Brief Report for 2016 of the Restoration Permanent Sample Plots (PSPs) at Nuluhon Trusmadi FR [1]

by

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Summary

Initially, 3 Permanent Sample Plots (PSPs) were set-up randomly in October, 2010 with the objectives to assess the survival rates and performance of the planted seedlings within the restoration areas at Apin-Apin, Nuluhon Trusmadi FR. The areas were rehabilitated a year earlier, in august of 2009. The plots were located as follows; - Plot 1 in Compartment 24, Plot 2 in Compartment 18 and Plot 3 in Compartment R15. An additional plot 4 was later set up in the project's subsequent new planting area at compartment R19. Compartment R19 was restored in august 2011 and the PSP or Plot 4 was set up in July 2013.

Each permanent plot is divided into three sub-plots to represent three slope-ranges in each permanent plot viz: - upper slope, middle slope and bottom slope. Altogether, a total of 12 sub-plots were set-up in the 4 different permanent plots. Each sub-plot consists of 150 planted points with seedlings planted at a distance of 3.5m along cleared planting rows and 10m between planting rows. In each Sub-plot there are 5 rows and each row contains 30 planting points. A permanent plot contains 450 planted points. The 4 permanent plots contain a total of 1,800 planted points covering an area of 6.3 ha.

Latest assessment conducted reveals an average survival rate of 40.1% for plot 1, 2 and 3 at the age of 84 months after planting. The survival rate breakdown by plots were;- 29.8% (plot 1), 46.4% (plot 2) and 44.2% (plot 3). However, plot 4 reveals a better survival rate of 74.2% at the age of 60 months after planting. So, taking the total average of the 4 plots regardless of age, the average survival of the 4 PSPs was about 48.6%. The survival rates of 48.6% translate to about 139 survive seedlings per hectare from an original planting density of about 285 seedlings per hectare. The lower sub-plots exhibit the highest mortality due to its location at the lower slope which is exposed to mud-rolled and other land slide related natural calamity which adversely affected the seedlings.

Seraya, Uratmata and kapur seems to be the most robust species in terms of survival and height growth performance in the areas. Seraya species planted in plot 2 performs the best mean height growth of 3.46 meters at 84 months old. Second best performer was Uratmata Daun Licin at plot 1 with a mean height growth of 2.99 meters at the same age. The detail information of the performance of the 4 plots was entailed in this report.

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The PSPs and Locations

- Three (3) Permanent Sample Plots (PSPs) were set-up randomly in October, 2010 with the objectives to assess the survival rates and performance of the planted seedlings within the restoration areas at Apin-Apin, Nuluhon Trusmadi FR. The areas were rehabilitated a year earlier, in august of 2009. The plots were located as follows; - Plot 1 in Compartment 24, Plot 2 in Compartment 18 and Plot 3 in Compartment R15. Each permanent plot is divided into three sub-plots to represent three slope-ranges in each permanent plot viz: - upper slope, middle slope and bottom slope. Altogether, a total of 9 sub-plots were set-up in the 3 different plots in 2010. An additional plot 4 was set up in the project's subsequent new planting area at compartment R19. Compartment R19 was restored in august 2011 and the PSP or Plot 4 was set up in July 2013.
- Each sub-plot consists of 150 planted points with seedlings planted at a distance of 3.5m along cleared planting rows and 10m between planting rows. In each Sub-plot there are 5 rows and each row contains 30 planting points. With 4 sub-plots, a permanent plot contains 450 planted points. The 4 permanent plots contain a total of 1,800 planted points covering an area of 6.3 ha. Location of the 4 PSPs are as fig 1.

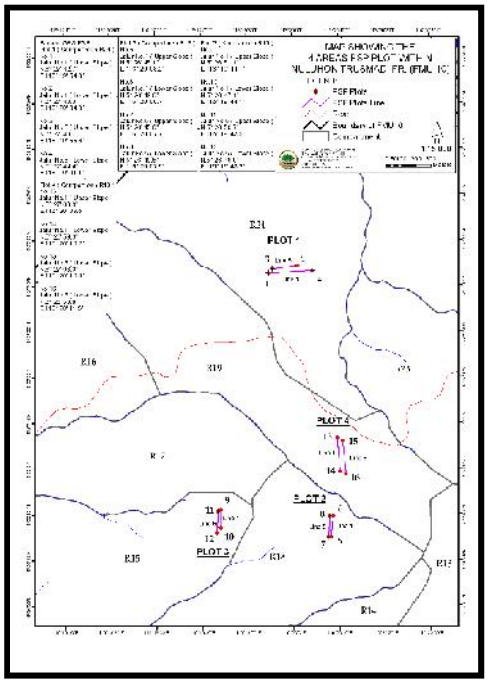
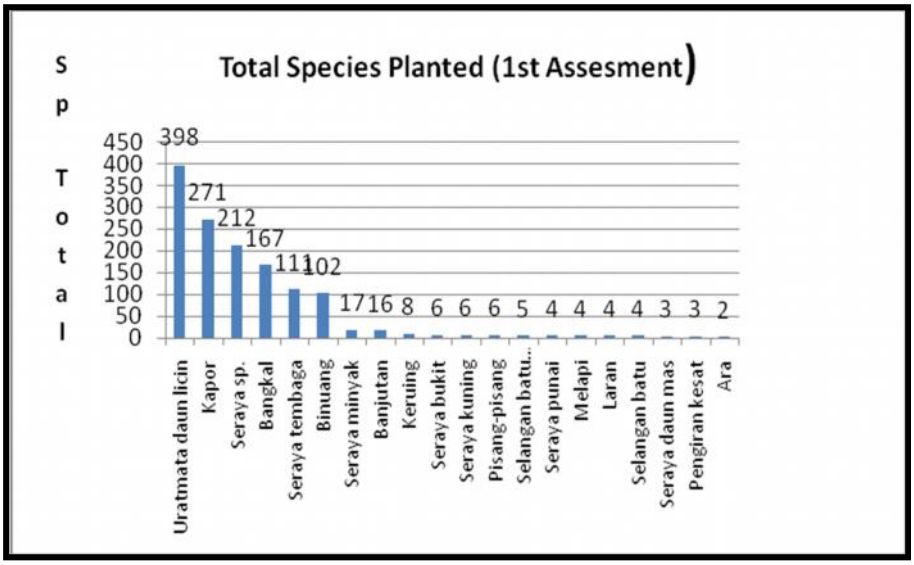


Fig 1: Locations of the 4 Restoration PSPs

Species Planted

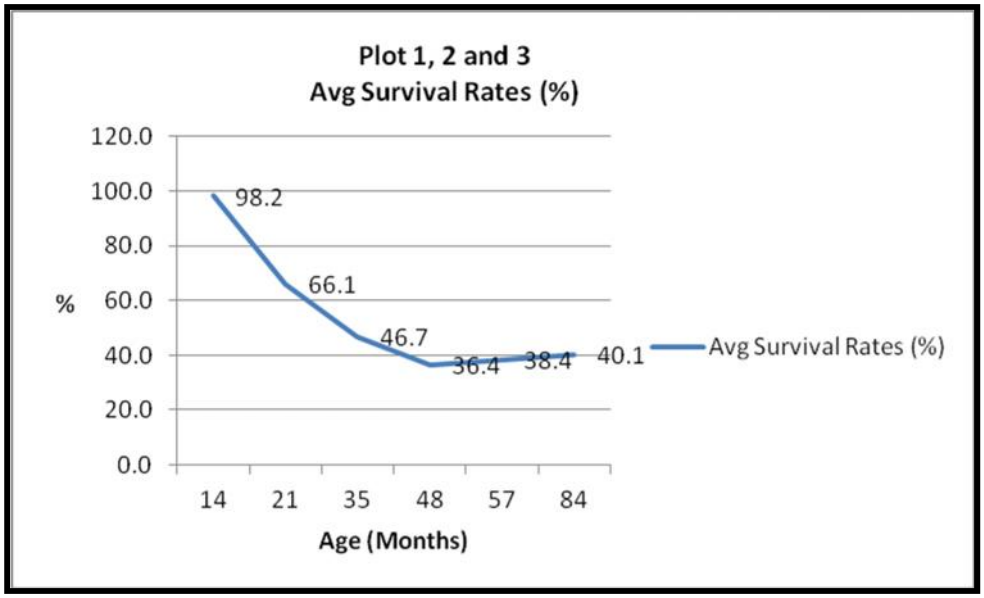
- Local indigenous species were planted in random in the restored areas. The following Graph 1 shows the various species planted in the first enumeration of the 3 PSPs (Plot 1, Plot 2 and Plot 3) during the setting up of the 3 plots. The main species planted were Uratmata, Seraya, kapur and Bangkal. Survival during the first enumeration (14 months after planting) was 98.2%. For Plot 4, the main species planted was mainly uratmata (75%) and the rest was of the Seraya species.



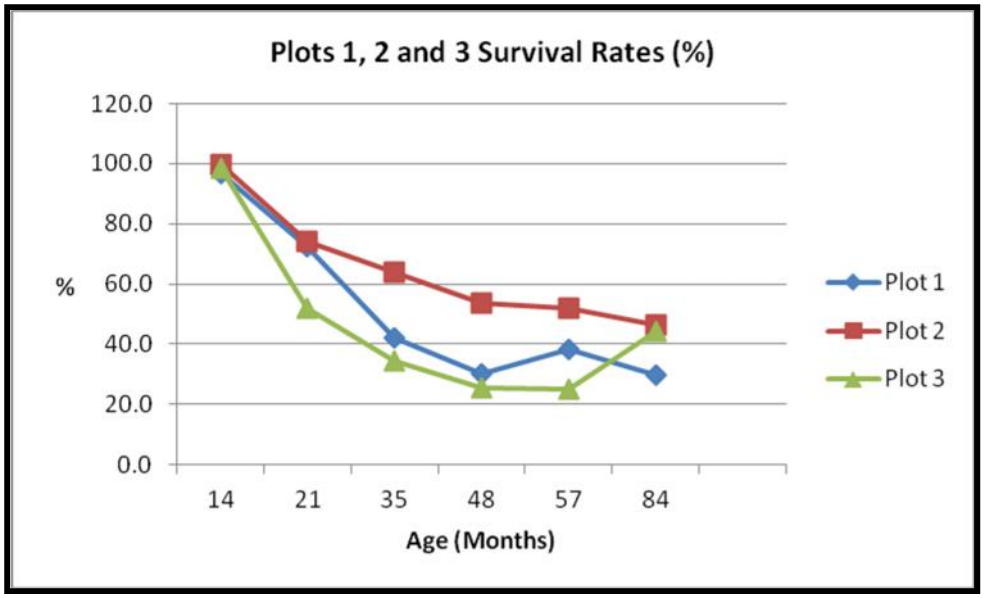
Graph 1: Summary of Species planted in Plot1, Plot2 and Plot3.

Enumeration and Survival Rates

- Since its inception, six (6) assessments have been conducted for Plot 1, 2 and 3 and three (3) assessments for plot 4. The latest enumeration was conducted in august, 2016.
- The latest assessment reveals an average survival rate of 40.1% for plot 1, 2 and 3 at the age of 84 months after planting (Refer Graph 2). The survival rate breakdown by plots were;- 29.8% (plot 1), 46.4% (plot 2) and 44.2% (plot 3). However, plot 4 reveals a better survival rate of 74.2% at the age of 60 months after planting. So, taking the total average of the 4 plots regardless of age, the average survival of the 4 PSPs was about 48.6%.
- The increase of Survival rates in the assessment were due to the facts that replanting was undertaken by FMU10 management team at plot 1 in mid 2012 and at plot 3 in late 2014. However, no replanting work was undertaken to plot 2. This explains why survival rates increased as shown in the below graphs.

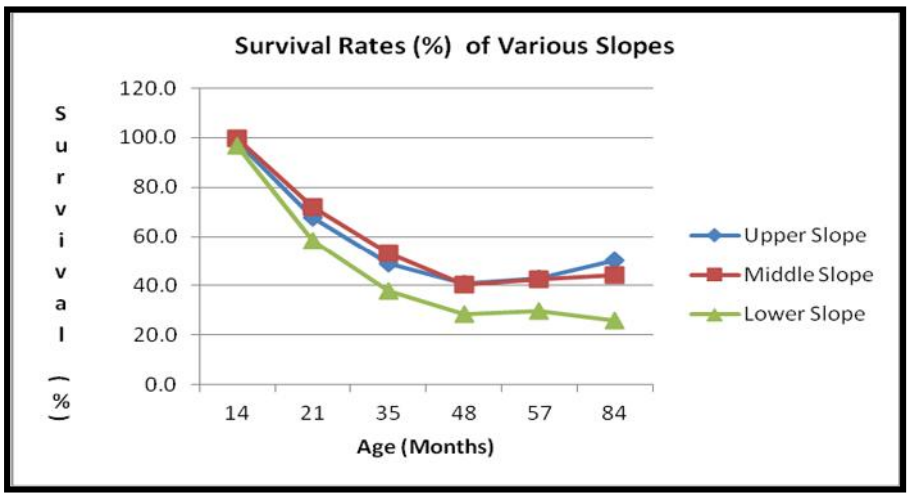


Graph 2: Average Survival Rates (%) of Plot 1,2 and 3.



Graph 3: Survival Rates (%) of Plot 1, 2 and 3

- The assessment also evaluates the effects of slope classes on survival of the planted seedlings. The lower slope was very vulnerable and exposed to soil erosion and woods debris sliding down the slopes affecting planted seedlings. Survival rate was the lowest at the lower slope as compared to the other upper slopes (refer Graph 4).



Graph 4: Survival Rates (%) on various slopes in Plot 1, 2 and 3

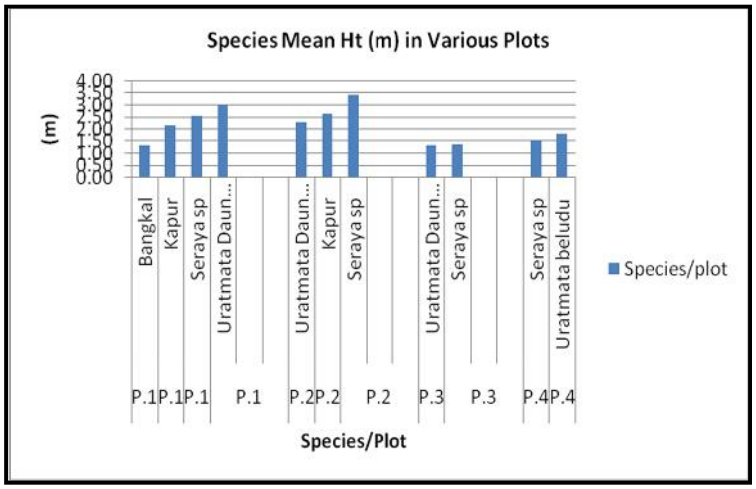
The Growth Performance

- The mean height of the species varies from 1.34m for Bangkal in plot 1 to 3.46m for Seraya sp in plot 2 at 84 months after planting. However, the growth of planted seedlings in plot 3 seems obviously low (refer graph 5) due to the facts that majority of enumerated seedlings were re-planted seedlings undertaken in late 2014. Plot 1 was replanted in mid 2012.

- Table 1 shows the summary of mean height growth of selected major species planted and graph 5 shows the graphic comparison of mean height growth between plots and species.

Table 1 : Mean Ht (m) Growth of selected major species planted

Plot	Species	Age Months	Mean Ht (M)	N
P.1	Bangkal	84	1.34	31
P.1	Kapur	84	2.17	11
P.1	Seraya sp	84	2.56	38
P.1	Uratmata Daun Licin	84	2.99	43
P.2	Uratmata Daun Licin	84	2.30	23
P.2	Kapur	84	2.65	98
P.2	Seraya sp	84	3.46	24
P.3	Uratmata Daun Licin	84	1.35	134
P.3	Seraya sp	84	1.38	66
P.4	Seraya sp	60	1.55	15
P.4	Uratmata beludu	60	1.83	319



Graph 5: Species Mean Ht (m) in various plots

General Discussion

- The average survival rates of the 4 PSPs covering a total area of about 6.3 ha with age (plot 1,2 and 3 at 84 months old and plot 4 at 60 months old) was 48.6%.
- The survival rates of 48.6% translate to about 139 survive seedlings per hectare from an original planting density of about 285 seedlings per hectare.
- The lower sub-plots suffers highest mortality due to its location at the lower slope which is exposed to soil erosion and woods debris sliding down the slopes affecting adversely the seedlings planted.
- The steep terrain of the rehabilitated sites with mostly at least 40 degrees slope provide the biggest challenge during planting and in the subsequent monitoring and maintenance activities. The steeper the slope the higher occurrences of land slide anticipated and hence the survival of planted seedlings.
- Seraya, Uratmata and kapur seems to be the most robust species in terms of survival and height growth performance in the areas. Seraya species planted in plot 2 performs the best mean height growth of 3.46 meters at 84 months old. Second best performer was Uratmata daun licin at plot 1 with a mean height growth of 2.99 meters at the same age.
- Generally the 4 PSPs still needs maintenance particularly eradicating climbing creepers and line weeding annually to ensure the remaining seedlings will continue to survive grow and restore the areas.

Nov, 2016.