

Seedling production. To estimate the amount of planting material needed, subtract the average woody plants/ha already present from the target stocking. For example, 2m x 3m spacing is about 1,670 trees/ha. If the area already has 600 wildings/ha, 1,070 seedlings/ha will be needed, plus an allowance for mortality.

9) Enrich by planting shade-tolerant species

Begin enrichment planting of shade tolerant species as soon as nurse trees and existing woody species cast appropriate shade.

At the start of the wet season, plant the high-value tree species between the nurse trees at 3 x 3m or 4 x 4m spacing, or at the recommended spacing requirements of each species. Bamboos, rattans, orchids, and other species that produce non-timber forest products can also be planted.

Please refer to Appendices and Annex below:

Appendix 1 – Species selection

Appendix 2 – Seed procurement

Appendix 3 – Nursery operation

Appendix 5 – Tending the plantation

Appendix 6 – Guideline for decision making in reforestation

Appendix 7 – Simple sampling for density and species for natural regeneration

Appendix 10 – Some tree species producing non-timber forest product

Annex 1 – Seed requirement calculations

4. Framework Species Method

The framework species method of forest restoration is designed to restore diverse forest ecosystems on degraded forestland for biodiversity conservation or environmental protection.

When an area has been heavily degraded and normal planting could hardly restore the forest ecosystem, it is therefore, of great benefit to use a technique called "framework species". Framework species are fast growing with dense shading crowns that rapidly shade out competing weeds, and attractive to seed dispersing wildlife, especially bats and birds.

The method depends on some tract forest patches or remnant forest trees, surviving fairly closed to planted plots, to provide a source of seeds. In addition, reasonably dense population of seed dispersing animals must occur in the vicinity. This can be achieved by planting a mixture of 20-30 native forest species (including fruit bearing species). Tree planting restores basic ecosystem structure and function, whilst seed-dispersing wildlife re-establishes biodiversity and the original tree species composition of the forest. If either of these two elements is missing from the surrounding landscape, natural regeneration within framework species plots may be unreliable. On such sites, if the initial planting of framework tree species failed to stimulate natural regeneration, subsequent planting of additional tree species may be necessary (see Pictures in the following pages).

Please refer to Appendices and Annex below:

Appendix 1 – Species selection

Appendix 2 – Seed procurement

Appendix 3 – Nursery operation

Appendix 5 – Tending the plantation

Annex 1 – Seed requirement calculations

THE FRAMEWORK SPECIES METHOD OF FOREST RESTORATION



The site is cleared of weeds, taking care to preserve any existing tree seedlings or saplings.



A mixture of 20-30 native tree species, including both pioneer (indicated by blue saplings) and climax (indicated by red saplings) species, is planted, spaced 1.6-1.8 m apart.

THE FRAMEWORK SPECIES METHOD OF FOREST RESTORATION



The pioneer trees (blue) grow rapidly, forming an upper canopy, which attracts seed-dispersing wildlife. Slower-growing climax trees form an understory (red). Seeds brought in by wildlife, germinate to form a layer of naturally-established trees (green).



After 10-20 years the pioneer trees begin to die, recycling nutrients and providing rotten wood for invertebrates. The planted climax trees (red) form the main canopy. Underneath, naturally-established trees (green) form an understory, ready to return the forest to its former diversity.

Source: *FOREST RESTORATION RESEARCH UNIT, 2000.*