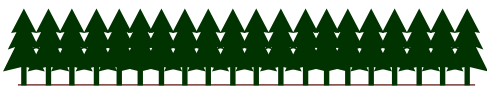


UNIFORM SHELTERWOOD

SYSTEM OVERVIEW

Shelterwood is a system of harvesting a stand of trees or a patch of forest which involve a series of 3 to 4 cuttings to promote establishment natural regeneration. The spaces opened from tree cutting allow seedlings to grow under the shade of remaining trees called shelter trees – hence the name of the system. Shelterwood creates a stand with two-age classes and a possibly a mix of shade tolerant and intolerant species. Shelterwood system has four main types namely: *uniform, group, strip and irregular*. This guide presents the experience of EnLiFT project in implementing a uniform shelterwood system in pine plantations managed by community forest users' group in the

Schematic Stand Diagram



PRE-TIMBER HARVESTING. Trees are even age and dominated by a single tree species. No significant regeneration, ground cover primarily low value grasses, e.g. *Eupatorium*.



2 YEARS AFTER TIMBER HARVESTING. Small seedlings of pine and broadleaf emerge at very high density from the grasses and weeds.



3-4 YEARS AFTER TIMBER HARVESTING. Seedling heights had differentiated indicating the need for regeneration thinning.



6-8 YEARS AFTER TIMBER HARVESTING. Saplings of mixed pine and broadleaf have captured the site seedlings. At this time, harvesting of shelter trees can be done.



STAND AFTER FINAL CUT. A stand of mixed pine and broadleaf forest is developed on the previously pure pine site. If Shelter trees are not cut, the stand will have two age classes.

Best Practice Guide

1 MEASURE AND MARK TREES. Measure trees and obtain tree cutting approval from DFO. Mark trees to be harvested following SFM guideline. Then, mark shelter trees, which are regularly spaced of about 15m – 20m, with yellow or white paint.



2 ESTABLISHMENT CUT AND PREPARE THE GROUND FOR REGENERATION. Cut trees marked for harvest, then clear forest residues to prepare the ground for regeneration and reduce fire risk. Slash bushes and grasses close to the ground.



3 REGENERATION THINNING. Thin seedlings 2 years after tree cutting. The spacing of seedlings after thinning was about 3m x 3m, comprised of both pine and broadleaf seedlings.



UNIFORM SHELTERWOOD

EXAMPLES OF PRACTICE

The Government of Nepal introduced the Scientific Forest Management (SFM) Guideline in 2015 which promoted the Shelterwood System as a regeneration system for community forests all throughout Nepal. This has provided the EnLiFT Project a legal basis for establishing silviculture systems demonstration in four community forests.

The SFM Guideline 2015 recommended retention of 15-25 shelter trees per hectare, however during consultation with EnLiFT collaborating CFUGs, this number of shelter trees is perceived to be too low, and almost clearcutting system by members of the FUG. Instead, the FUG members recommended retention of 50 shelter trees per hectare to provide shelter and as mother trees. In addition, preparatory cut was deemed unnecessary hence the establishment or seed cut was implemented as initial cut. Nonetheless, The Shelterwood System demonstration in EnLiFT sites provided learning opportunities for government foresters, forest users, FECOFUN, and non-government organisations which was at the time considered a novel system in mid-hills Pine plantations.

The table below is stand profile of the shelterwood demonstration plots. Chapani and Deupokhari represented mature unharvested even age Pine stand with tree density of 362 trees per hectare (tph) (basal area of 28 m²/ha) and 272 tph (basal area of 27m²/ha), respectively. Shree Chap and Sansari had a 4-D harvest few years prior thus showing two stand strata – Pine in the dominant stratum and Schima in the intermediate stratum. Shelterwood resulted to harvesting of 76-92% of standing stem volume or about 228 m³ to 411 m³ per ha. In Chapani, seedling inventory at 2 years after the first cutting resulted to a seedling density of 123,929 seedlings per hectare (sph). Chapani showed the highest regeneration among sites indicating that *P. patula* respond well to shelterwood system than *P. roxburghii* and *P. wallichiana*.

Table 1. Stand profile of community forests’ shelterwood demonstration plot

CFUG Name	Chapani	Shree Chap	Sansari	Deupokhari
Plot size (ha)	0.42	1	1	1
1st Cutting Year	2015	2021	2021	2021
Main species	<i>P. patula</i>	<i>P. roxburghii</i>	<i>P. roxburghii</i>	<i>P. wallichiana</i>
Stand strata	Dominant (Pine)	Dominant (Pine), Intermediate (Broadleaf)	Dominant (Pine), Intermediate (Broadleaf)	Dominant (Pine)
Tree density (tph)	362	406	294	272
Basal area (m ² /ha)	28	23	18	27
Stumpage volume (m ³ /ha)	537	406	294	272
Volume harvested (m ³ /ha)	411	288	228	249
Volume harvested (%)	76	71	78	92
Seedling density 2 years after 1 st cutting (sph)	123,929	27,774	4,451	2,320

Citation: Cedamon E, Bashyal M, Karki P, Paudel NS, Karki R, Nuberg I, 2024, Uniform Shelterwood, SILVICULTURE PRACTICE GUIDE: Synthesis of ACIAR-funded EnLiFT Project Silviculture Demonstrations.

Acknowledgement: The EnLiFT Project is thankful to the Australian Centre for International Research (ACIAR) for funding the Silviculture Trials presented in this practice guide. The author is thankful for the support of University of Adelaide, University of New South Wales, ForestAction Nepal, Nepal’s Department of Forest, RECOFTC and the various Division Forest Officers in Kavrepalanchowk and Sindhupalchowk Districts.

KEY LESSONS

- The uniform shelterwood silviculture system provided huge amount of marketable timber to CFUG and demonstrated the ability of the stand to promote development of high-density regeneration.
- CFUGs recommended 50 shelter trees per hectare to provide sufficient shelter to seedlings.
- There has been strong preference among FUG members to keep the shelter trees until precommercial harvest of the newly regenerated thus avoiding cost of obtaining harvesting permits for the shelter trees. This resulted to a two-age class stand as demonstrated in Chapani CF.
- Regeneration of broadleaf species did not occur in Chapani due to lack of mother trees nearby unlike in the other sites. Therefore, planting of desired broadleaf species is recommended if FUGs want to develop a mix pine and broadleaf forest.



Ministry of Forests & Environment
Government of Nepal



Australian Government
Australian Centre for International Agricultural Research

EnLiFT Project Contact Details
ForestAction Nepal
Dr. Naya Sharma Paudel
Phone: +9779851015388
Email: naya@forestaction.org