the post strong enough to resist wind pressure
- Footing isolates the bamboo posts from the ground, so bamboo is less affected by water and infestation
- It can also be uninstalled easily if it needs to be changed

Mitigation – efforts to reduce impact on the environment



BAMBOO CONNECTIONS

- Open holes in bamboo allow moisture to get inside the bamboo, increasing risk of deterioration and infestation.
- Similarly, rope absorbs moisture and when looped through holes in the bamboo introduces moisture inside the bamboo.
- Use of metal allow for tightening of joints and are more durable than dowels.

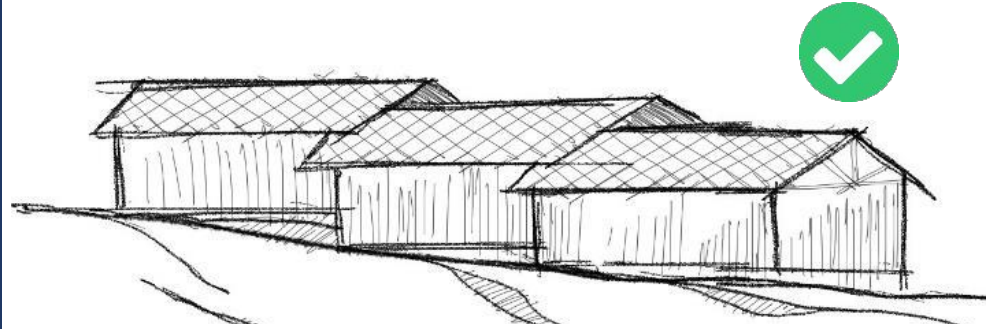
Mitigation – efforts to reduce impact on the environment

Design solutions



The most external material deteriorates first.

- Use tarpaulin on the inside and bamboo mat on the outside.
- Add tarpaulin or other waterproof materials to the lower part of the wall on the outside to prevent seepage of water inside the shelter. Bamboo garenja on top of tarpaulin



Site planning for appropriate orientation of shelters

Mitigation – efforts to reduce impact on the environment

Alternative materials



Source: SNFI Sector



Source: SNFI Sector



Source: CRS/Caritas

Left: Double storey steel-framed structure; earth shelter; Jutin shelter

Source: SNFI Sector

Alternative materials

- Double storey steel-framed shelters - more durable and reducing bamboo dependence; approvals on hold
- Earth shelters (existing in the camps) - limitation of sourcing earth and providing repair packages
- Jutin sheet - Jute compressed with resin; pilots and research ongoing

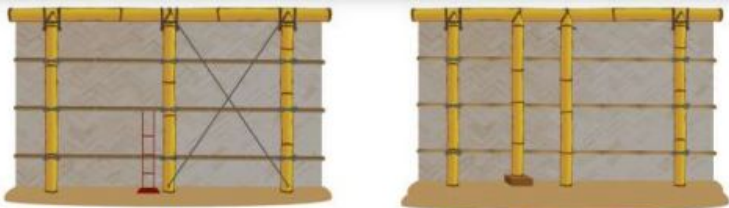
Mitigation – efforts to reduce impact on the environment

Community engagement, local knowledge



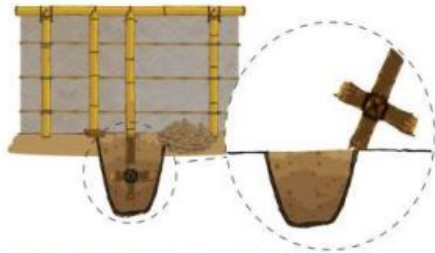
Source: SNFI Sector

- Capacity building
- Use of local knowledge
- IEC



၁။ တိုင်တစ်ချင်းစီဖယ်ရှားပါ။
ခြေကုပ်ကိုတိုင်ဘေးတွင်ထားပါ။
တူးရန် ခန့်မှန်းခြေနေရာကိုမှတ်သားထားပါ။

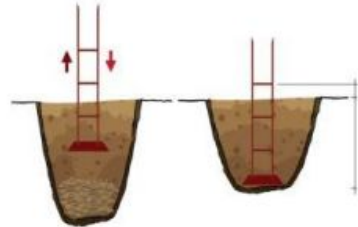
၂။ ဖယ်ရှားရမည့် တိုင်၏ဘေးတွင်
အထောက်အပံ့ဝါးတိုင်တစ်ချောင်းကိုထားပါ။
အထောက်အပံ့ဝါးတိုင်အားပျိုကြိုသော အောက်ခြေ
ကိုပေးပါ။ ချပ်တန်းများရှိပါက ဖယ်ရှားပါ။



၃။ တိုင်ပတ်လည်တွင် အဆောက်အအုံ၏ အတွင်းနှင့်
အပြင်ဘက်တို့မှ တွင်းတူးပါ။အထောက်အပံ့ဝါးတိုင်ကို
သေချာအောင် ပြုလုပ်ကာတိုင်ကိုမသိမသာဖယ်ရှားပါ။



၄။ အနက် မည်မျှ တူးရန် သိရှိနိုင်ရန်အတွက်
အောက်ခြေအဆင့် (plinth level) တွင် ကြိုးဖြင့်
မျဉ်းကြောင်း ဆွဲပါ။ တွင်းအောက်ခြေမှ plinth level
အထိအနက်သည် (၂)ပေ(၆)လက်မ ရှိရမည်။
လိုချင်သောတွင်းအနက် ရောက်သည်အထိ
အတွင်းနှင့်အပြင်ဘက်တို့မှ ဆက်တူးပါ။



၅။ တွင်းအောက်ခြေကိုကျစ်လျစ်သိပ်သည်းမှုရှိစေရန် ပြုလုပ်ပါ။
ဝါးတိုင်ထိုင်မည့် နေရာနှင့် အောက်ခြေ (plinth) အကြား
(၂) လက်မကွာစေရန် သေချာအောင် ပြုလုပ်ပါ။



၆။ ခြေကုပ် (footing) ကိုတပ်ဆင်ပါ။ နံရံ၏
အလယ်လိုင်းမှ ချိန်သံဖြင့် ဖြောင့်တန်းမှုရှိ/မရှိ
စစ်ဆေးပါ။

Mitigation



Betterment



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NATURE BASED SOLUTIONS

- Rohingya Refugees camps are situated in hilly areas and some locations need to be reinforced to avoid landslides.
- Plantations as slope stabilization
- It provides small garden space for vegetables
- Watershed management projects: Reduce disaster risks and pollution by improving water flow, manage solid waste and introduce nature-based solutions
- Create a riparian vegetation, increase tree density and biodiversity in the watershed
- Improve social cohesion between refugees and host communities



LPG



- Provision of LPG ensures access to sustainable cleaner cooking energy for Rohingya refugees.
- This solution is essential to mitigate protection risks associated with food security and nutrition, sexual and gender-based violence (SGBV) (women and children going alone collecting wood), health (air quality), environmental degradation and climate change.
- It is also a solution to reduce tensions between refugees and host communities over common natural resources.



Mitigation



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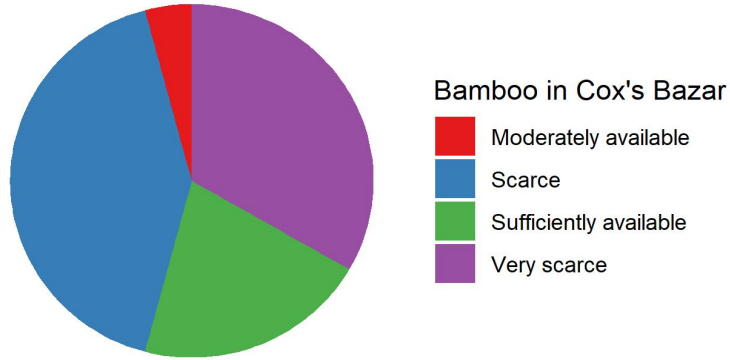


Do no harm

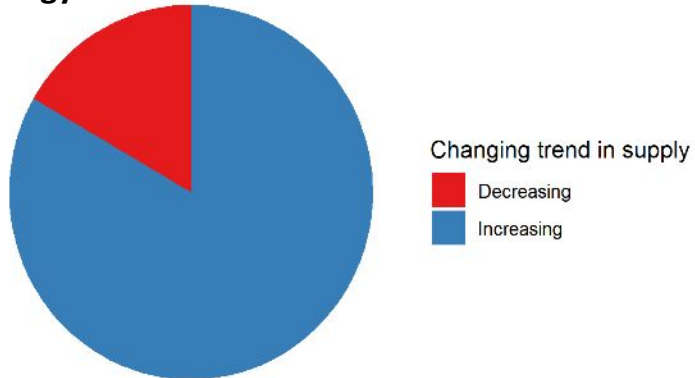


DO NO HARM

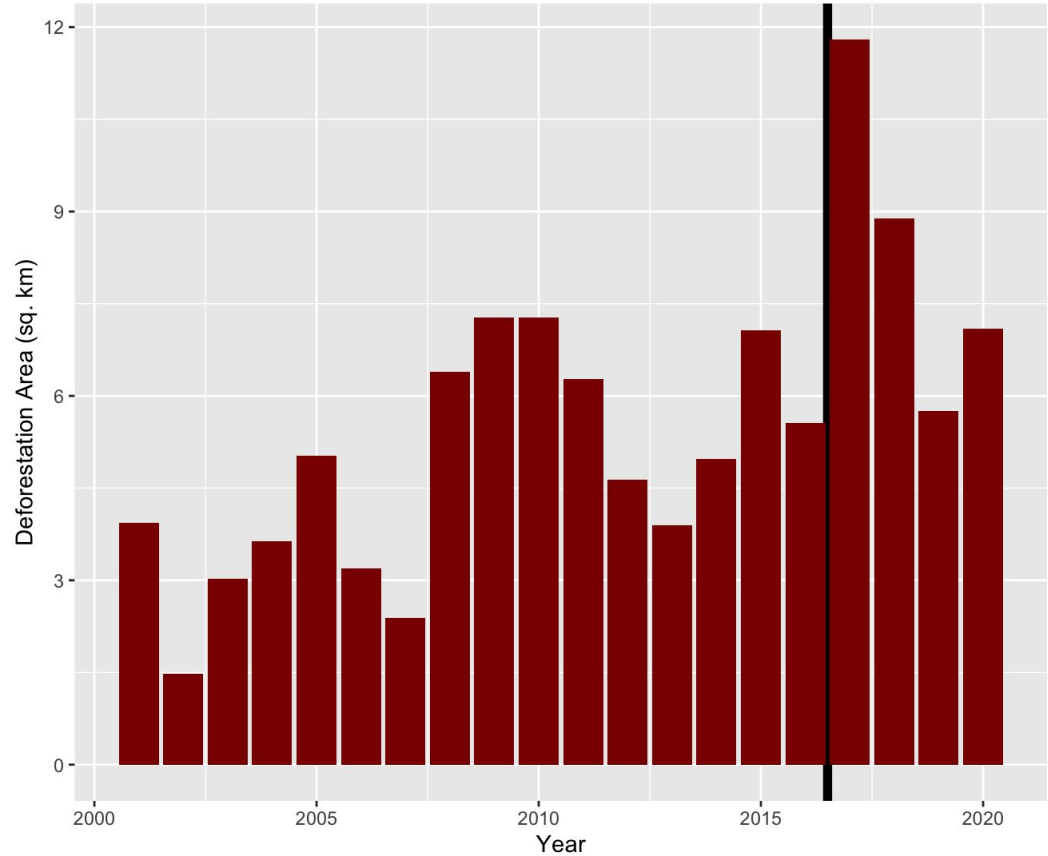
Supplier's perceived stock of bamboo in Cox's Bazar



Change in the demand of bamboo due to the Rohingya influx



Deforestation in Cox's Bazar District



LONGER TERM IMPACT:

Bamboo treatment, proper design and site planning could reduce frequency of bamboo replacement from every year to every 5 years or longer.

Distribution of clean cooking energy is estimated to prevent extraction of over 533,000 tonnes per year of firewood from the mixed hilly forest area in Cox's Bazar

Use of LPG for cooking reduces firewood demand by 50 percent in the host community and 80 percent in the camps.

- Design and site planning
- Bamboo treatment
- Alternative solutions/materials
- Nature Based Solutions
- Cleaner energy
- Waste management
- Upcycling
- Community engagement



How to ensure environmentally sustainable measures with reduced funding?

How to convince the government to approve and upscale those solutions?

How to involve the community for longer term sustainability ?