

Forest Vines and their Volume in Selected Municipalities of Camarines Sur and Albay Provinces, Philippines

Jennifer M. Conda*, Mario DR. Ramos, Rodrigo E. Cortez, Jr. and Jovito A. Elec

Department of Science and Technology – Forest Products Research and Development Institute,
College, Los Baños, Laguna, Philippines

*Corresponding author. E-mail: jhen_0421@yahoo.com

ABSTRACT

This study provides information on the availability and volume of forest vines in the province of Camarines Sur and Albay. Three quadrants measuring 100 x 100 ha were laid-out in each of the project areas namely: Bula, Pamplona, Balatan, Maramba and Bogtong. Forest vines inside the quadrant were identified while length and diameter were measured for the density and volume computation. A total of twenty forest vine species belonging to twenty genus and fifteen families were inventoried. Most species belong to the family Menispermaceae. Samahang Organisyong Pangkalikasan (SOK) and Maramba Upland Farmers Association Inc. (MUFAI) have the highest and lowest species diversity, respectively. The forest vines with large volumes were *Ichnocarpus frutescens* (L.) W.T. Aiton, *Derris elliptica* (Roxb.) Benth., *Merremia peltata* (L.) Merr., *Arcangelisia flava* (L.) Merr and *Ficus subulata* Blume. Regeneration and propagation study of forest vines are encouraged for sustainable supply of raw materials to Bicol provinces as well as to the country's handicraft industry.

Keywords: forest vines, density, volume, propagation, regeneration

INTRODUCTION

The Philippines is one of the world's producer of handicrafts. Among its regions, Bicol is home for good quality, innovative handcrafted bags and baskets which generated US\$2.87-M in export sales, PhP45.30-M in domestic sales, P14.71-M in investments, and 1,387 jobs from 2009 to 2011 (Bulawan, 2012). Despite of this, the handicraft industry is experiencing export problems due to an insufficient supply of raw materials and stiff competition from other handicraft producing countries such as China, Vietnam, Malaysia, and Thailand.

To address these problems, resource surveys and inventories of forest vines have been conducted in several Bicol provinces. In 1992, Aragones *et al.* conducted a resource survey of forest woody vines in Camarines Norte and Sorsogon. Their study revealed twenty-eight forest vine species available for utilization. Meanwhile, the same study conducted in municipalities of Labo and Basud, Camarines Norte identified fifteen forest vines species including *Lygodium circinatum* (Burm.) Bedd., *Rhaphidophora*

monticola Krause, *Stenochlaena palustris* (Burm. f.) Bedd., *Agelaea borneensis* (Hook. f.) Merr., *Flagellaria indica* L., *Dicranopteris linearis* (Burm. f.) Underw., *Tetracera scandens* (L.) Merr., *Ichnocarpus frutescens* (L.) W.T. Aiton and others (Aragones and Maningas, 2012).

Other initiatives in solving the problem in supply of raw materials in Bicol included studies on the properties, harvesting, propagation and utilization of forest vines (Doydora *et al.*, 1990; Piñol *et al.*, 1996; Quimio, 2005; Razal and Palijon, 2009; Tolentino *et al.*, 2010; and the Philippine Council for Agriculture, Aquatic and Natural Resources Research and Development, 1994; 2013).

Regardless of the efforts, sources of raw materials are still a continuing problem for the gatherers and handicraft manufacturers in the region. Thus, inventory of forest vines is proposed in the other unexplored municipalities of Bicol provinces. This study aimed to determine the availability and volume of forest vines in selected municipalities of Camarines Sur and Albay provinces.

MATERIALS AND METHODS

Project Site Selection

The project sites selected were Community Based Forest Management (CBFM) areas in Camarines Sur and Albay with active Peoples Organization (POs). Accessibility, security and availability of forest vines were considered in the selection process. The POs suggested by the Department of Environment and Natural Resources (DENR) from Camarines Sur were Samahang Organisasyong Pangkalikasan (SOK), Samahang Nagkakaisang Magsasaka Para sa Magandang Kinabuhayan, Inc. (SANAMAMAKA, Inc.) and San Ramon Upland Farmers Association

(SRUFA). Whereas, the two POs from Albay were Maramba Upland Farmers Association Inc. (MUFAl) and Bogtong Concerned Citizen for Environment, Inc. (BOCCEI).

Forest Vines Inventory

Sampling plots were constructed in every project sites (Fig. 1). In each project site, three areas were selected. In each area, three plots measuring 100 m x 100 m (1 ha) consisting of 10 strips (Fig. 2) were established based on the volume, density and dominance of forest vine, stiffness in the area and prevailing environmental condition. In each strip, 10 quadrants were laid-out.

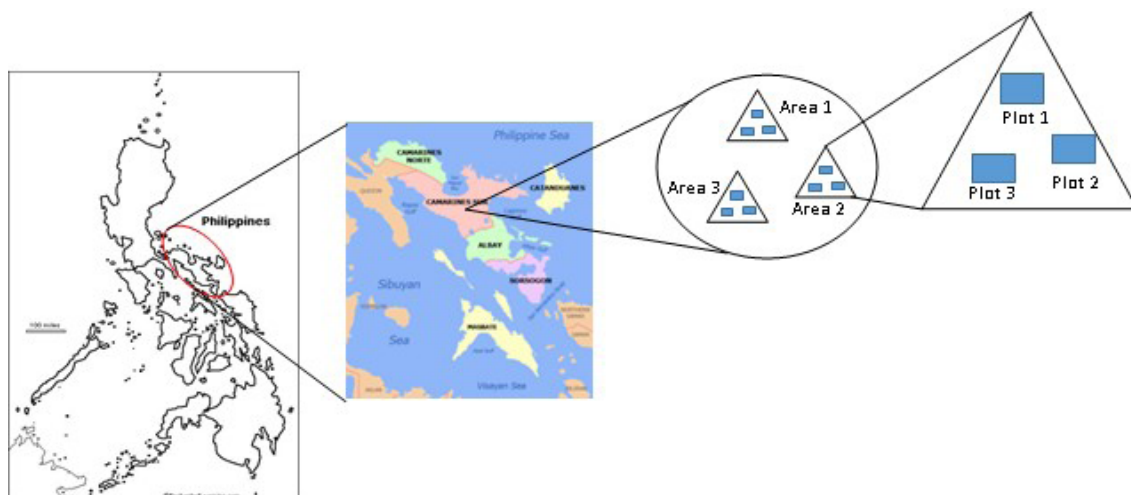


Figure 1. Project sites and sampling plots.

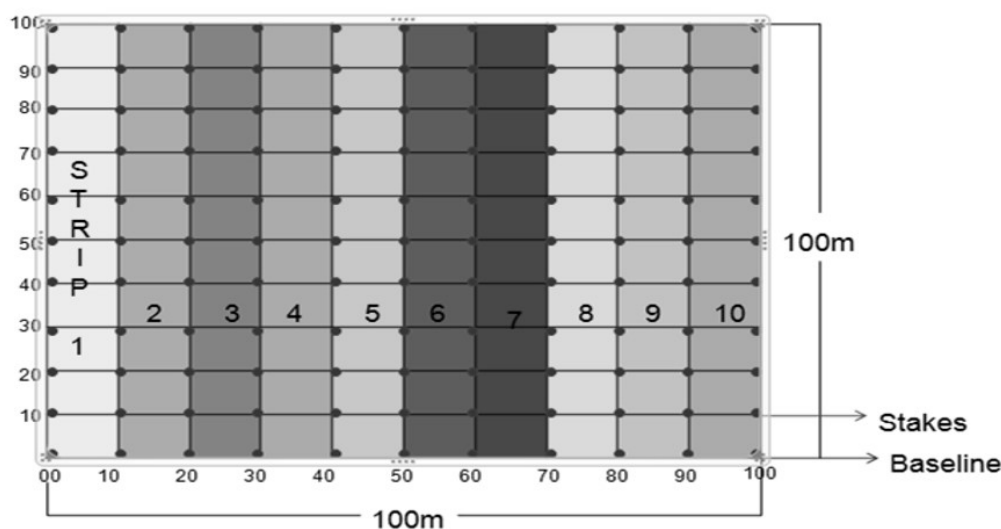


Figure 2. Lay-out of 1 hectare plots using the strip transect method.

All vine species were counted and recorded to determine the density (number of individuals of a particular species occurring within plot). The diameter (centimeter) and length (lineal meter) were measured using digital calipers and meter sticks (Fig. 3).

Initial measurements were taken from the stem's basal portion. Height or length was based on length of prostrate (lying down) stem and portion of stem that clings on to neighboring trees. Volume of forest vines were computed using the volume of a cylinder.



Figure 3. Field inventory activities: (a) plot establishment; (b) diameter and length measurement; (c) Tagging using paint.

RESULTS AND DISCUSSION

Forest Vines in the Camarines Sur and Albay

A total of twenty forest vine species belonging to twenty genera and fifteen families were inventoried and identified (Tab 1.). Location maps of the 1-hectare plots were provided (Figs. 4–8). High species diversity with a total of 17 forest vines was observed in Bula, Camarines Sur. Meanwhile, Maramba, Oas had the lowest density with a total of 10 forest vine species.

The traditionally used forest vines in handicraft weaving were *Lygodium circinatum* (Burm.) Bedd., *Ichnocarpus frutescens* (L.) W.T. Aiton, *Raphidophora pinnata* (L. f.) Schott., *Bauhinia integrifolia* Roxb. and *Flagellaria indica* L.

Alternative forest vines such as *Poikilospermum acuminatum* (Trec.) Merr., *Artabotrys blumei* J. K. & Th., *Anamirta cocculus* (L.) W. & A., *Pericampylus glaucus* (Lam.) Merr., *Entada phaseoloides* (L.) Merr. and *Freycinetia* species were rarely found in the project areas.

Table 1. Forest vines and volume in project areas in Camarines Sur and Albay Provinces.

Scientific Name	Plant parts used	Volume (lineal meter)				
		Camarines Sur				Albay
		Bula	Balatan	Pamplona	Maramba	Bogtong
Annonaceae						
<i>Artabotrys blumei</i> J. K. & Th.	stem	1.65				
Apocynaceae						
<i>Ichnocarpus frutescens</i> (L.) W.T. Aiton	stem	242.22	20.59	38.35	221.53	168.57
Araceae						
<i>Pothodium lobbianum</i> Schott.	aerial root	1.34	2.27			
<i>Rhaphidophora pinnata</i> (L. f.) Schott.	aerial root	32.55	2.01	3.71	1.27	11.75
Caesalpiniaceae						
<i>Bauhinia integrifolia</i> Roxb.	stem	47.63	7.52	18.69	23.46	76.29
Cecropiaceae						
<i>Poikilospermum acuminatum</i> (Trec.) Merr.	stem			16.58		
Connaraceae						
<i>Agelaea</i> sp.	stem	3.74	19.19	13.31	0.75	7.64
Convulvolaceae						
<i>Merremia peltata</i> (L.) Merr.	stem	168.59	124.01	23.58	1.02	122.27
Flagellariaceae						
<i>Flagellaria indica</i> L.	stem	8.40	11.01	8.26	6.82	35.09
Menispermaceae						
<i>Anamirta cocculus</i> (L.) W. & A.	stem	9.47				
<i>Arcangelisia flava</i> (L.) Merr.	stem	145.09			14.06	55.70
<i>Parabaena elmeri</i> Diels	stem	4.23				
<i>Pericampylus glaucus</i> (Lam.) Merr.	stem	0.06	21.98	0.76		
Mimosaceae						

Table 1. (Continued).

Scientific Name	Plant parts used	Volume (lineal meter)					
		Camarines Sur			Albay		
		Bula	Balatan	Pamplona	Maramba	Bogtong	
<i>Entada phaseoloides</i> (L.) Merr	stem					5.34	
Moraceae							
<i>Ficus</i> sp.	stem	10.70	78.41		154.06	60.46	
Pandanaceae							
<i>Freycinetia</i> sp.	aerial root			0.63			
Papilionaceae							
<i>Derris elliptica</i> (Roxb.) Benth.	stem	75.90	82.21	49.57	157.14	281.55	
Schizaeaceae							
<i>Lygodium circinatum</i> (Burm.) Bedd.	stem	26.07	37.06	32.70	26.26	21.06	
Vitaceae							
<i>Ampelocissus</i> sp.	stem	10.41				31.46	
<i>Cayratia japonica</i> (Thunb.) Gagn.	stem	43.36		1.13		3.33	

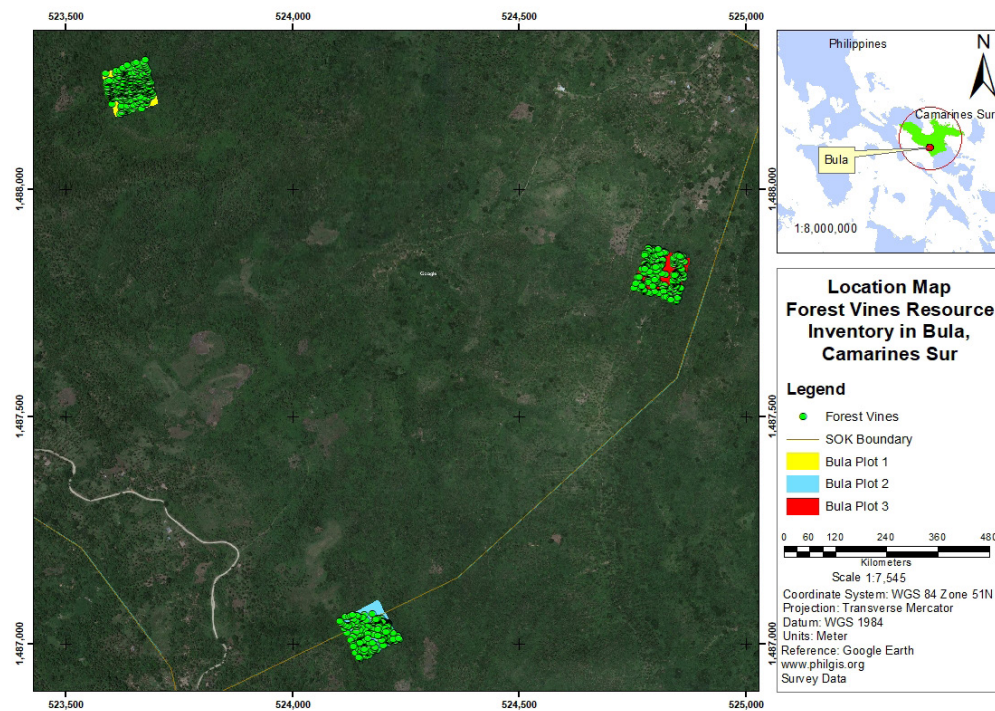


Figure 4. Location Map of the sampling plots in Bula, Camarines Sur.

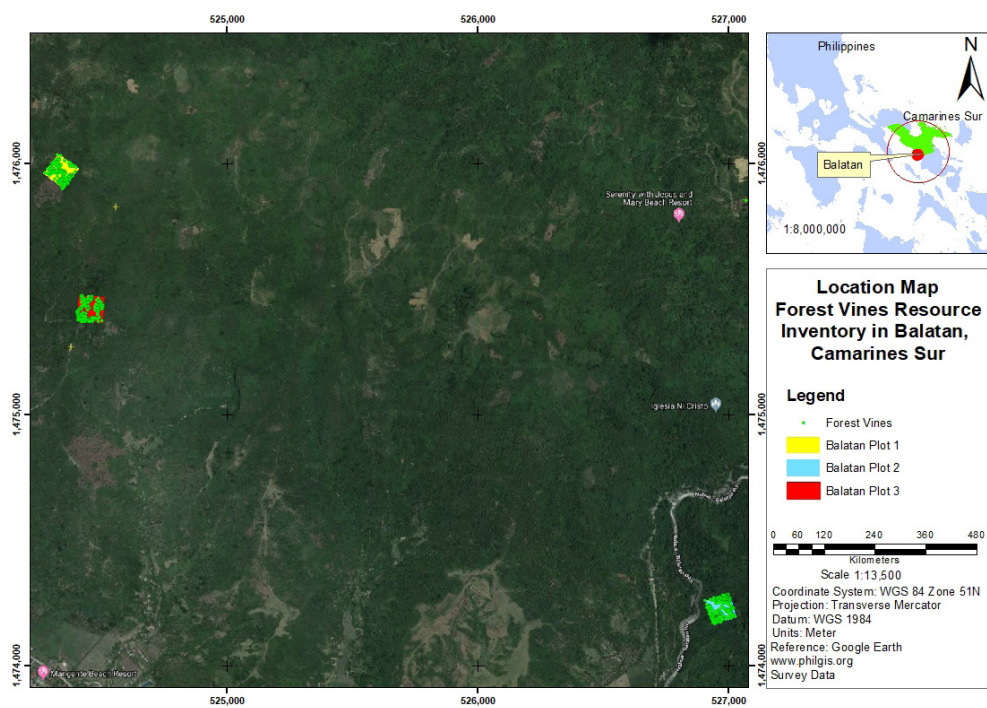


Figure 5. Location Map of the sampling plots in Balatan, Camarines Sur.

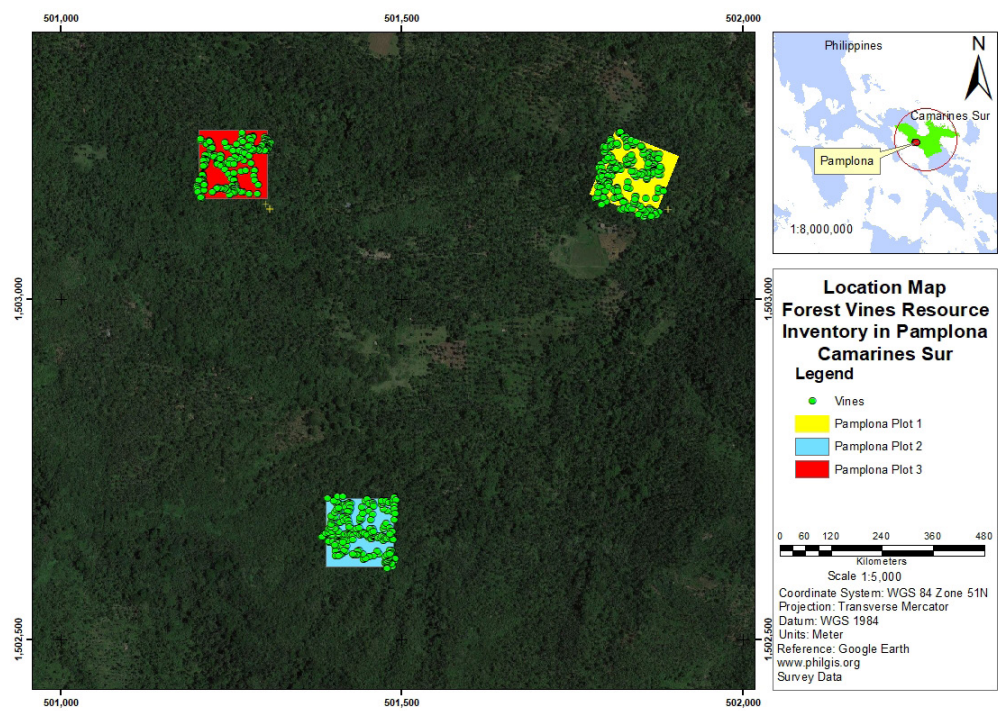


Figure 6. Location Map of the sampling plots in Pamplona, Camarines Sur.

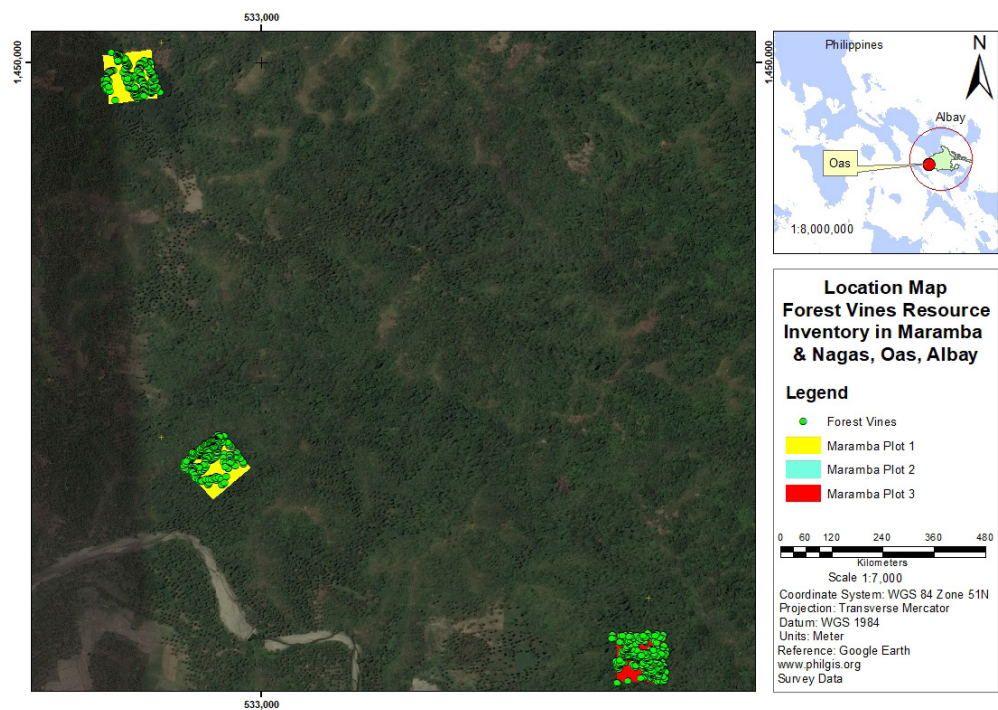


Figure 7. Location Map of the sampling plots in Maramba, Oas, Albay.

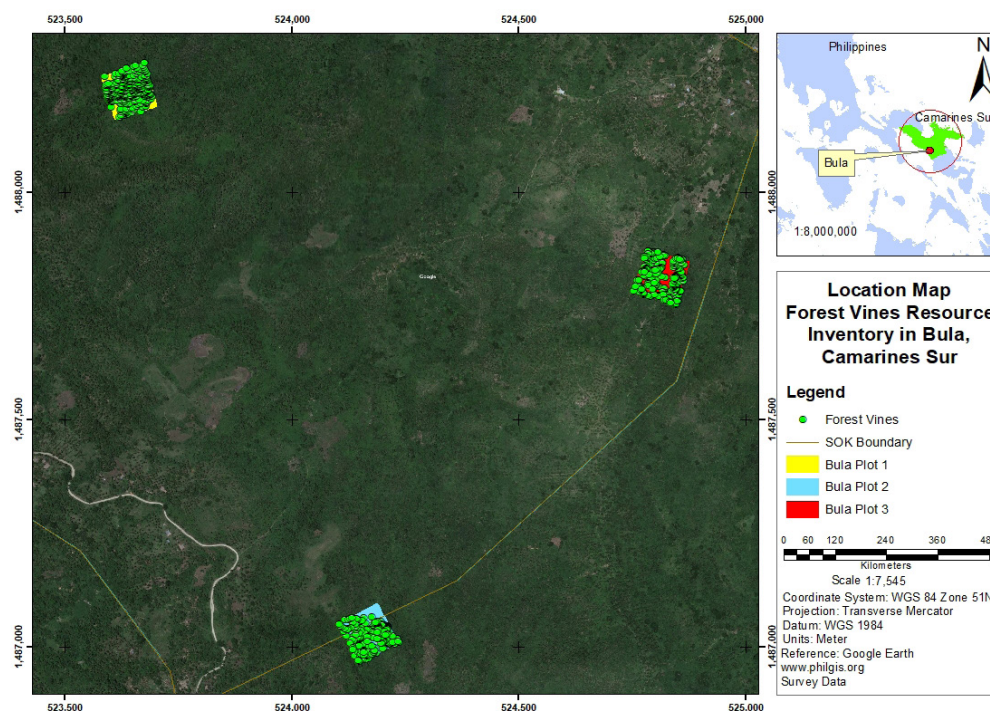


Figure 8. Location Map of the sampling plots in Bogtong, Oas, Albay

Differences in forest vines composition in the four provinces of Bicol (Camarines Sur, Camarines Norte, Sorsogon and Albay) were noticed as evidenced by the resource survey conducted by FPRDI (Aragones *et al.*, 1992; Aragones and Maningas, 2012). Several vine species observed naturally occurring in Camarines Norte and Sorsogon but not frequently found in Camarines Sur and Albay provinces were *Dicranopteris linearis* (Burm. f.) Underw., *Stenochlaena palustris* (Burm. f.) Bedd. and *Tetracera scandens* (L.) Merr.. Factors affecting differences could be climatic condition, soil types and geographic location. A thorough study on this is suggested for future research.

Per communication with residents of Pamplona, Camarines Sur, *Stenochlaena palustris* (Burm. f.) Bedd. and *Dicranopteris linearis* (Burm. f.) Underw. were previously occurring in their CBFM areas. However, the unregulated collection for handicraft production diminished their populations. Thus, policy on harvesting and collection of forest vines is recommended for sustainable utilization of NTFP. Planting and propagation of *Stenochlaena palustris* (Burm. f.) Bedd. and *Dicranopteris linearis* (Burm. f.) Underw. is suggested to outgrow the remaining population in the area.

Volume of Forest Vines

Table 1 shows the volume of forest vines per project sites. Species such as *Ichnocarpus frutescens* (L.) W.T. Aiton, *Derris elliptica* (Roxb.) Benth., *Merremia peltata* (L.) Merr., *Arcangelisia flava* (L.) Merr. and *Ficus subulata* Blume had the largest volume. The lowest volume was computed for *Lygodium circinatum* (Burm.) Bedd., probably, because few samples were inventoried and *Lygodium circinatum* (Burm.) Bedd. stems were cut during tree planting and dried when exposed to adverse environmental condition.

Based on this study, the volume of forest vines was insufficient to sustain the market demand. Visiting and interviewing some handicraft weavers and souvenir shops revealed that 5 meters of *Lygodium circinatum* (Burm.) Bedd. stems were needed to make one piece of *Lygodium circinatum* (Burm.) Bedd. plate. In weaving a laundry basket made up of *Flagellaria indica* L. 17 meters of *Flagellaria indica* L. were needed per set. Comparing it with the volume of forest vines surveyed, their volume is not enough to accommodate bulk orders whenever comes.

If a hundred percent inventory were to be conducted in the project sites, the volume of forest vines might sustain the orders for a short period. However, as

Table 2. Forest vines composition in different Bicol Provinces.

Forest Vines	Camarines Sur	Camarines Norte	Albay	Sorsogon
Annonaceae				
<i>Artabotrys blumei</i> J. K. & Th.	x			
Apocynaceae				
<i>Ichnocarpus friutescens</i> (L.) W.T. Aiton	x		x	
Araceae				
<i>Pothodium lobbianum</i> Schott.	x			
<i>Raphidophora monticola</i> Krause	x			
<i>Raphidophora pinnata</i> (L. f.) Schott.	x		x	
Blechnaceae				
<i>Stenochlaena palustris</i> (Burm.f.) Bedd.		x		x
Caesalpiniaceae				
<i>Bauhinia integrifolia</i> Roxb.	x	x	x	x
Cecropiaceae				
<i>Poikilospermum acuminatum</i> (Trec.) Merr.	x	x		x
Connaraceae				
<i>Agelaea borneensis</i> (Hook.f.) Merr.		x		
<i>Agelaea</i> sp.	x		x	x
Convulvolaceae				
<i>Merremia peltata</i> (L.) Merr.	x	x	x	x
Dilleniaceae				
<i>Tetracera scandens</i> (L.) Merr.		x		x
Flagellariaceae				
<i>Flagellaria indica</i> L.	x	x	x	x
Gleicheniaceae				
<i>Dicranopteris linearis</i> (Burm. f.) Underw		x		x
Menispermaceae				
<i>Anamirta cocculus</i> (L.) W. & A.	x			
<i>Arcangelisia flava</i> (L.) Merr.	x		x	x
<i>Parabaena elmeri</i> Diels	x			
<i>Pericampylus glaucus</i> (Lam.) Merr.	x			x
<i>Tinospora glabra</i> (Burm f.)		x		
Mimosaceae				
<i>Entada phaseoloides</i> (L.) Merr		x	x	x
Moraceae				
<i>Ficus</i> sp.	x		x	
Pandanaceae				
<i>Freycinetia</i> sp.	x			
Papilionaceae				
<i>Derris elliptica</i> (Roxb.) Benth.	x		x	x

Table 2. (Continued).

Forest Vines	Camarines Sur	Camarines Norte	Albay	Sorsogon
Schizaeaceae				
<i>Lygodium circinatum</i> (Burm.) Bedd.	x	x	x	x
Vitaceae				
<i>Ampelocissus</i> sp.	x		x	
<i>Cayratia japonica</i> (Thunb.) Gagn.	x		x	

Note: x = present/available

bulk orders come there would be a need to further study the propagation of forest vines and plantation establishment.

CONCLUSION

The Philippines is rich with forest vines that are of great importance to the handicraft industry. Aside from the commercially used forest vines, alternatives abound in the Philippine forests. Based on the result of the twenty forest vines that were inventoried, the density and volume of the vines were not enough to meet the demand of the industry. Thus, further study on regeneration and propagation is encouraged for the sustainable utilization of the natural resources.

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