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PROJECT TECHNICAL REPORT

Resource survey and inventory of selected
non-timber forest products (NTFP) in
secondary growth forest in selected projects
sites in Quezon and Camarines Norte
Los Baños, Laguna Philippines
AUGUST 2012

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(In cash and in kind)

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ABSTRACT

Resource survey and inventory of selected non-timber forest products (NTFP) in secondary growth forest in selected projects sites in Quezon and Camarines Norte were conducted in systematic sampling using a 1 ha plot (100m x 100m) replicated five (5) times at each project site. Density and volume were computed to determine the dominant species namely: anahaw [*Livistona rotundifolia*(Lam.) Mart.], for tree-like species; bamban [*Donax cannaeformis*(G. Forster) K. Schum.] for herb; limuran (*Calamus ornatus* Blume.), palasan (*Calamus merrillii* Becc.), tumalim (*Calamus mindorensis* K. Larsen & S.S. Larsen) for climbing palm; baling-uai (*Flagellaria indica* L.), tilob/lamon [*Dicranopteris linearis* (Burm. f.) Underw.], kamagsa [*Agelaea borneensis* (Hook.f.) Merr.], nito [*Lygodium circinatum*(Burm.) Bedd.], lukmoy (*Raphidophora monticola* Krause), gugo [*Entada phaseoloides*(L.) Merr.], hinggiw [*Ichnocarpus frutescens* (L.) W.T. Aiton], hagnaya [*Stenochlaena palustris* (Burm.f.) Bedd.], red vine (*Freycinetia sp.*), white vine (*Freycinetia sp.*) and katmon baging/takinis [*Tetracera scandens*(L.) Merr.] for forest vines.

Field observation of seedlings was done for regeneration study where increase in length and diameter was monitored regularly for at least 3-4 months interval. It showed that most of the species have minimal increase in said growth parameters in all study sites. With tremendous collection and extraction rate particularly of forest vine materials for handicraft products both in Quezon and Camarines Norte provinces, there could be danger of supply depletion from the natural forest.

Plantation establishment and enrichment planting is highly recommended for the sustainability of raw materials and its supply.

INTRODUCTION

Resource survey and inventory constitute a very important aspect of wise utilization and management of any renewable resource whether it is timber of non-timber or the so-called non-wood forest products (NWFP). In focusing to utilize particular plant species for specific end-use, viz., bamboo for furniture and house wares or buri (*Corypha*) for handicraft products, any economic or commercial venture would dare to determine and have knowledge first and foremost of the species availability. When availability is guaranteed, the next most probable question is where are they? Where can they be found? How much is extractible in a hectare of land for instance? Will the supply and volume meet and sustain the demand for species-product use? Since it is renewable, it means it is regenerating and may be mass-produced by planting. What about information on this aspect? Right now, inventory works on NWFP do no receive the right attention from forest managers unlike timber.

Compared to a general floristic inventory (Prance, 1977) done usually by plant ecologist and systematist for the purpose of determining species for a particular end-product aims primarily at providing answers to the earlier questions posed. Said queries when taken together with their respective answer will seriously spell successful and sustainable economic utilization of both wood and non=wood forest products species.

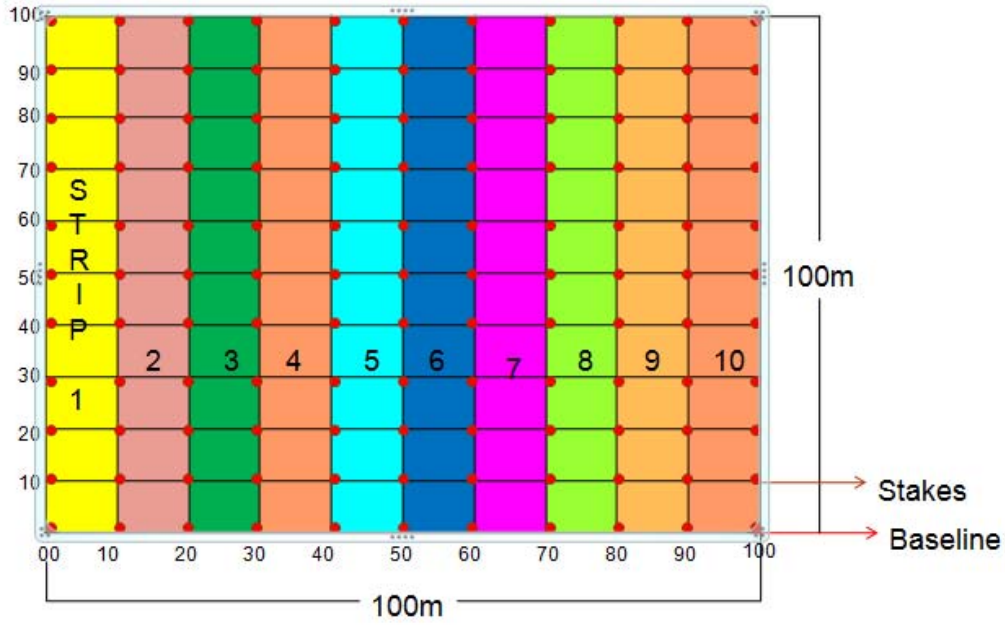
OBJECTIVES

It is the study's primary objective to conduct survey of existing handicraft materials and determine their available volume in nature. Also, determine rate of natural regeneration at least for the leading species at each study site in terms of density (number of individuals) and volume by periodic measurement (3-4 months interval) of parameters like diameter and length/or height increment in tagged wildlings or young regenerants.

METHODOLOGY

Sampling and Site Selection

Resource survey and inventory of selected non-timber forest products (NTFP) in secondary growth forest in selected projects sites in Quezon and Camarines Norte were conducted in systematic sampling using a 1 ha plot (100m x 100m) replicated five (5) times at each project site.



Lay-out of a 1-ha resource inventory plot

Measurement of Inventory Parameters

In choosing a particular locality for sampling, the element of bias could not be eliminated. First, there were target species and doing so basically reuired presence or occurrence of such species in the area before [plot establishment could be decided. Otherwise, a locality is rejected when desired species are absent. This selection method in a floristic inventory is technically known as systematic sampling (Prance, 1977).

The following parameters were measured and hereto defined.

Lineal meter (l.m.) = unit for the calculated volume of rattan and other forest vines which corresponds actually to the estimated total length of their individuals.

Density – number of individuals of a particular species occurring within plot including seedlings and saplings; sapling for the erect palms in particular are referred to those individuals with distinct short stem above ground but total height to the topmost part of the crown is less than 3 m.

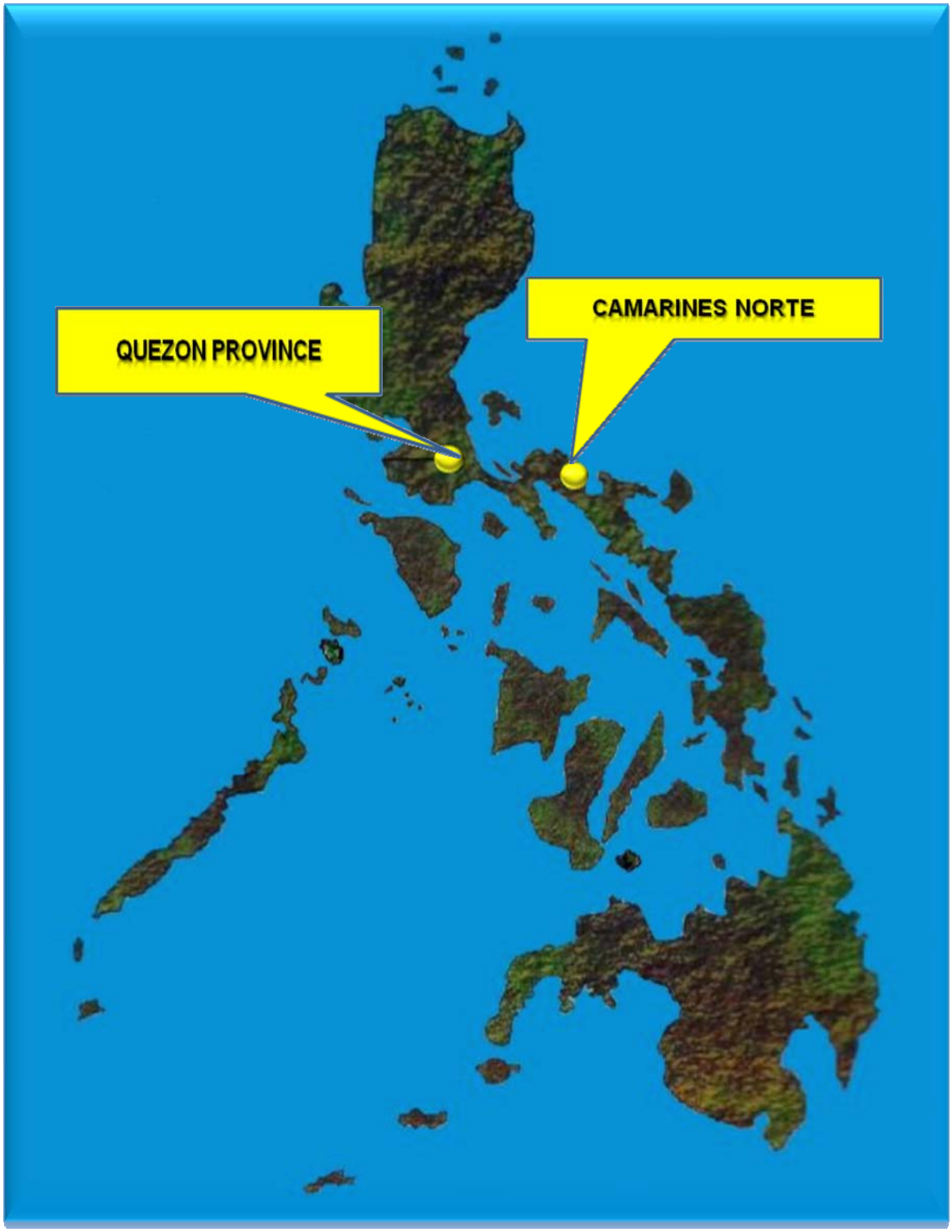
For rattan and other forest vines, diameter was taken of the stem's largest part usually near the basal portion.

For erect palms, bamboo and pandan total height was measured using Haga altimeter from the base to topmost part of the foliage; for the rattan and other climbers, height or length was approximately based on length of prostate (lying down) stem and portion of stem that clings on to neighboring trees whose height can actually be measured using an instrument.

Assessment of Natural Regeneration

Field observation was made of mature individuals including wildlings and saplings of the subject species to gather notes on ecology, viz., phenology (flowering and fruiting), seed fall and germination within plot, pattern of dispersal gauged from dense or crowded germination, growth away from mother plants or widely scattered, etc. animal or insect visitors, environmental factors fro natural growth and development such as location of the plant with respect to light, temperature and moisture. Direct or actual measurement, however, of biological and physical factors that influence successful plant establishment and resource sustainability for economic use was not made but merely based on qualitative assessment and notes taken of the plant species in nature.

LOCATION OF PROJECT AREAS



DATA GATHERED, ANALYSIS AND INTERPRETATION OF THE RESULTS

Inventory results of the study in selected POs and sites in Quezon and Camarines Norte Provinces have been summarized and presented in Tables 1-7 indicating precisely the name of POs. For clarity, the NTFP species were classified into tree-like, herb, palm and vine. Photographs of dominant species and tagged regenerants were presented and documented in Annex A and Annex B, respectively.

We selected for purposes of discussion baling-uai (*Flagellaria indica*) and Bamban (*Donax cannaeformis*) which in several occasions in our interview of handicraft manufacturers and material collectors had been cited prominently in manufacture of various handicraft products. *Flagellaria* apparently is more abundant in the natural forest, considering of course the sites of POs surveyed in Quezon. It had a density of 77 individuals with an average volume of 484.70 l.m. in KBFAI. At Kapatirang Samahan ng Magsasaka ng Casispalan (KASAMACA), it registered a total of 39 individuals having integrated volume of 285.44 l.m. while in Caayunan Bantay Kalikasan, Inc.(Basud, Camarines Norte) it had only 1 individual measuring 2.71 l.m. in volume. It was surprisingly not present in all plots at Tuaca Environment Brigade, Inc. (Tuaca, Camarines Norte) and in San Pascual Community Based Resource Management, Inc. (San Pascual, Camarines Norte). Interestingly *Flagellaria* in plots at Tao-Kalikasan in Labo, Camarines Norte showed 13 individuals with aggregate volume of 75.59 l.m..

Table 1. Average density and volume of a 5-ha plot of Commercially utilized NTFP's in Kapit-Bisig Farmer's Association Inc. (KBFAI).

Local Name	Plant habit	Plant part used	Scientific Name	Family Name	Density	Volume
Tree-Like						
Anahaw	erect, tree like	leaves	*Livistona rotundifolia* (Lam.) Mart.	Arecaceae	101	3.30
Herb						
Bamban	herb	stem	*Donax cannaeformis*(G. Forster) K. Schum.	Marantaceae	296	296
Palm						
Limuran	palm	stem	*Calamus ornatus* Blume.	Palmae	27	75.32
Palasan	palm	stem	*Calamus merrillii* Becc.	Palmae	9	28.80
Tumalim	palm	stem	*Calamus mindorensis* K. Larsen & S.S. Larsen	Palmae	1	8.46
Vine						
Baling-uai	vine	stem	*Flagellaria indica* L.	Flagellariaceae	77	484.70
Tilob/Lamon	vine	stem	*Dicranopteris linearis* (Burm. f.) Underw.	Gleicheniaceae	242	268.14
Kamagsa	vine	stem	*Agelaea borneensis* (Hook.f.) Merr.	Connaraceae	90	265.82
Nito	vine	stipes	*Lygodium circinatum*(Burm.) Bedd.	Schizaeaceae	75	114.78
Lukmoy	vine	root	*Raphidophora monticola* Krause	Araceae	29	82.32
Gugo	vine	stem	*Entada phaseoloides*(L.) Merr.	Mimosaceae	1	5.56
Hinggiw	vine	stem	*Ichnocarpus frutescens* (L.) W.T. Aiton	Apocynaceae	1	2.80

Table 2. Average density and volume of a 5-ha plot of commercially-utilized NTFP's in Luntiang Magsasaka ng Casispalan Inc. (LUMACA).

Local Name	Plant habit	Plant part used	Scientific Name	Family Name	Density	Volume
Tree-Like						
Anahaw	erect, tree like	leaves	*Livistona rotundifolia* (Lam.) Mart.	Arecaceae	10	0.62
Herb						
Bamban	herb	stem	*Donax cannaeformis*(G. Forster) K. Schum.	Marantaceae	385	385
Palm						
Tumalim	palm	stem	*Calamus mindorensis K. Larsen & S.S. Larsen*	Palmae	16	233.56
Limuran	palm	stem	*Calamus ornatus* Blume.	Palmae	24	225.58
Palasan	palm	stem	*Calamus merrillii* Becc.	Palmae	29	214.50
Vine						
Hagnaya	vine	stipes	*Stenochlaena palustris* (Burm.f.) Bedd.	Blechnaceae	404	975.52
Baling-uai	vine	stem	*Flagellaria indica* L.	Flagellariaceae	35	285.41
Nito	vine	stipes	*Lygodium circinatum*(Burm.) Bedd.	Schizaeaceae	92	165.66
Tilob/Lamon	vine	stem	*Dicranopteris linearis* (Burm. f.) Underw.	Gleicheniaceae	40	94.48
Hinggiw	vine	stem	*Ichnocarpus frutescens* (L.) W.T. Aiton	Apocynaceae	25	62.34
Red vine	vine	stem	*Freycinetia sp.*	Pandanaceae	26	57.46
Kamagsa	vine	stem	*Agelaea borneensis* (Hook.f.) Merr.	Connaraceae	12	38.20
Gugo	vine	stem	*Entada phaseoloides*(L.) Merr.	Mimosaceae	2	7.57

Table 3. Average density and volume of a 5-ha plot of commercially-utilized NTFP's in Kapatirang Magsasaka ng Casispalan - Multi-Purpose Cooperative (K ASAMACA-MPC).

Local Name	Plant habit	Plant part used	Scientific Name	Family Name	Density	Volume
Palm						
Palasan	palm	stem	*Calamus merrillii* Becc.	Palmae	37	200.18
Tumalim	palm	stem	*Calamus mindorensis K. Larsen & S.S. Larsen*	Palmae	14	116.05
Limuran	palm	stem	*Calamus ornatus* Blume.	Palmae	13	109.08
Vine						
Red vine	vine	stem	*Freycinetia sp.*	Pandanaceae	391	749.08
Kamagsa	vine	stem	*Agelaea borneensis* (Hook.f.) Merr.	Connaraceae	111	276.49
White vine	vine	stem	*Freycinetia sp.*	Pandanaceae	113	252.23
Nito	vine	stipes	*Lygodium circinatum*(Burm.) Bedd.	Schizaeaceae	113	179.74
Baling-uai	vine	stem	*Flagellaria indica* L.	Flagellariaceae	39	155.59
Lukmoy	vine	root	*Raphidophora monticola* Krause	Araceae	21	67.18
Tilob/Lamon	vine	stem	*Dicranopteris linearis* (Burm. f.) Underw.	Gleicheniaceae	25	65.50

Table 4. Average density and volume of a 5-ha plot of Commercially-utilized NTFP in Caayunan Bantay Kalikasan, Inc. (CBKI), Basud, Camarines Norte.

Species	Plant habit	Plant part used	Scientific Name	Family Name	Density	Volume
VINES						
Lamon/Tilob	vine	stem	*Dicranopteris linearis* (Burm. f.) Underw.	Gleicheniaceae	457	2644.45
Nito	vine	stipes	*Lygodium circinatum*(Burm.) Bedd.	Schizaeaceae	860	934.93
Hagnaya	vine	stipes	*Stenochlaena palustris* (Burm.f.) Bedd.	Blechnaceae	263	567.72
Kamagsa	vine	stem	*Agelaea borneensis* (Hook.f.) Merr.	Connaraceae	65	113.99
Baling-uai	vine	stem	*Flagellaria indica* L.	Flagellariaceae	1	2.71
TREE-LIKE						
Anahaw	tree like	leaves	*Livistona rotundifolia* (Lam.) Mart.	Arecaceae	8	0.28
HERB						
Bamban	herb	stem	*Donax cannaeformis*(G. Forster) K. Schum.	Marantaceae	9	9

Table 5. Average density and volume of a 5-ha plot of Commercially-utilized NTFP in Tuaca Environment Action Brigade, Inc. (TEABI), Basud, Camarines Norte.

Species	Plant habit	Plant part used	Scientific Name	Family Name	Density	Volume
VINES						
Hagnaya	vine	stipes	*Stenochlaena palustris* (Burm.f.) Bedd.	Blechnaceae	211	745.82
Nito	vine	stipes	*Lygodium circinatum*(Burm.) Bedd.	Schizaeaceae	390	650.91
Kamagsa	vine	stem	*Agelaea borneensis* (Hook.f.) Merr.	Connaraceae	30	71.96
Lukmoy	vine	root	*Raphidophora monticola* Krause	Araceae	16	49.84
Katmon-baging/Takinis	vine	stem	*Tetracera scandens*(L.) Merr.	Dilleniaceae	2	3.00
Lamon/Tilob	vine	stem	*Dicranopteris linearis* (Burm. f.) Underw.	Gleicheniaceae	2	0.27
TREE-LIKE						
Kalagimay	tree-like	leaves		Pandanaceae	6	0.01
PALM						
Huyo	palm	stem		Palmae	53	180.34
Huag	palm	stem		Palmae	33	30.95
Limuran/kalapi	palm	stem	*Calamus ornatus* Blume.	Palmae	39	23.59
Uway	palm	stem		Palmae	1.0	1.80
HERB						
Bamban	herb	stem	*Donax cannaeformis*(G. Forster) K. Schum.	Marantaceae		
Bamboo Orchid/Lagotok/Pagokpok	herb	leaves	*Setaria palmifolia* (*Koenig*) Stapf	Poaceae	20	20
BAMBOO						
Bikal	bamboo	stem	*Dinochloa acuticlora* (Munro) S. Dransf.	Poaceae	1	2.28

Table 6. Average density and volume of a 5-ha plot of Commercially-utilized NTFP in San Pascual Community Based Resource Management, Inc. (SPCBRMI), Basud, Camarines Norte.

Species	Plant habit	Plant part used	Scientific Name	Family Name	Density	Volume
VINES						
Hagnaya	vine	stipes	*Stenochlaena palustris* (Burm.f.) Bedd.	Blechnaceae	536	2725.20
Lamon/Tilob	vine	stem	*Dicranopteris linearis* (Burm. f.) Underw.	Gleicheniaceae	163	667.57
Nito	vine	stipes	*Lygodium circinatum*(Burm.) Bedd.	Schizaeaceae	505	1206.20
Kamagsa	vine	stem	*Agelaea borneensis* (Hook.f.) Merr.	Connaraceae	76	436.83
Katmon-baging/Takinis	vine	stem	*Tetracera scandens*(L.) Merr.	Dilleniaceae	25	113.48
Gugo	vine	stem	*Entada phaseoloides*(L.) Merr.	Mimosaceae	19	126.65
Red vine	vine	stem	*Freycinetia sp.*	Pandanaceae	28	170.47
PALM						
Limuran/kalapi	palm	stem	*Calamus ornatus* Blume.	Palmae	19	64.41
Huyo	palm	stem		Palmae	76	421.26
Huag	palm	stem		Palmae	15	49.06
Uway	palm	stem		Palmae	19	71.29
TREE LIKE						
Anahaw	tree-like	leaves	*Livistona rotundifolia* (Lam.) Mart.	Arecaceae	1	0.02

Table 7. Average density and volume of a 5-ha plot of Commercially-utilized NTFP in Tao-Kalikasan Foundation of the Philippines, Inc. (TKFPI), Labo, Camarines Norte.

Species	Plant habit	Plant part used	Scientific Name	Family Name	Density	Volume
VINES						
Hagnaya	vine	stipes	*Stenochlaena palustris* (Burm.f.) Bedd.	Blechnaceae	124	562.38
Kamagsa	vine	stem	*Agelaea borneensis* (Hook.f.) Merr.	Connaraceae	127	546.52
Nito	vine	stipes	*Lygodium circinatum*(Burm.) Bedd.	Schizaeaceae	298	515.53
Hanopol	vine	stem	*Poikilospermum acuminatum* (Terc.) Merr.	Cecropiaceae	59	366.65
Lukmoy	vine	root	*Raphidophora monticola* Krause	Araceae	50	246.10
Katmon-baging/Takinis	vine	stem	*Tetracera scandens*(L.) Merr.	Dilleniaceae	46	179.50
Gugo	vine	stem	*Entada phaseoloides*(L.) Merr.	Mimosaceae	14	118.65
Banot	vine	stem	*Bauhinia integrifolia* Roxb.	Caesalpiniaceae	20	87.02
Baling-uai	vine	stem	*Flagellaria indica* L.	Flagellariaceae	13	75.59
Red vine	vine	stem	*Freycinetia sp.*	Pandanaceae	20	68.42
White vine	vine	stem	*Freycinetia vidalii* Hemsl.	Pandanaceae	17	56.83
Makabuhay	vine	stem	*Tinospora glabra* (Burm f.)	Menispermaceae	6	50.38
Karugtong	vine	stem		Pandanaceae	4	34.04
Lamon/Tilob	vine	stem	*Dicranopteris linearis* (Burm. f.) Underw.	Gleicheniaceae	4	11.90
TREE-LIKE						
Anahaw	tree like	leaves	*Livistona rotundifolia* (Lam.) Mart.	Arecaceae	15	1.19
Kalagimay	tree-like	leaves		Pandanaceae	7	0.27
Bariw	tree-like	leaves	*Pandanus copelandii* Merr.	Pandanaceae	28	0.21

PALM						
Limuran/kalapi	palm	stem	*Calamus ornatus* Blume.	Palmae	109	671.06
HERB						
Bamban	herb	stem	*Donax cannaeformis*(G. Forster) K. Schum.	Marantaceae	189	189
Bamboo Orchid/Lagotok/Pagokpok	herb	leaves	*Setaria palmifolia* (*Koenig*) Stapf	Poaceae	1	1

Bamban (*Donax cannaeformis*) was, again, more prominent and abundantly encountered in PO sites in Quezon province. At Kapit-Bisig, it had 296 individuals, absent in Kapatirang Samahan ng Magsasaka ng Casispalan, occurred in plot at Luntiang Samahan ng Magsasaka ng Casispalan with 385 individuals but was down to 9 individuals at Caayunan Bantay Kalikasan (Basud, Camarines Norte). It was absent again in Tuaca Environment Action Brigade (Tuaca, Basud. Camarines Norte.) until it resurfaced at Tao-Kalikasan in Labo, C.N. with 189 individuals.

Variation and difference in population and density within PO sites have been elaborated and discussed under item on extraction rate.

Other NTFP species observed in abundant volume in almost all sites covered by the inventory include kamagsa (*Agelaea borneensis* (Hook.f.) Merr.), nito (*Lygodium circinatum*(Burm.) Bedd.), hagnaya (*Stenochlaena palustris* (Burm.f.) Bedd.), lamon/tilob (*Dicranopteris linearis* (Burm. f.) Underw.) and lukmoy (*Raphidophora monticola* Krause). Rattan had been prominently abundant in Luntiang Magsasaka where palasan (*Calamus merrillii* Becc.), limuran (*Calamus ornatus* Blume.) and tumalim (*Calamus mindorensis K. Larsen & S.S. Larsen*) registered a combined volume of 670 l.m.. Limuran, again, was observed abundantly with a total volume of 671 l.m. at Tao-Kalikasan in Labo, Camarines Norte.

Regeneration Study

Figures 1-14 depict in graphic form height and diameter increment of NTFP species found dominant in terms of volume and density at each people organization's project site.

Figures 1 & 2 in particular show limuran (*Calamus ornatus* Blume.) having the greatest height and diameter growth increment of 2.5 m and 2.4 cm, respectively, in Atimonan, Quezon project site for 6 measurement period shown on the graphs. Nito [*Lygodium circinatum* (Burm.)Bedd.], on the other hand, displayed the least increment of both height /length, just a little over 1 m and about 0.25 – 0.3 cm in diameter growth for a period of almost 2-year observation and measurement.

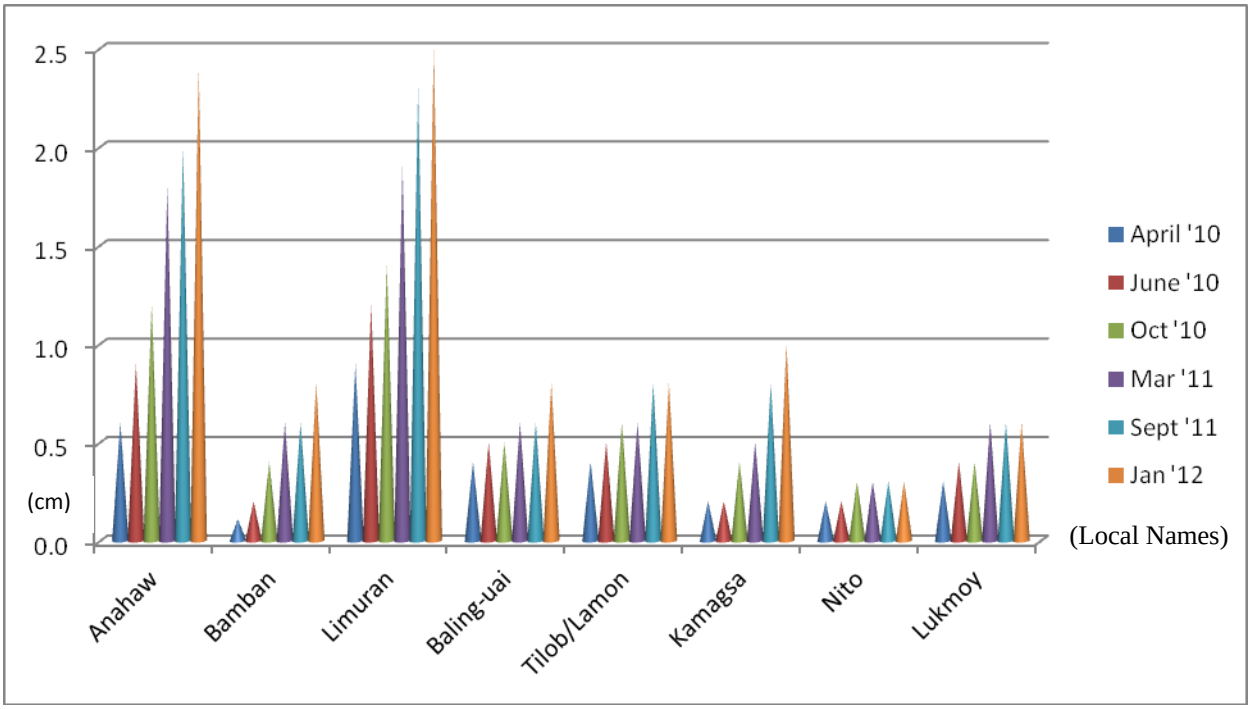


Figure 1. Regeneration growth (diameter) of most dominant species in Kapit-Bisig Farmer's Association, Inc. Atimonan, Quezon.

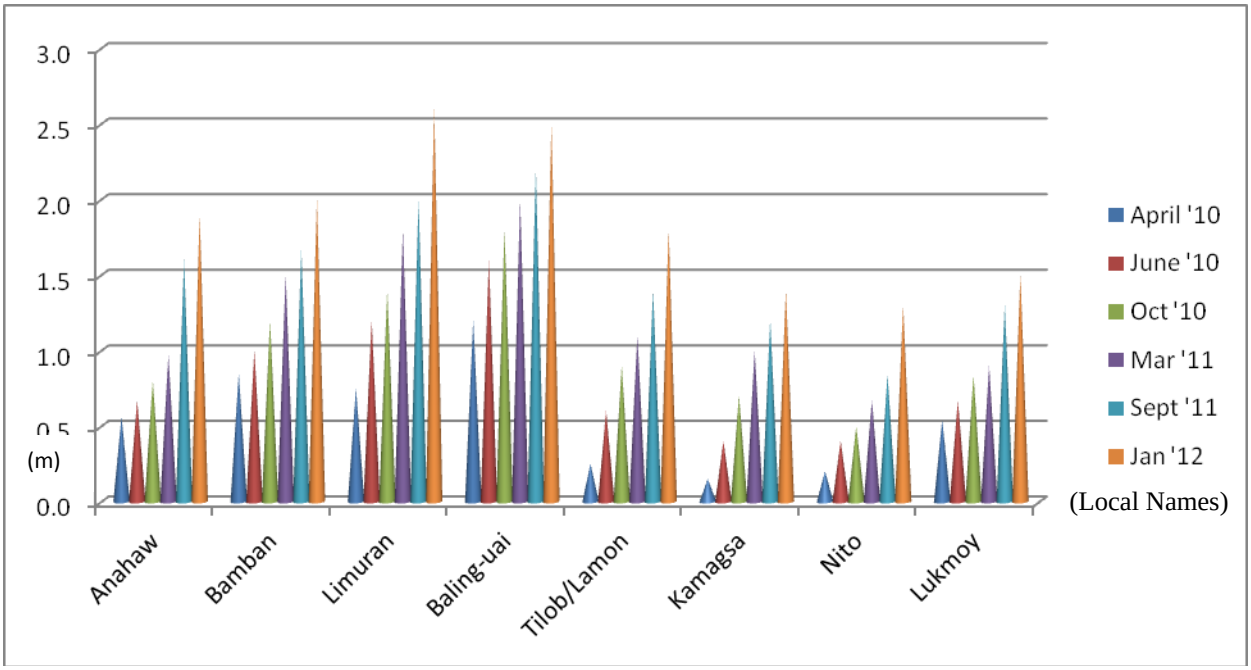


Figure 2. Regeneration growth (length) of most dominant species in Kapit-Bisig Farmer's Association, Inc. Atimonan, Quezon.

Figure 3 & 4 depict regeneration growth of six (6) most dominant NTFP species at project site in Tagkawayan, Quezon. The graphs show highest increment in both diameter (1.75cm) and length (2.0 m) for the climbing palm officially known as limuran (*Calamus ornatus* Blume.). While nito [*Lygodium circinatum*(Burm.) Bedd.] again displayed the least growth increment in terms of diameter (less than 0.2 cm) which was almost constant from the first measurement (April 2010) until January 2012, the length increment was greatest again for palasan (*Calamus merrillii* Becc.) at 2.0 m in 6 measurements taken. Interestingly, nito yielded length increment that progressively increased from 0.4 m to a high of around 2.4 m on the sixth measurement period (January 2012).

In a second site at Casispalan, Tagkawayan, Quezon (Kapatirang Samahan ng Magsasaka), white vine showed the highest diameter growth increment (2.1 cm) among the five most dominant species tagged. However the same species shared highest length increment (close to 1.2 m) with red vine and palasan. The lowest diameter and length increment was exhibited by kamagsa (*Agelaea borneensis* (Hook.f.) Merr.) with a little less than 1 cm and 0.6 m, respectively, for measurement taken from June 2010 to January 2012 as shown in Figures 5 and 6.

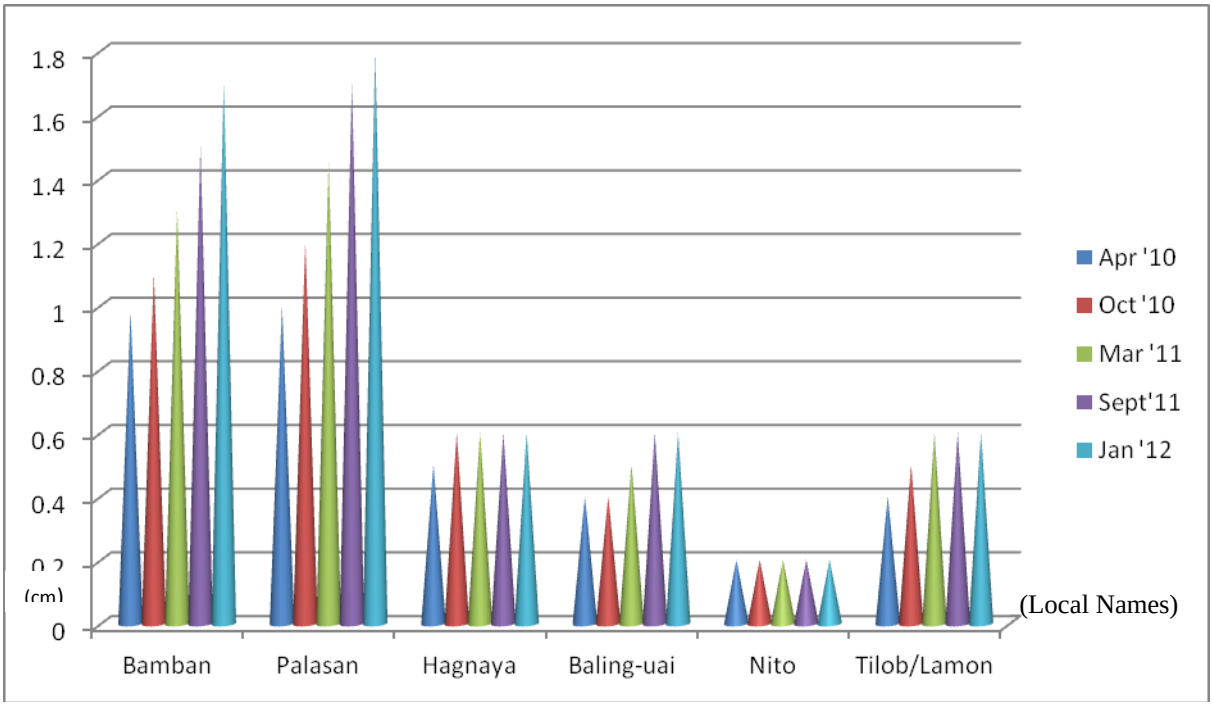


Figure 3. Regeneration growth (diameter) of most dominant species in Luntiang Magsasaka ng Casispalan, (LUMACA), Tagkawayan, Quezon.

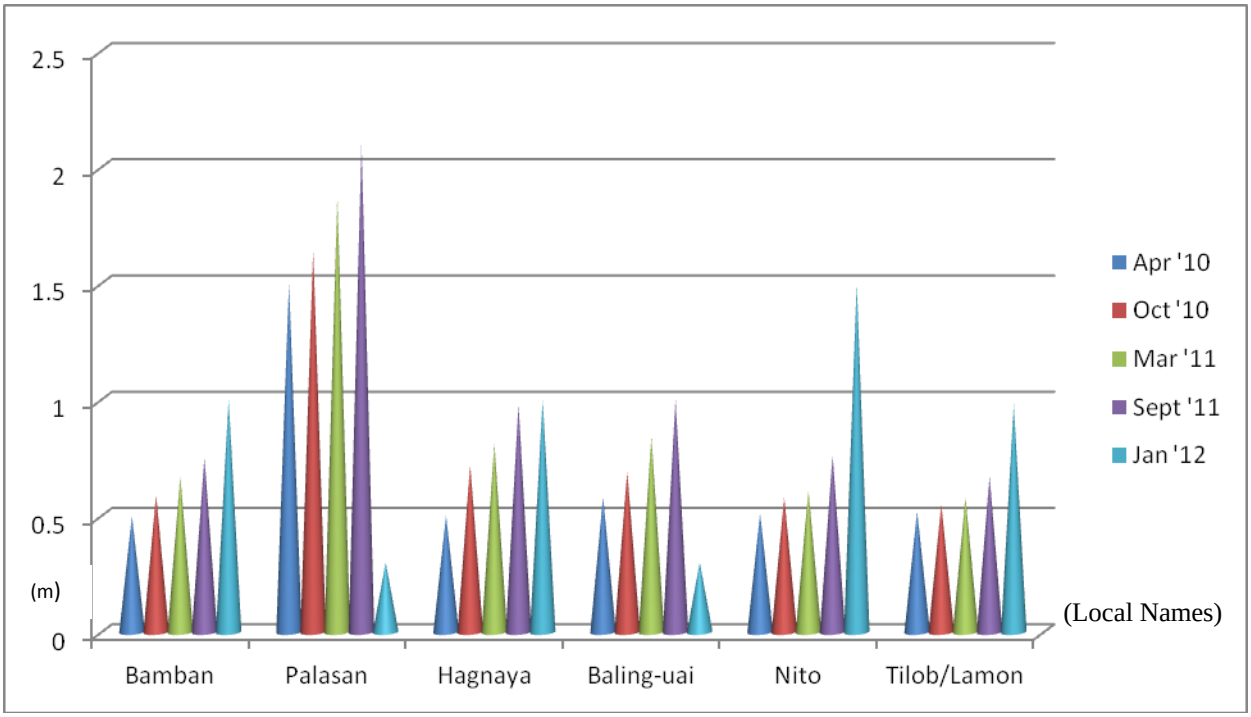


Figure 4. Regeneration growth (length) of most dominant species in Luntiang Magsasaka ng Casispalan, (LUMACA), Tagkawayan, Quezon.

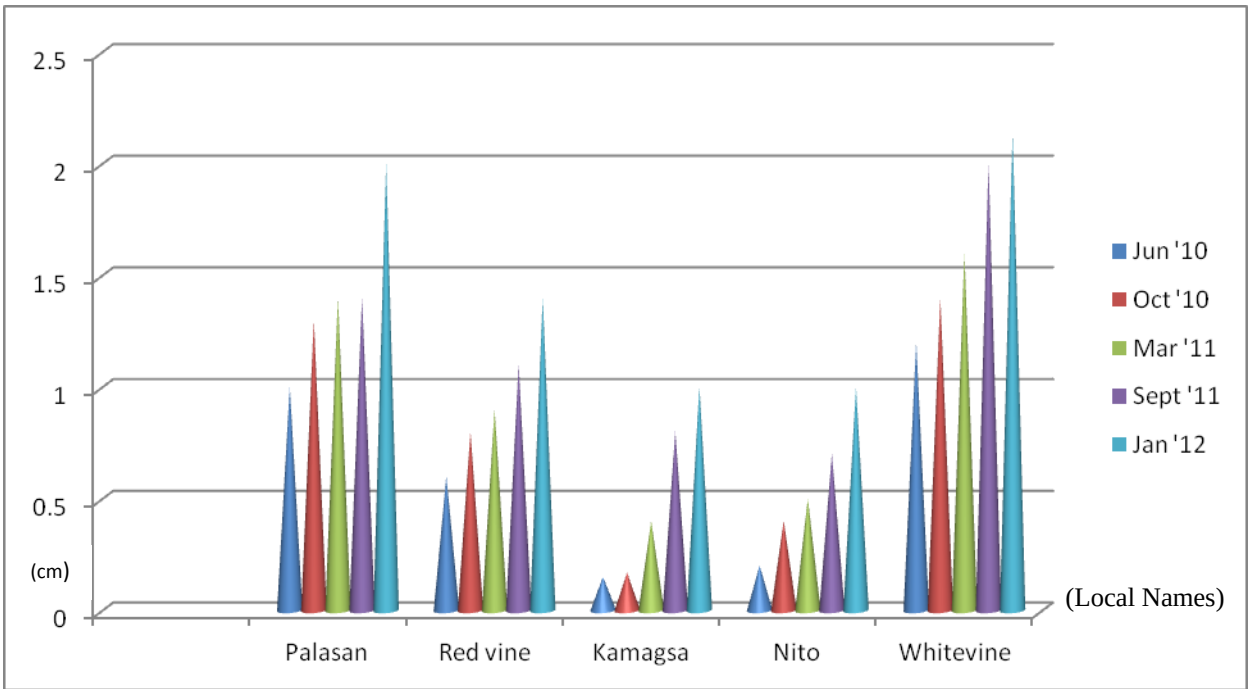


Figure 5. Regeneration growth (diameter) of most dominant species in Kapatirang Samahan ng Magsasaka ng Casispalan, Tagkawayan, Quezon.

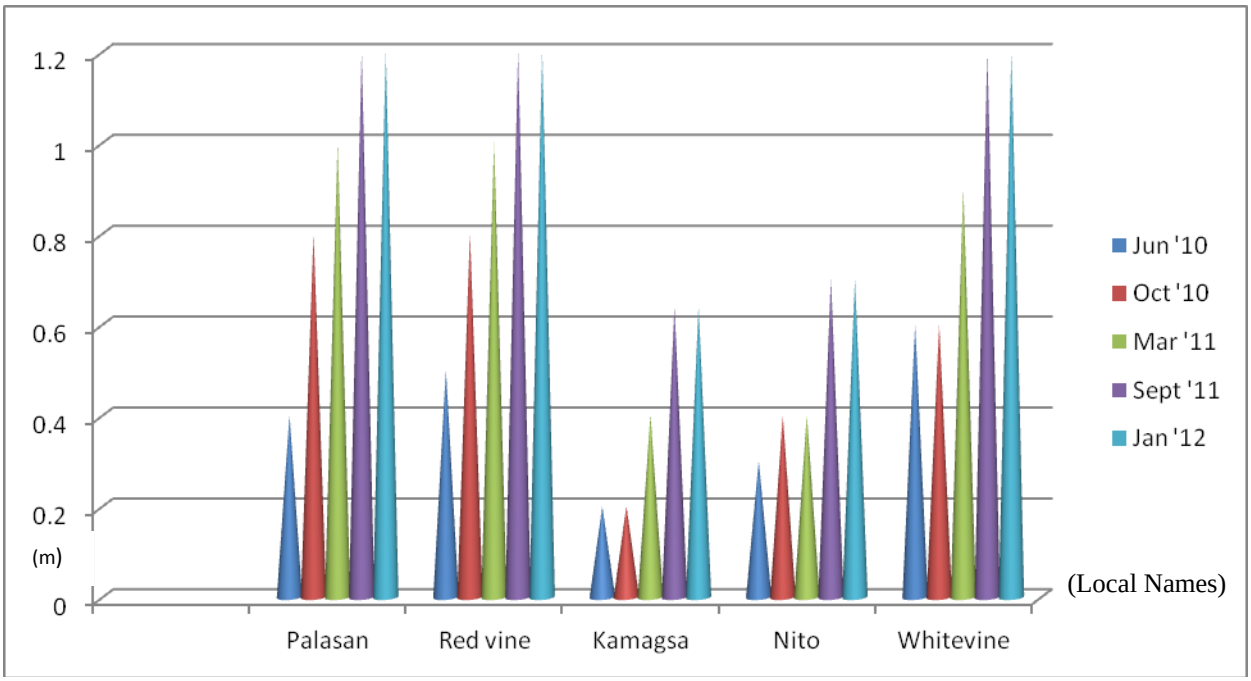


Figure 6. Regeneration growth (length) of most dominant species in Kapatirang Samahan ng Magsasaka ng Casispalan, Tagkawayan, Quezon.

Regeneration growth in diameter and length increment of six most dominant NTFP species for Caayunan Bantay Kalikasan, Inc. (CBKI) in Basud, Camarines Norte is shown in Figures 7 and 8. The greatest diameter growth was obvious and prominent for anahaw (*Livistona rotundifolia* (Lam.) Mart.) at about 2.3 cm average in four measurement periods (Fig. 7). Nito showed the least among the species with only about 0.3 cm average for the periods shown in the graph. Interestingly, height increment was found greatest for hagnaya (almost 1.2 m) while anahaw only had around 0.75 m behind tilob (*Dicranopteris linearis* (Burm. f.) Underw.) , 0.8 m and kamagsa [(*Agelaea borneensis* (Hook.f.)], 0.78m.

In Tuaca Environment Action Brigade, Inc. (TEABI), Basud, Camarines Norte, diameter increment among the nine (9) most dominant NTFP species was greatest for the climbing palm, limuran (*Calamus ornatus* Blume.) at an average of around 1.85 cm in four (4) measurement period shown in Fog. 9. Least diameter growth was exhibited by nito at only 0.2 cm. Length increment was found greatest again for limuran at 2.0 m as shown in Fig. 10 and least for bamboo orchid (*Setaria palmifolia* (*Koenig*) Stapf) at about 0.2 m. Other species

with considerable length increment for the 4 measurement period were huyo, 1.8 m and lukmoy (*Raphidophora monticola* Krause) at 1.5 m.

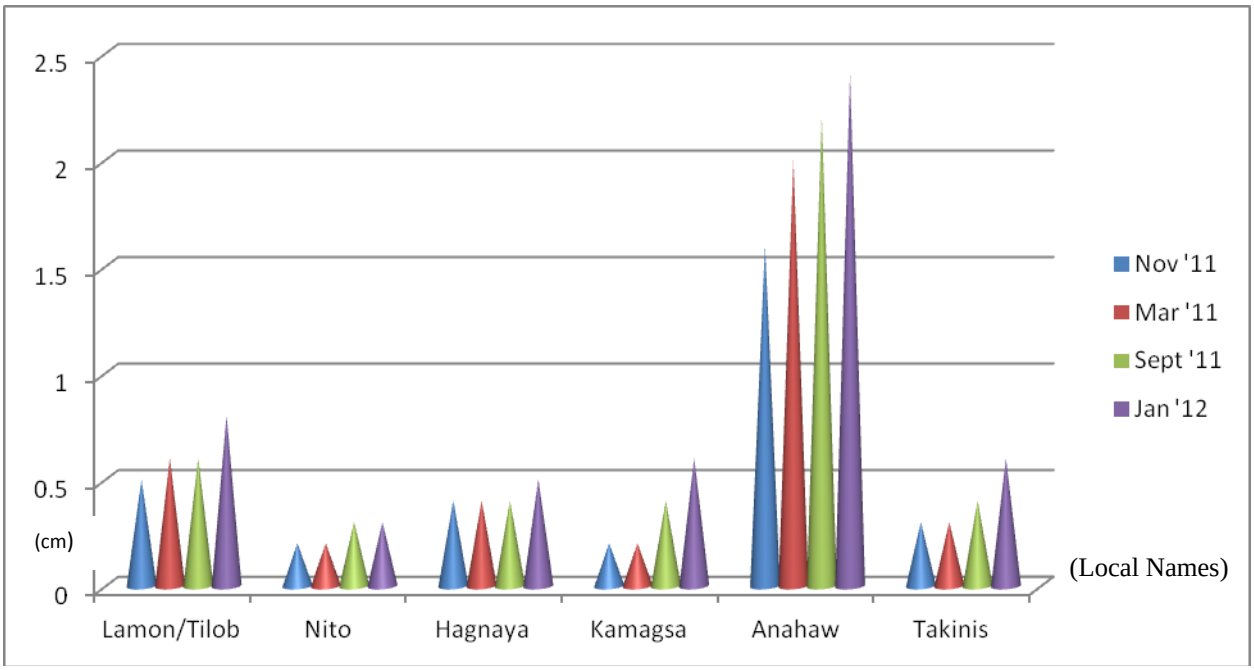


Figure 7. Regeneration growth (diameter) of most dominant species in Caayunan Bantay Kalikasan, Inc. (CBKI), Basud, Camarines Norte.

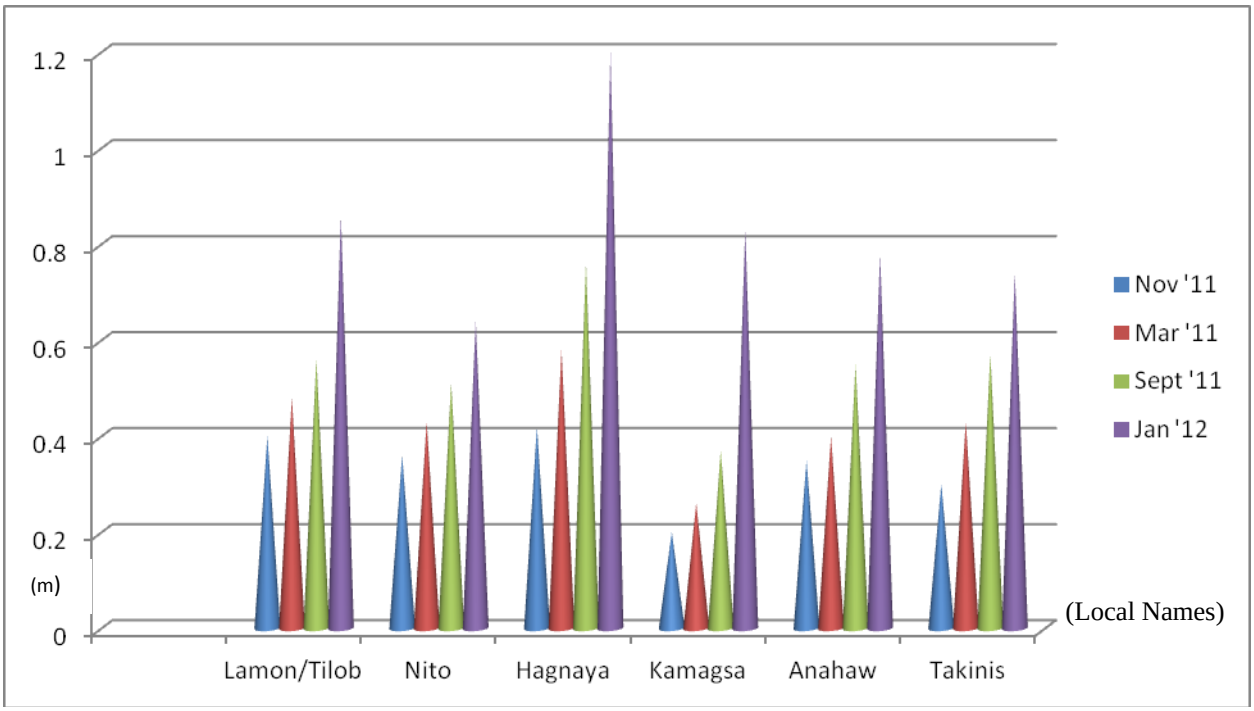


Figure 8. Regeneration growth (length) of most dominant species in Caayunan Bantay Kalikasan, Inc. (CBKI), Basud, Camarines Norte.

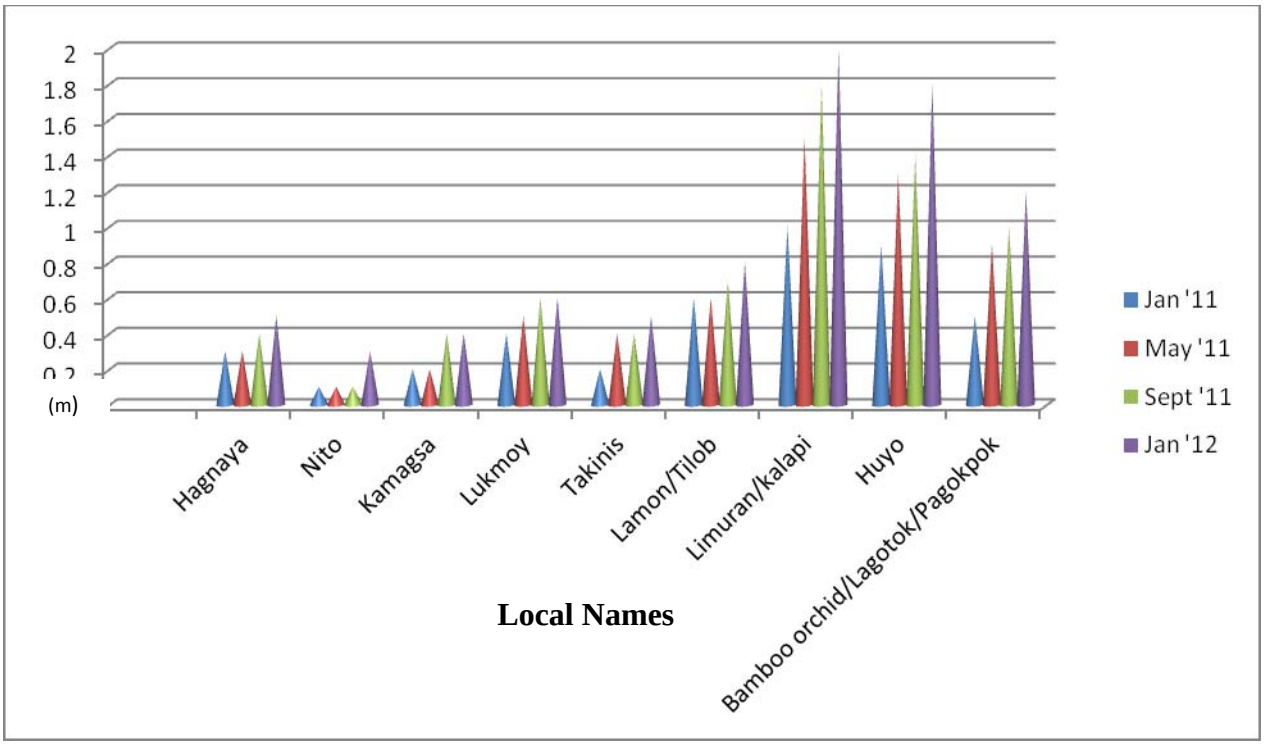


Figure 9. Regeneration growth (diameter) of most dominant species in Tuaca Environment Action Brigade, Inc. (TEABI) , Basud, Camarines Norte.

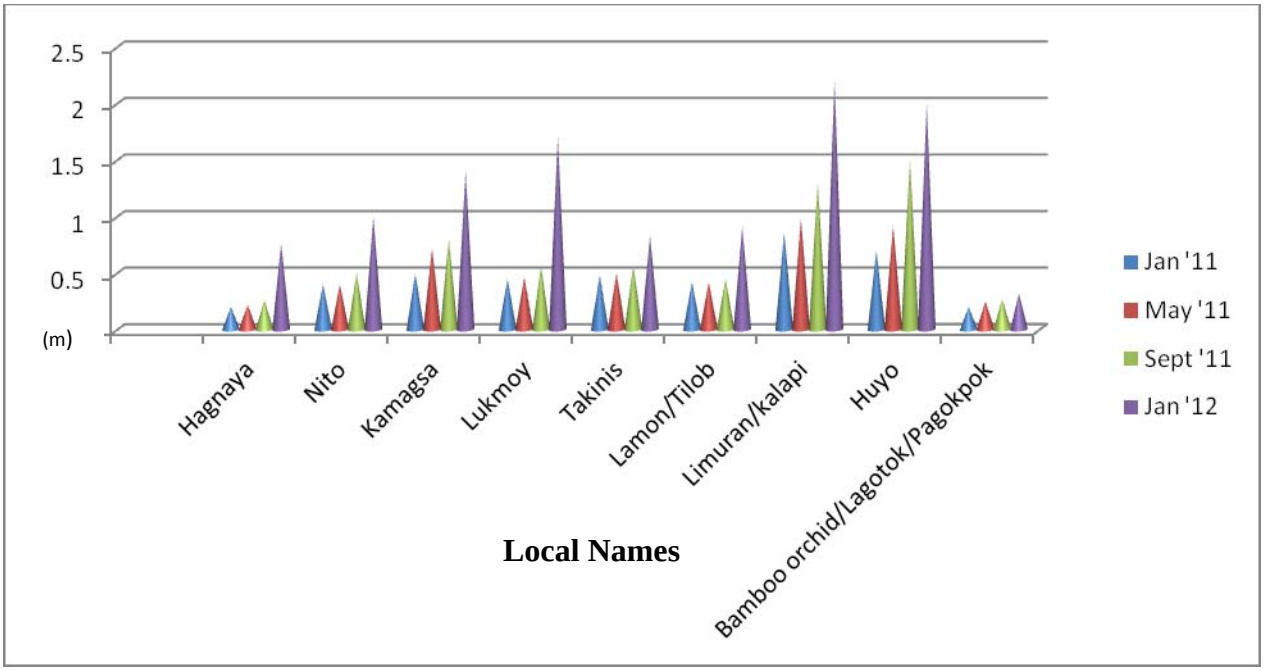


Figure 10. Regeneration growth (length) of most dominant species in Tuaca Environment Action Brigade, Inc. (TEABI) , Basud, Camarines Norte.

Figures 11 and 12 depict in graphs the diameter and length increment for the seven (7) most dominant NTFP species at San Pascual Community Based Resource Management, Inc., Basud, Camarines Norte project site.

Diameter growth was greatest for huyo at around 1.2 cm average for the three measurement periods shown in Fig. 11. The least was found in nito (*Lygodium circinatum* (Burm.)Bedd.) with only a little more than 0.2 cm diameter increment.

Length increment was, however, greatest for hagnaya [*Stenochlaena palustris* (Burm.f.) Bedd.] at almost 1.4 m for three measurement periods indicated in Fig. 12. While nito emerged as third (close to 1.0 m) among 7 dominant species, huyo which got the greatest diameter increment got the least of length increment (0.4 m) similar to anahaw (*Livistona rotundifolia* (Lam.) Mart.).

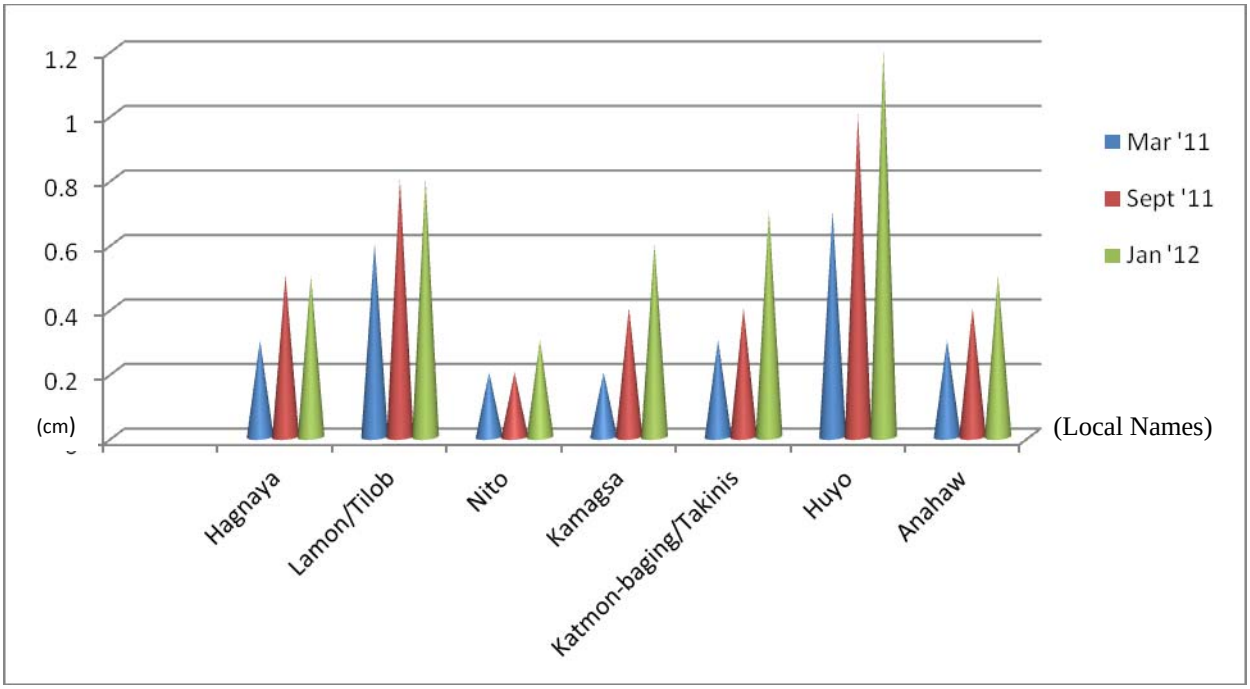


Figure 11. Regeneration growth (diameter) of most dominant species in San Pascual Community Based Resource Management, Inc, Basud, Camarines Norte.

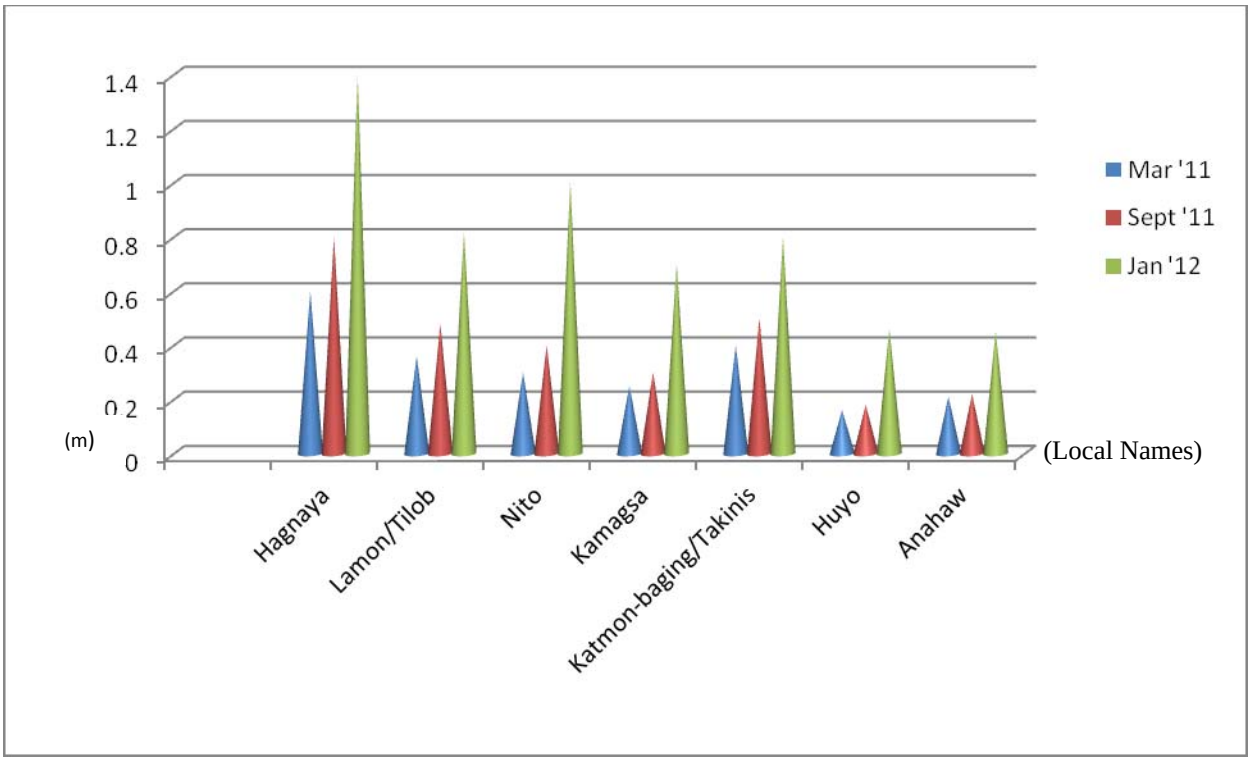


Figure 12. Regeneration growth (length) of most dominant species in San Pascual Community Based Resource Management, Inc, Basud, Camarines Norte.

Regenaration measurements for three given period at Tao-Kalikasan Foundation in Labo, Camarines Norte are shown in Figures. 13 and 14. Diameter increment was greatest for anahaw (*Livistona rotundifolia* (Lam.) Mart.) at around 1.35 cm and least for nito which did not yield any increase at all. It was 0.18 cm on first measurement in April 2011 and was the same on the third period of measurement in January 2012.

Length increment on the other hand, was greatest for lukmoy (*Raphidophora monticola* Krause) and baling-uai (*Raphidophora monticola* Krause) which had an identical 1.4 m for the three measurement periods. Other species is the 10 most dominant ones seemingly did not exhibit apparent disparity in length increase as discerned in Fig. 14. Nonetheless, it was lowest for bariw (*Pandanus copelandii* Merr.) at a little more than 0.5 m while 0.6 m for nito [*Lygodium circinatum* (Burm.)Bedd.] and limuran (*Calamus ornatus* Blume.). The rest of the species showed length increment in the range of 0.65 m to around 0.7 m.

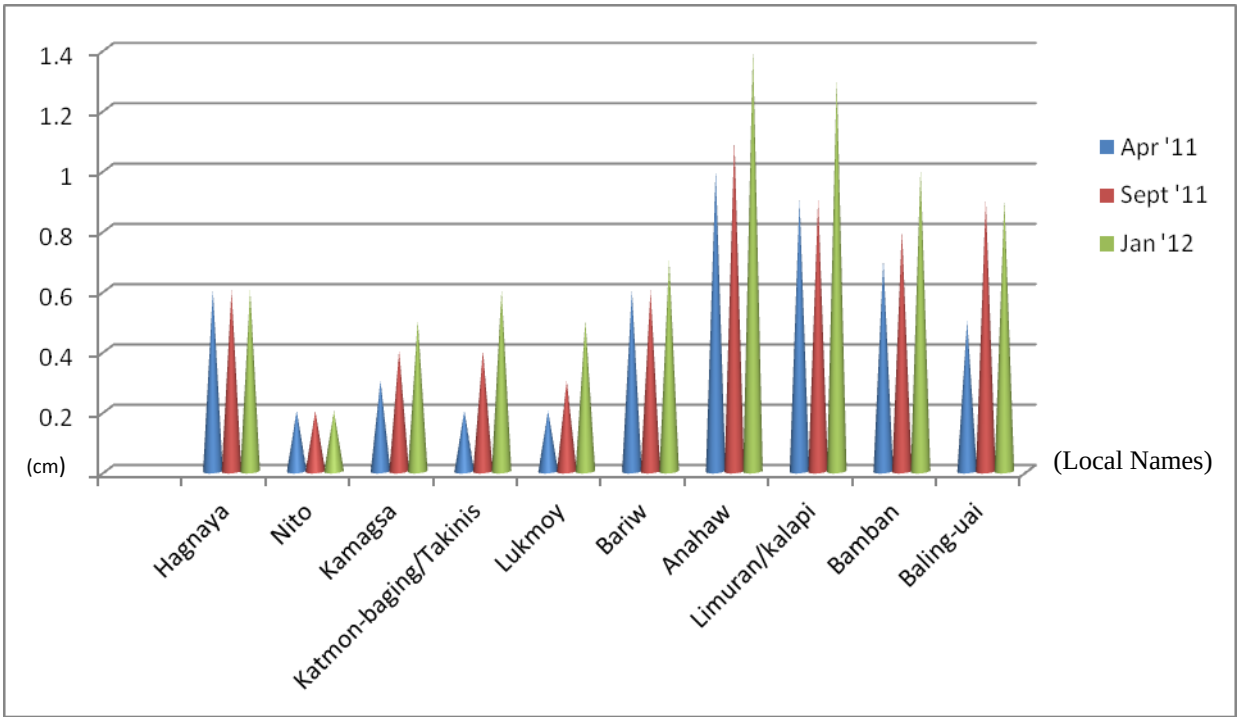


Figure 13. Regeneration growth (diameter) of most dominant species in Tao-Kalikasan Foundation of the Philippines, Inc. (TKFPI), Labo, Camarines Norte.

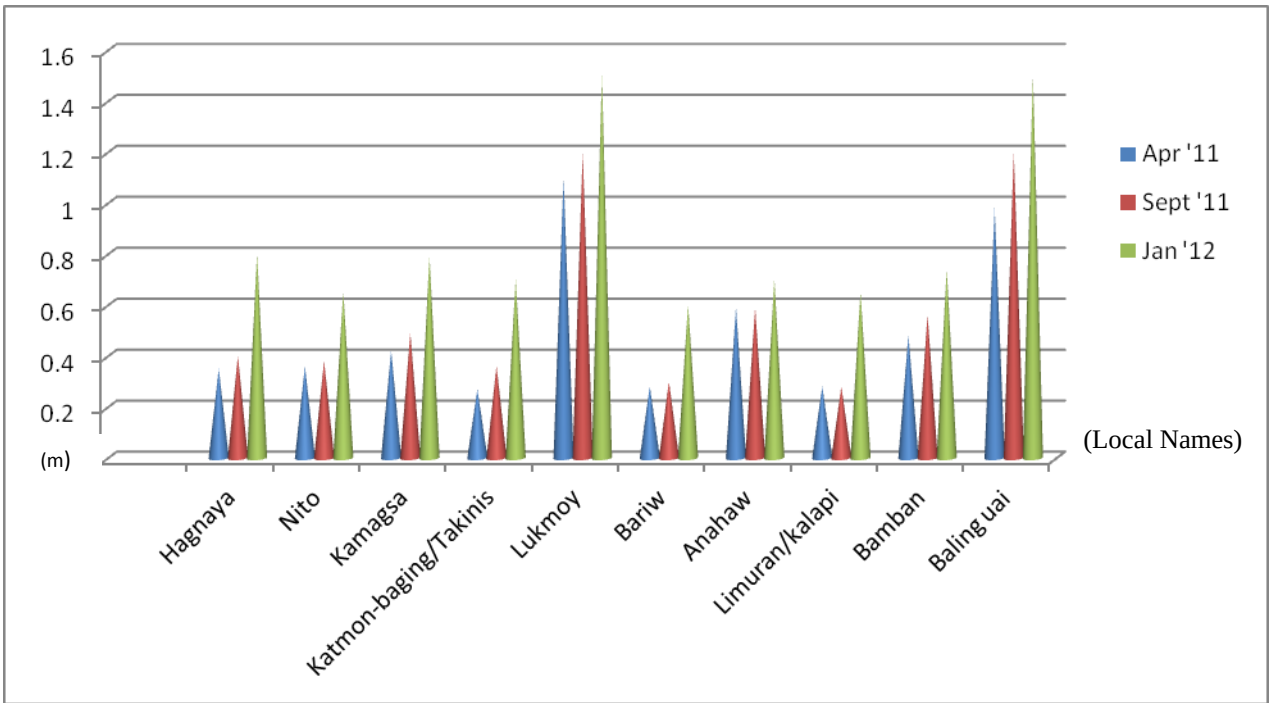


Figure 14. Regeneration growth (length) of most dominant species in Tao-Kalikasan Foundation of the Philippines, Inc. (TKFPI), Labo, Camarines Norte.

Extraction Intensity

Photographs of NTFP's during the interview of handicraft shops and manufacturers: a. galtang (*Arcangelisia flava* (L.) Merr.), b. gugo (*Entada phaseoloides* (L) d. dilang butiki.

In Table 8 are integrated data and information gathered from manufacturers and handicraft shops in Camarines Norte Province covering the towns of Daet, Labo, and Basud while Table 9 showed the same for shops interviewed in Quezon.

Interpolating from the data (Table 8) using baling-uai *(Flagellaria indica)* and bamban *(Donax cannaeformis*) as examples, plates produced from the former requires 10 pcs. for the base, each piece measures 17 inches. Thus, 10 pcs. will have a total length of approximately 14 ft (roughly 4.2m). Collection intensity as indicated is 2 dozen (24 pcs.) per month with 14 dozen stocks. Taking average collection on a yearly basis, we obtain 408 l.ft. (approximately 120.6 lineal meter). Relating, then, the density and volume of baling-uai gathered in the project sites at Tao-Kalikasan Camarines Norte province (Table 7) it appears that collected materials far exceeded the 75.59 total volume of *Flagellaria* inventoried. Nonetheless, it could be due to collection from other areas not covered by the survey and inventory. If such data on collection is consistent 120 l.m. per year) the species may be found elsewhere in the province abundantly.

Regeneration growth of *Flagellaria* as shown in Table 7 of tagged regenerants shows a total of 13 individuals having average increment in length and diameter of 0.22 m and 0.4 cm, respectively. The species, seemingly. Is slow-growing and there appears threat on its supply from the natural forest.

On the other hand, bamban (*Donax*) manufactured to laundry basket is being collected at a rate of 36 plants (1.5 m tall) for a set of laundry basket. Frequency of collection is 1 set per month. On a regular basis approxiamtely 432 plants of the said species is expected for collection yearly to sustain 1 set per month of laundry basket from bamban. Relating again the intensity of expected collection with obtained inventory density of the material, Table 7. from Tao-kalikasan shows a total of 189 individuals. Again, the materials gathered far exceeded density obtained from 5-ha inventory plots. It could be attributed once more to occurrence of bamban in other sites and localities within the province not covered by the survey and inventory. Regenerants of *Donax* in the inventory plots were found growing at an average rate in height of 0.8 cm per quarter.

Interpolation of harvesting or extraction rate incidentally can be applied or employed to larger areas should the second growth forest size of a given province is known or given.

Table 8. Handicraft materials and products and source based on information gathered from manufacturers and handicraft shops.

Handicraft products (manufactured/being sold)	Materials used	Source or origin of materials either collected by store/manufacturing shop or purchased	Volume of supply collected or purchased per material	Frequency of purchased /delivery of supply (by material)
Plates	Baling-uai Bamban	Daet, Basud	10 pcs. baling uai for base(17 inches)	2 dozen per month (14 dozen stocks)
Laundry Basket	Baling uai Bamban	Daet, Basud, Labo	17 pcs. Baling uai (1 meter)/laundry basket. 36 pcs. (1.5m) of bamban for 1 set.	1 set per month (17 sets stocks)
Fruit tray (12"x 8"x 4")	Lamon Uway	Daet, Labo	25 pcs of lamon per piece 5 pcs of rattan per set	4 sets per month
Walis Tambo	Tiger grass	Daet	3-5 pcs of tiger grass/pc	10 pcs/month
Plates	Nito	Daet, Labo	5 pcs (1meter) per plate	2 dozen per month 8 sets (stock)
Basket	Baling-uai Uway	Daet, Labo	12 pcs of Baling uai (2meters) 36 pcs of uway /pcs of basket	2 pcs per month (13 stock)
Plates	Baling-uai Bamban	Labo, Daet, Basud	10 pcs of baling uai for base (17 feet/dozen) 16 pcs of bamban (12 inches/dozen)	1 dozen per month
Laundry basket (small, medium and large)	Bamban Baling-uai	Daet, Labo	17 pcs of Baling uai for 1 set (1 meter) 36 pcs of bamban for 1 set	3 sets per month
Fruit tray	Lamon Uway	Labo, Daet, Basud	35 pcs lamon (2 meters) 10 pcs uway (1 meter)	3 pcs per week.

Walis tambo	Tiger grass	Labo, Daet, Basud	3-5 pcs tambo/pc	10 pcs/2 month
Plates	Nito	Labo, Daet, Basud	6 pcs nito (1meter)/pc	2 dozen/month
Basket (small, medium, large)	Baling-uway Uway	Labo, Daet, Basud	12 pcs (1 meter)/set 36 pcs of uway/set	2 pcs/ month
Walis tambo	Tiger grass	Labo	3 pcs tiger grass /pc	50 pc /season
Laundry basket	Baling-uai bamban	Labo	17 pcs baling-uway (1 meter) 36 pcs bamban (1.5 meters)	5 sets per month

Table 9. Handicraft materials and products and source based on information gathered from manufacturers and handicraft shops.

Handicraft products (manufactured/being sold)	Materials used	Source or origin of materials either collected by store/manufacturing shop or purchased	Volume of supply collected or purchased per material	Frequency of purchased /delivery of supply (by material)
	rattan	Atimonan	12 ft for 1 pc.	
	hagnaya	Atimonan	2 meters for 1 pc.	
	Dilang butiki	Atimonan	1 kilo (10 ft)	More or less 50 kl/month
	Lukmoy	Atimonan	1meter for 1 pc.	More or less 30-50 per month
	Tilob	Atimonan	2 meters per pc. 100 pcs. per bundle	
	Baling-uai	Atimonan	1 pc (2 meters) 1 bundle (100 pcs)	
Basket	Uway,	Atimonan	Uway – 5 ft (20 pcs.) 1 bundle – 100 pcs.	10 pcs of bag per week

	Lukmoy		Lukmoy – (1 kilo – 10 ft)	
Bag	Huwag Lukmoy Tilob	Atimonan	Uway – 21 pcs. (3ft/pc.) Handle – (2 pc – 3ft) Lukmoy – 26 pcs (10ft.) Tilob – 5 pcs (6ft)	14 pcs. Per week
Eagle basket	Tilob Uway	Atimonan	Tilob – (6ft) (40 pcs.) Huwag – 17 pcs (split) (3ft)	1 pc per week
Basket	Uway lukmoy	Atimonan	Standard size : 1 bundle – 100 pcs. 6ft /pc. Lukmoy – 1 kilo (10ft/kl)	5 pcs per month
Bag	Tilob Uway Lukmoy	Atimonan	Tilob (5 pcs) 6ft/pc Huwag – 21 pcs (3ft /pc) Lukmoy – 26 pcs 95ft /pc)	5 pcs per month
Plates	Huwag Lukmoy	Atimonan	Lukmoy – 4 pcs (1 meter) Huwag – 9 pcs (10 inches)	5 dozenper month (1 dozen = 12 plates)
Plates	Huwag Bamban	Atimonan	Huwag – 4pcs (1meter) Bamban – 20 pcs (2 meter)	
Nito plates	Nito	Atimonan	15 pc of nito for 1 plate (1 meter)	1 dozen per month
Basket	Bamban Baling-uai	Atimonan	20pcs of baling-uai (1 meter) and 35 pcs of bamban (1 meter) for 1 set	3 basket per month
Bag	Tilob huwag	Atimonan	35 pcs of Tilob (1 meter) 4 pcs of huwag (1 meter)	2 pcs per month
Nito plates	Nito	Atimonan	17 pcs of nito for 1 plate	2 dozen per month

CONCLUSION

Resource survey and inventory of available materials for handicraft industry will remain an important and very significant component of any endeavor to sustain such industry. Knowledge of material component and their relative number available for utilization from the natural forest are always relevant. Information on their regeneration will, moreover, provide ideas to industrialist on sustainability of product market and the industry itself.

Sustainable management and utilization of material resources will always have to consider the collection practices and appropriate conservation measures including the regeneration growth of subject non-timber forest products species. They may be harvested either for their leaves, stems, roots or even barks. When harvested for stems as in most erect and climbing palms and vines depletion of supply certainly becomes a big threat when done indiscriminately and sustainability of the industries that rely on the natural supply of material is put at state.

Collection for stem utilization for that matter should be based on age or size of the plant material. In doing so, it will ensure perpetuity giving time for the young ones to grow and attain full maturity to serve as future stock for harvest. Nonetheless, there is no specific law that covers the non-timber forest resources except perhaps the rattans (climbing palms). Care should be exercised when collecting for the leaves as in most pandan and buri to make sure photosynthetic activity that sustains the life of the plant proceeds normally. There should always be consideration for residuals or young regenerants. Care shoud be taken when collecting stems such as pulling down rattan and forest vines. The rule can be always give allowance for the next generations of crops as excessive cutting or harvesting will devastate the stand and will not guarantee material for future use.

RECOMMENDATIONS

In attempting to conduct and implement a similar project in the future, it would be best to identify exhaustively all possible agencies, sectors, organizations, individuals who could provide assistance and cooperation particularly in conduct of field activities. Allowance for delay in implementation of scheduled activities should always be considered in relation to weather, the peace and order situation and prevailing condition in the field or forest. Although there may be pre-identified project sites/areas, flexibility should be exercised in locating similar areas that would equally yield the needed results or output. Material resource survey and inventory in particular should cover a wider scope or be conducted more extensively to provide a wider base of data and information on non-wood forest products species distribution, supply and volume including regeneration.

Annex A. Photographs of dominant species in Quezon and Camarines Norte the project sites.

Local Name : Bamban
Scientific Name : *Donax cannaeformis*(G. Forster) K. Schum.
Family Name: Marantaceae

Local Name : Baling-uai
Scientific Name : *Flagellaria indica* L.
Family Name: Flagellariaceae

Local Name : Kamagsa
Scientific Name : *Agelaea borneensis* (Hook.f.) Merr.
Family Name: Connaraceae

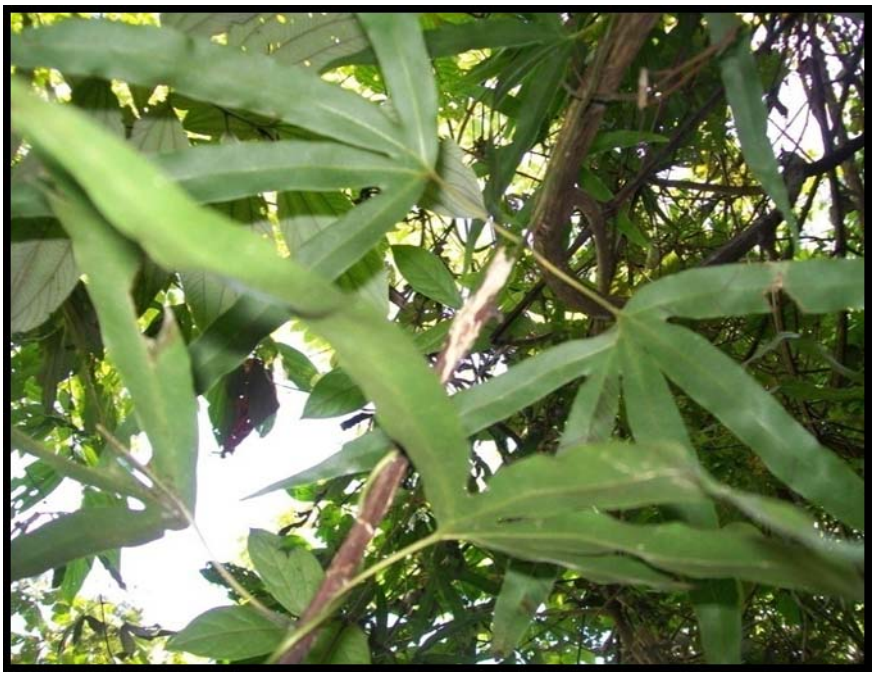
Local Name : Lukmoy
Scientific Name : *Raphidophora monticola* Krause
Family Name: Araceae

Local Name : Gugo
Scientific Name : *Entada phaseoloides(*L.) Merr.
Family Name: Mimosaceae

Local Name : Tilob/Lamon
Scientific Name : *Dicranopteris linearis* (Burm. f.) Underw.
Family Name: Gleicheniaceae

Local Name : Anahaw
Scientific Name : *Livistona rotundifolia* (Lam.) Mart.
Family Name: Arecaceae

Local Name : Hagnaya
Scientific Name : *Stenochlaena palustris* (Burm.f.) Bedd.
Family Name: Blechnaceae



Local Name : Nito
Scientific Name : *Lygodium circinatum*(Burm.) Bedd.
Family Name: Schizaeaceae

Local Name : Banot/Pakpak angel
Scientific Name : *Bauhinia sp.*
Family Name: Caesalpiniaceae

Local Name : Red vine
Scientific Name : *Freycinetia sp.*
Family Name: Pandanaceae

Local Name : White vine
Scientific Name : *Freycinetia sp.*
Family Name: Pandanaceae

Local Name : Limuran/kalapi
Scientific Name : *Calamus ornatus* Blume.
Family Name: Palmae

Local Name : Katmon baging/takinis
Scientific Name : *Tetracera scandens* (L.) Merr.
Family Name: Dilleniaceae

Local Name : Bamboo orchid/Lagotok/Pagokpok
Scientific Name : *Setaria palmifolia* (Koenig) Stapf.
Family Name: Poaceae

Annex B. Some Photographs of regenerants in the project sites in Quezon and Camarines Norte Provinces.

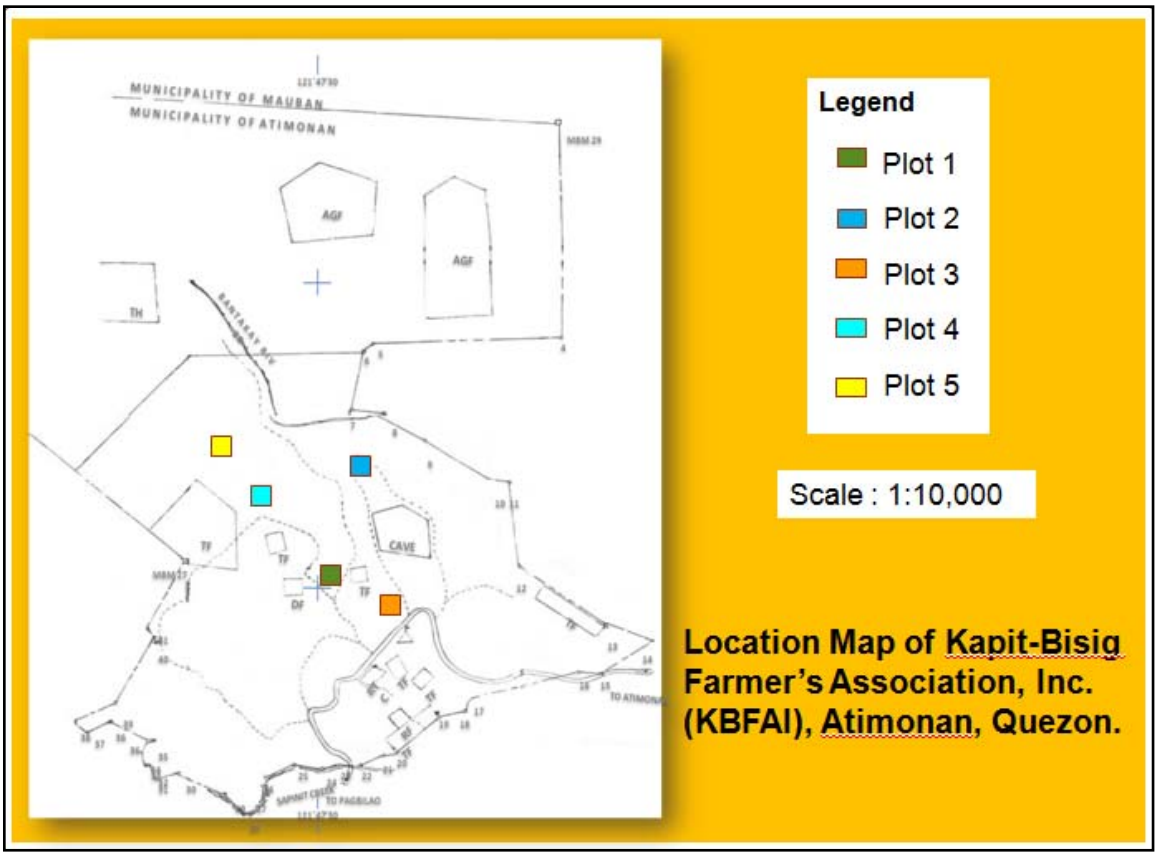
Young regenerants of anahaw [*Livistona rotundifolia* (Lam.) Mart.]
Photo taken in Atimonan, Quezon

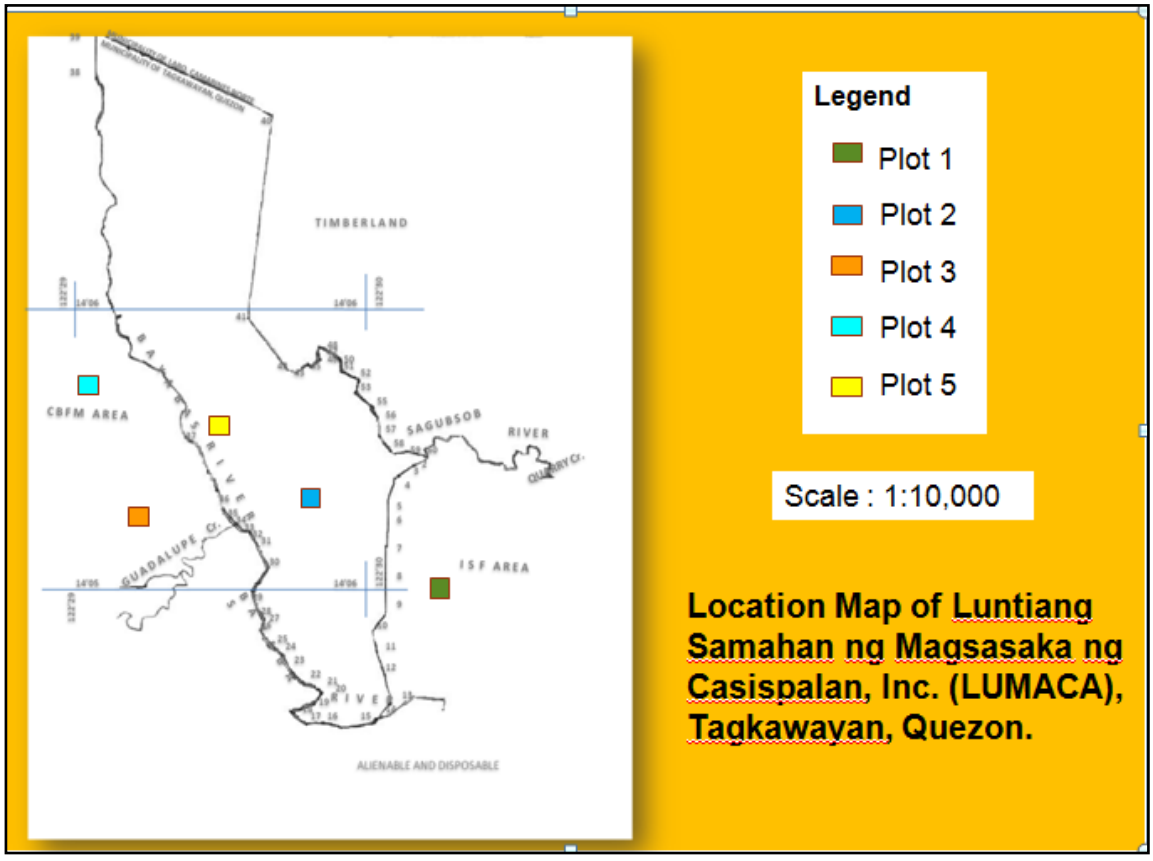
Young regenerants of limuran (*Calamus ornatus* Blume.)
Photo taken in Tagkawayan, Quezon.

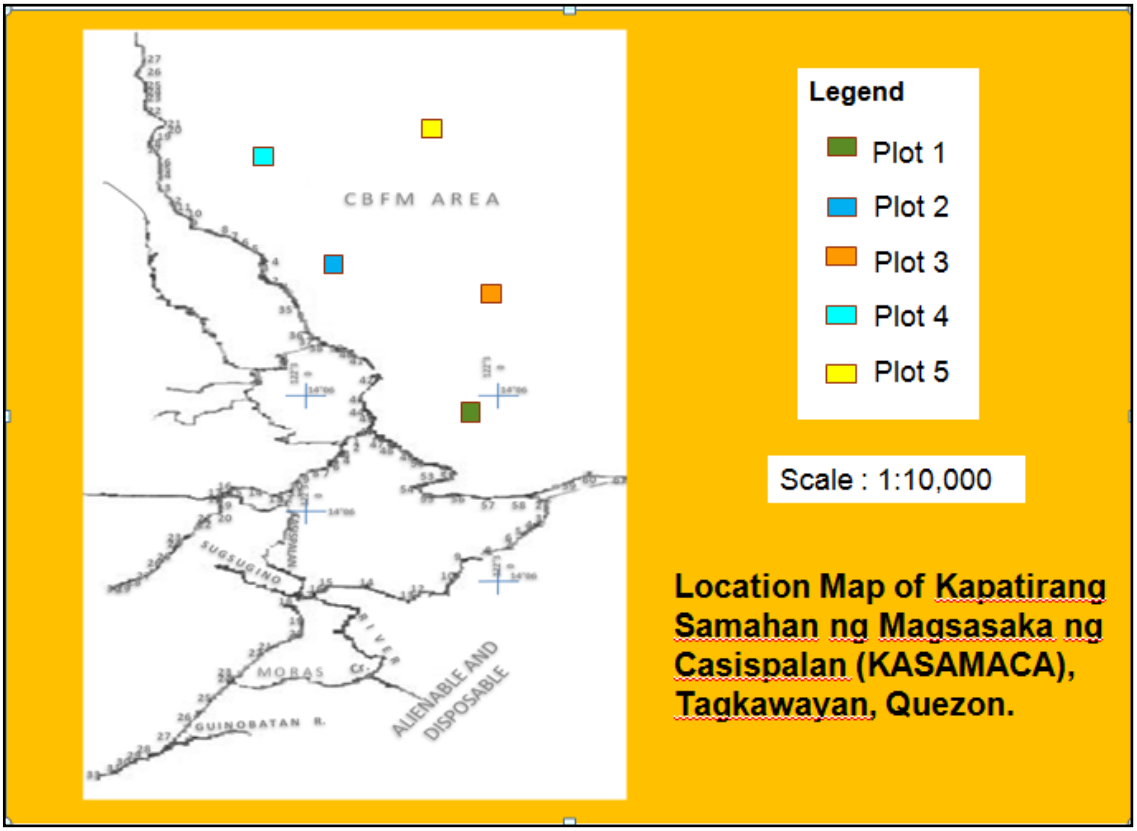
Initial measurement of diameter and length of *Calamus ornatus* Blume.

Initial measurement of diameter and length of *Setaria palmifolia* (Koenig) Stapf..

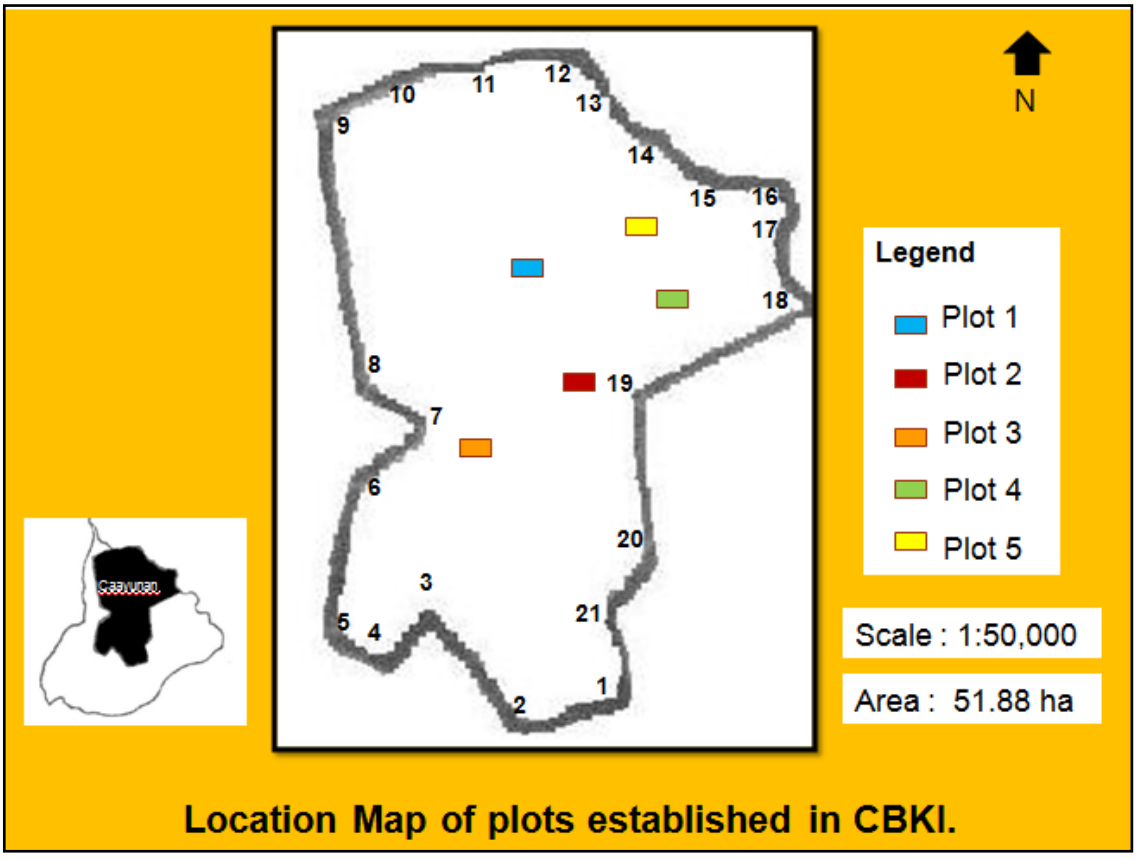
Annex C. Location Maps of Quezon and Camarines Norte Project Sites



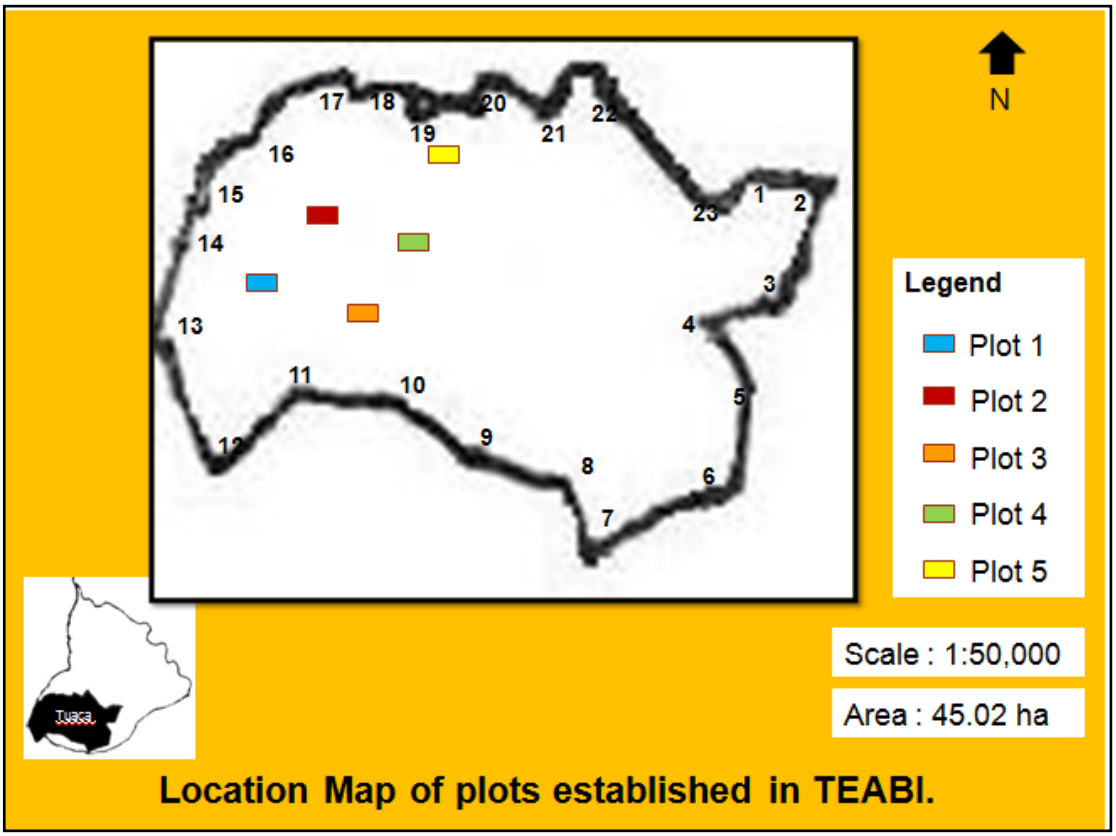




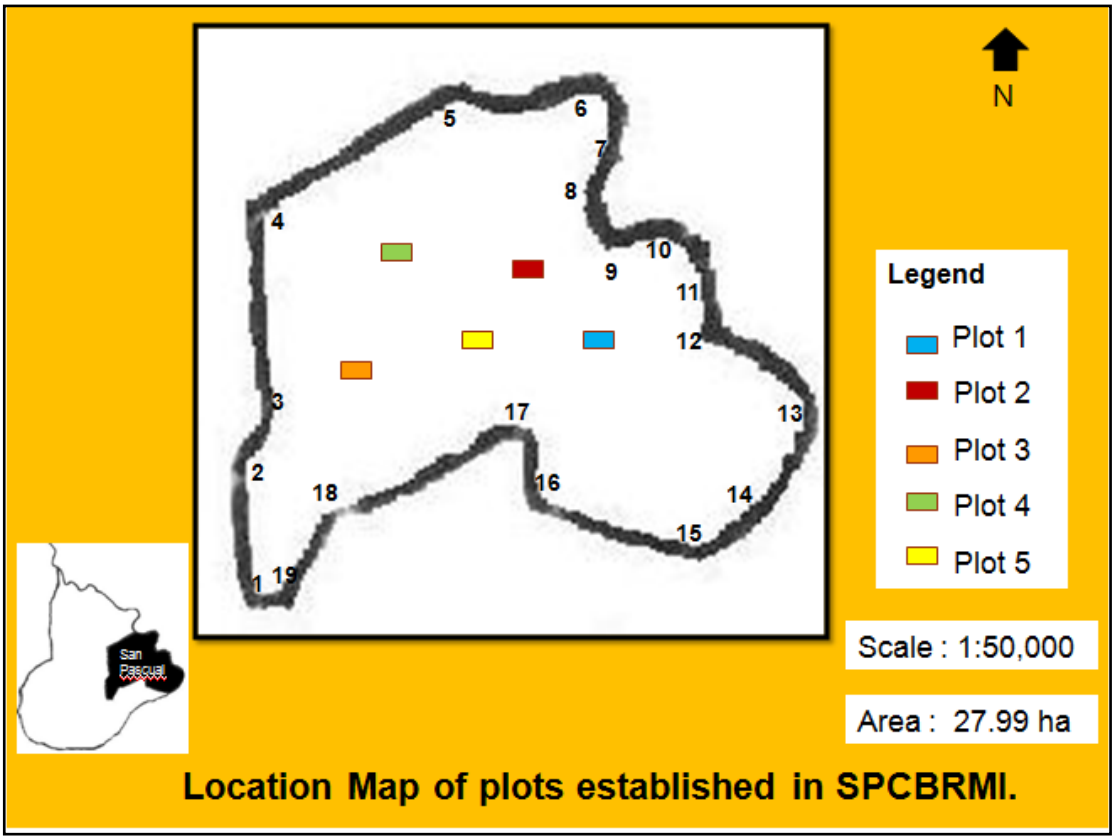
Location Map of Kapatirang Samahan ng Magsasaka ng Casispalan (KASAMACA), Tagkawayan, Quezon.



Location Map of plots established in CBKI.



Location Map of plots established in TEABI.



Location Map of plots established in SPCBRMI.

Annex D. Interviews conducted for Extraction Intensity of NTFP

Interview with Ms.Prima C. Avallez, NTFP collector in Pagbilao, Quezon.

Interview with Mr. Bernie Abisamis, handicraft manufacturer in Tayabas, Quezon.