

# SILVICULTURE PRACTICE GUIDE

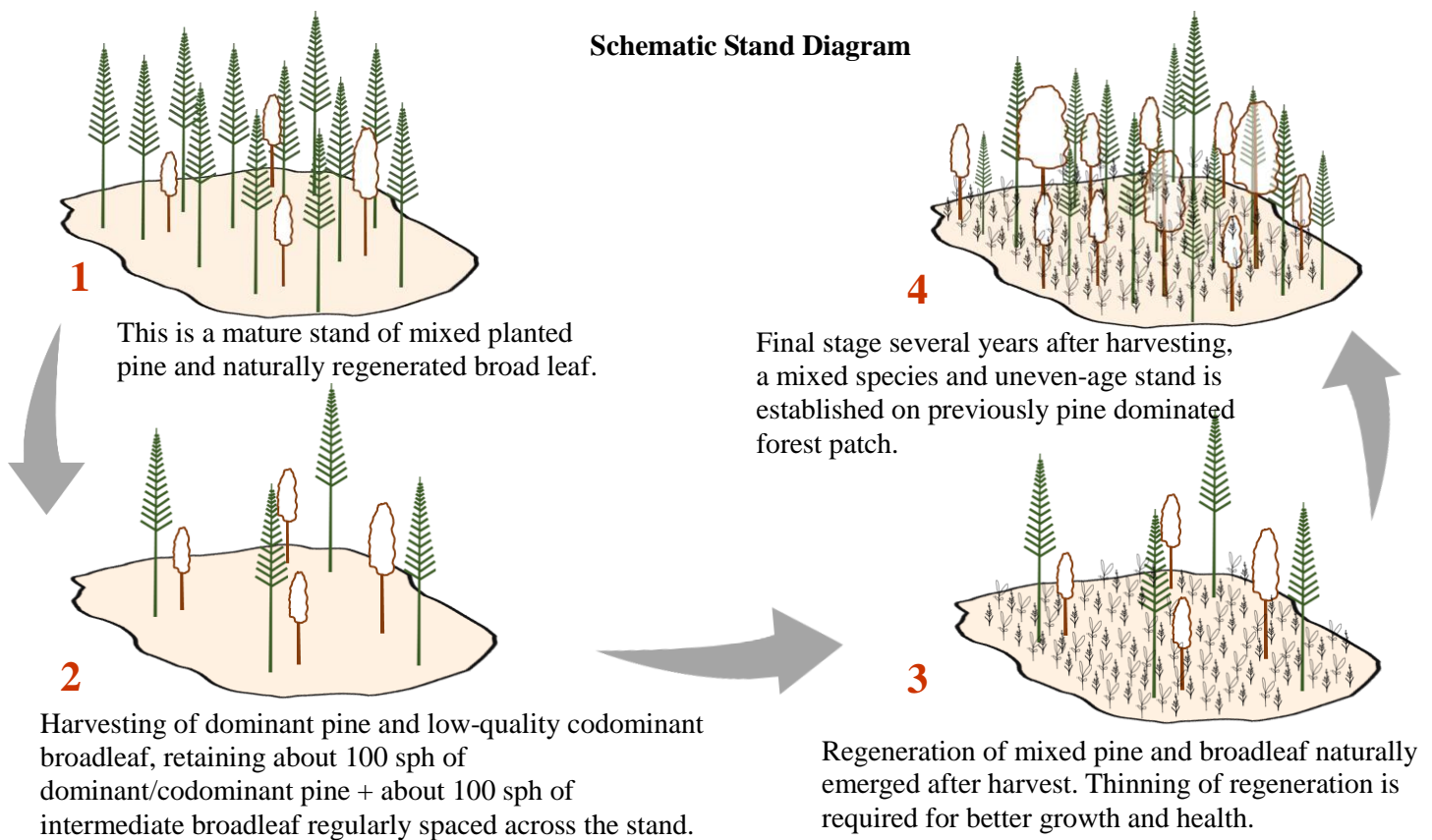
SYNTHESIS OF ACIAR-FUNDED EnLiFT2 PROJECT SILVICULTURE DEMONSTRATION

## VARIABLE RETENTION

### SYSTEM OVERVIEW

Variable retention is a silviculture regime which retains part of the original forest after harvest and kept through to the next rotation as an innovative approach to emulate natural disturbance regimes and protect biodiversity. It aims to maintain mature forest species and structures thus maintaining the ecological function of the forest in forested landscape and improve connectivity, and decrease the time required for late successional species to re-establish in harvested areas. It is also known as retention forestry and can be in a form of *dispersed* where single trees or clump of trees are left throughout the stand which EnLiFT2 established demonstration plot in its project sites or *aggregated* with groups or patches of trees retained.

#### Schematic Stand Diagram



### BEST PRACTICE GUIDE

#### ● Measure and Mark Trees

Measure trees and obtain harvesting approval from DFO. Mark trees to be harvested and to be retained in 10m x 10m. Ensure there is about 100 stems per hectare (sph) of dominant/ codominant pine and about 100 sph of intermediate broadleaf regularly spaced across the stand.

#### ● Trees Harvesting

Tree should be harvested as per the harvesting plan approved by DFO. Fell marked trees for harvesting avoiding injuries to trees marked for retention. Clear forest floor of residues and weeds to ensure healthy regeneration and reduce risk for forest fire.

#### ● Regeneration Management

Select healthy seedlings of pine and mixtures of broadleaf species as potential crop trees. Slash unwanted seedlings and weeds to promote for better growth and health. Ensure the stand is protected from grazing and establish fire lines to manage wildfires.

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### EXAMPLES OF PRACTICE

At the start of EnLiFT2 in 2018 the prevailing forest harvesting guideline were the Scientific Forest Management Guideline 2014 and the Thinning Guideline 2007. Both harvesting regimes meant re-entry to harvested sites which could cause disruption to regeneration development. In variable retention system we recommended at most 100 stand per hectare of dominant/codominant pine and about 100 stand per hectare of intermediate broadleaf. The variable retention system is an innovative regeneration harvesting regime suitable to topography of midhills Nepal. Demonstration plots were established by EnLiFT2 in Chautara and Lisankhupakhar municipalities in Sindhupalchowk to show stand development in variable retention system compared to silviculture regimes.

Table 1 shows the stand profile of the strip seed tree demonstration plots. Firstly, it is notable that the three demonstration sites represent different stand structures. In Shreechap, 19,691 seedlings per hectare (sph) were found in Feb 2023 in which 24.3% are pine while the majority are broadleaf species primarily Schima. In Sansari, the regeneration was found at 10,958 sph in which 54.9% are pine while the remainder is broadleaf timber species. The Shreechap and Sansari CF demo plots were protected from grazing and grass cutting. Deupokhari has very low regeneration in which it was reportedly due to grazing by goats and cows.

We have observed that the proportion of pine regeneration in Shreechap DVR plot is 24% compared to 1% in control plot. In Sansari, the proportion of pine seedlings was increased from 40% to 55% before and after harvesting respectively. The increase of proportion of pine seedlings is due to opening of canopy from harvesting of dominant and codominant trees following dispersed variable retention system. In Deupokhari, where grazing and grass cutting were allowed in the forest, the proportion of pine seedlings were increased to about 15% after harvest from 0% before harvest.

**Table 1. Stand profile of CF's dispersed variable retention demonstration plot**

CFUG Name	Shreechap	Sansari	Deupokhari
Plot size (ha)	1	1	1
Cutting Year	2021	2021	2021
Main species	<i>P. roxburghii</i>	<i>P. roxburghii</i>	<i>P. wallichiana</i>
Stand strata	Dominant (Pine)	Dominant (Pine)	Dominant (Pine)
Tree density before harvest (tph)	452	282	383
Basal area (m <sup>2</sup> /ha)	24	16	26
Stumpage volume (m <sup>3</sup> /ha)	211.55	154.88	227.97
Volume harvested (m <sup>3</sup> /ha)	145.85	97.67	130.36
Seedling density 2 years after 1 <sup>st</sup> cutting (sph)	19,691	10,958	3,798
Tree seedling species (%)	Pine	54.9	14.5
	Broadleaf	75.7	45.1

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### KEY LESSONS

- Disperse variable retention (DVR) system facilitated transformation of pine dominated stand to a more mixed pine and more diverse broad leaf species such Schima, Castanopsis, Syzygium, Litsea, Toona.
- The presence of broadleaf species in the intermediate stratum and pine in the dominant stratum disperse regularly in the stand is aesthetically appealing to forest users promising them a more diverse forest species to meet their social, economic and environmental service needs.
- As with other silviculture systems demonstrated by EnLiFT2, the rate of regeneration development is dependent upon cultural regime of the site. As experienced in Shreechap and Sansari where the demo plot was closed for grazing and grass cutting, the regeneration is 3-4 times higher than Deupokhari where grazing and grass cutting were allowed.



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