

Appendix A:

TERMS OF REFERENCE

Consultancy on Rattan Growth study & Inventory

I. BASIC INFORMATION ABOUT CONSULTING TASKS

WWF Greater Mekong (WWF-GM)

WWF is one of the first international non-governmental organizations working in Viet Nam. In 1985, WWF began to implement a national conservation strategy and has since worked closely with the Government of Viet Nam on a variety of environmental issues as well as on-site activities nationwide. Find out more at www.panda.org/greatermekong. WWF Viet Nam is part of WWF Greater Mekong, operating in 5 countries: Laos, Thailand, Myanmar, Cambodia and Viet Nam. Find out more at <http://vietnam.panda.org/>.

Forests in the Greater Mekong Subregion (Thailand, Viet Nam, Laos, Myanmar and Cambodia) are considered as one of the regions with the highest rates of deforestation and forest degradation in the world. The wildlife system, ecological and hydrological functions as well as local communities that depend on and depend on these landscapes are experiencing significant negative impacts. Direct and indirect drivers of forest loss and degradation include population growth, ineffective land use planning, weak management, increasing market demand, and favorable policies. The result is more short-term results than sustainability.

IKEA and WWF are aware of these challenges and have worked together to transform the market over the past decade by using sustainable market needs as a driving force for positive change. WWF has successfully promoted sustainable management, responsible production and procurement of forest products (mainly rattan, bamboo, plantation timber) by small and medium-sized communities and businesses in the area Mekong subregion provided. WWF has supported local livelihoods and improved conservation by helping communities better organize their natural resources management and through developing and strengthening green supply chains. After piloting, scaling up and strengthening interventions successfully, the results need to be strengthened throughout the region. In this context, the IKEA / WWF Cooperation Project Phase 7 (Project SBARP) will be implemented under four main commodities (1) Rubber in Thailand; (2) Acacia in Viet Nam; (3) Rattan in Viet Nam and Laos; (4) Bamboos in Viet Nam, Laos and Cambodia.

In Viet Nam, the Project will continue and expand its participation with key stakeholders to (i) promote responsible forest management and trade activities for sustainable supply chains. Sustainability and standards of acacia and natural fibers (rattan), (ii) promoting national policies, laws and local governance structures as well as taking advantage of international standards to strengthen governance. management and regulation of FSC® certified forests at the national level to support acacia plantation households to continue investing in sustainable afforestation. In parallel with these, preparing small and medium-sized businesses and smallholders to comply with 'green' market requirements, towards complying with the US Lacey Act, the EU Timber Regulation (EUTR) and other similar laws, accordingly, is a prerequisite for small businesses to do business with international partners.

To ensure the enhancement of the legal rattan supply chain, the sustainable harvest and management of rattan resources, clear traceability, compliance with regulations on management and traceability of forest products according to Circular 27/2018-BNNPTNT, meet the international market requirements and contribute to developing a sustainable forest

management plan according to Circular 38/2014/TT-BNNPTNT especially in the Protection Forest Management Boards (PFMBs) in Central Viet Nam with the potential of natural rattan; a qualified consultant service and/or senior consultant will be recruited and contracted by WWF, with details as described below.

II. OBJECTIVES OF CONSULTANCY ACTIVITIES

Studying annual rattan growth and stock to develop a "reference" table about yearly sustainable harvest volume of the key commercial rattan species in natural forests belonging to PFMBs in Central Viet Nam.

- (i) Collect data about rattan stem growth rates, survival and reproduction rates (vital rates) in natural populations, including collecting rattan tissues for DNA (Please see Annex 2 for a visual guide to collecting rattan tissues for DNA).
- (ii) Conduct rattan inventory to collect information on the species composition, number of individuals or clumps, stem lengths, and extractable canes (number of stems and their lineal length, or green or dry weight) for the estimation of available rattan stocks in forests.
- (iii) Propose a sustainable harvest volume, including harvest intensity and rotation.
- (iv) Recommendations for management interventions to make optimize stocking. This might include enrichment planting or perhaps in some extreme cases, removal of excess stems.

III. SUBJECTIVE AND SCOPE OF CONSULTANCY ACTIVITIES

Collect secondary data (forest status of PFMB) in Central Viet Nam (from Thanh Hoa to Binh Thuan provinces).

Inventory, and study rattan growth rate of prioritized rattan species (Please see Annex 1 for details) except the *Calamus eugenei*/Mây nước mỡ/Mây nước gai vàng that has already been done) in PFMBs of A Luoi (Thua Thien Hue) and Dong Giang (Quang Nam).

Inventory the stock of common and commercially valuable rattan species in Central Viet Nam belong to natural forest of potential rattan volume in PFMBs provinces of Ha Tinh, Quang Binh, Quang Tri, Thua Thien Hue (Northern Central), Quang Nam and Quang Ngai (Central Coast).

Each rattan species identified for the growth rate should be inventoried at least 30 plants of each height level (< 1 m; 1 - 2 m; 2 - 3 m; 3 - 4 m; 4 - 5 m; > 5 m); total 180 plants (6 height levels).

In each selected province, one PFMB will be identified for rattan inventory for stock assessment.

In each selected PFMB for rattan inventory, survey on the growth and stock of rattan species with the total surveyed area determined according to Circular 33/2018/TT-BNNPTNT, with a survey rate of 0.03% of the total forest area of the entire selected PFMB.

Collecting plant samples of 6 selected rattan species for DNA analysis. Take photos, make specimens and collect 3-5 leaf and stem samples for each inventoried rattan species with GPS coordinates. Samples after being collected will be transferred to KEW Botanical Garden for DNA analysis (undertaken by WWF).

Editing materials/documents and organizing training to identify and classify common rattan species in the area.

Training methods to inventory for the growth and stock of common rattan species.

Technical training on sustainable rattan harvest and management.

IV. METHODOLOGY

4.1. Secondary data collection methodology

Collecting secondary data on the status of natural forests of PFMBs in the central region (inheriting data in 2020 and updating data in 2022 & 2023).

4.2. Specialized inventory methodology

4.2.1. Setting up transect lines and plots

At each PFMB, 0.03% of the forest area is inventoried, the transect lines and plots should be designed covering all the typical topography and forest habitats with rattan distribution. The inventory area is determined according to Circular 33/2018/BNNPTNT, and the methodology of determining the transect lines and the standard plot is based on the instructions of the Charles.M. Peter et al 2014 “Systematics, Ecology and Management of Rattans in Cambodia, Laos, and Viet Nam_The Biological Bases of Sustainable Use”

Transect lines must be straight, and should not be on trails or along streams

The transect line is evenly spread over the forest area, representing the characteristics of topographical conditions and forest ecology.

Forest area to be inventoried:

The proportion of inventory area as prescribed in Circular 33/2018/BNNPTNT is from 0.01% to 0.05% depending on the size of the area, reliability, and resources. In this study, the survey rate was chosen to be 0.03%.

PFMB	Total natural forest areas (ha)	Inventoried areas (0,03%) (ha)	Standard inventory plots (Plot areas = 200 m ²)
A Luoi	20,476	6.1428	307
Tay Giang	45,556	13.6668	683
Total	66, 032	19.8096	990

Determine the inventory transect lines, the distance between the transect lines

The transect line has a width of 10m.

The distance between transect lines determines the percentage of the entire inventory area. The closer the transect lines are to each other, the higher the inventory percentage, and the larger the number of plots representing the entire area to be inventory.

The formula for calculating the distance between the transect lines according to the percentage of inventoried area:

Distance between transect lines (m) = Transect line width (m)/ Sample density (%) with a inventory rate of 1.5% or 0.015:

Distance between transect lines is: $x = 10: 0.015 = 667$ m

with a inventory rate of 0.03% or 0.0003:

Distance between transect lines is: $x = 10: 0.0003 = 33, 333$ m or 33 Km

Based on the number of plots to be inventoried and the length of the transect lines, the distance between the transect lines can be adjusted to ensure the sample size.

4.2.2. Investigate the scene

Conduct rattan inventory by standard plot method with transect lines.

Carrying out the inventory activities throughout the entire transect line. However, to avoid errors, it is advisable to establish close standard plots (100% survey) on the identified transect

lines in the identified inventory area for each forest status. On the transect lines, the standard plots have an area of 200m² (10m in width according to the width of the transect line and 20m in length for each plot followed the transect length).

In 2022, conduct a study of rattan growth:

For species that have not been studied for growth, conduct inventory, attach etyket, and GPS location to determine the amount of growth. Growth by height rate is assessed in 2023 with 05 species (expected).

At each PFMB, for each height level, measure at least 30 plants/height level – equivalent to the number of plants for growth study= 6 height levels x 30 plants = 180 plants for each selected PFMB.

These plants will be measured again after 1 year (in 2023).

Measure the indicators according to the pre-made form.

RATTAN GROWTH INVENTORY FORM

Transect line: **Sub-compartment:** **Compartment:** **PFMB:**
Date of inventory: **Inventory team:**

No.	Rattan bushes	Rattan species	Etyket	LOCATION		Types of forest	Canopy	H (m)	Notes
				X	Y				
1									
2									
									Natural regeneration

In 2023, inventory to determine rattan stock:

Conduct inventory on forest types with potential rattan distribution. Each PFMB conducts an inventory area at the rate of 0.03% of the total forest area of the potential rattan distribution. Measure the indicators according to the pre-made form.

RATTAN INVENTORY FORM

Standard plot #: Standard plot areas: 1,000 m²
 PFMB: Sub-compartment: Compartment:
 Village: Commune: District:
 Forest types: Canopy: Attitude:
 Location OTC: X= Y=
 Inventory date: Inventory team:

Rattan bush #	Rattan species	Rattan plant #	Hvn (m)	Note

4.2.3. Plant sampling method

Plant samples of 06 selected rattan species are collected according to the method of "A visual guide to collecting plant tissues for DNA" - Royal Botanic Gardens KEW. 01 species/individual collected 3-5 leaf samples (Please see Annex 2). Samples after being collected are transferred to KEW Botanical Garden for DNA analysis (undertaken by WWF).

4.2.4. Training and coaching methods

Based on specialized documents, published works to:

Prepare training materials to identify common, valuable and commercial rattan species;

Compilation of documents on methods of studying the rattan growth and stock.

Compiling documents on sustainable rattan harvest and management.

Conduct training courses for those interested in and related to the sustainable management and development of Rattan.

4.2.5. Analyze and evaluate inventory data

Distribution of rattan species: Distribution of rattan species according to forest status;

Distribution of rattan density/ha of each rattan species according to forest status; distribution of rattan plants by height class according to species; distribution of number of rattan plants by height class –rattan species – forest status

Determination of natural regeneration rate of rattan species.

Determine the average annual growth of each inventoried rattan species

Determine the amount of growth according to each height level of each rattan species.

Calculation of sustainable harvest for each rattan species inventoried.

The results of DNA analysis of all 6 selected species are published by KEW.

Documentation and Report of training results to identify common rattan species with commercial value in the region.

Documentation and Report on results of technical training on growth and stockpile survey of common rattan species

Documents and Report on training results on sustainable rattan harvest and management

V. MAIN ACTIVITIES AND RESPONSIBILITIES OF CONSULTANCY AND DELIVERABLES

No.	Activities	Deliverables	Timeline	Consultant days
I	Deskwork			
1	Second information/data collection	Forest status and protection forest areas in Central Viet Nam.	May 2022 May 2023	
2	Researching documents and relevant reports	Communicate with stakeholders, prepare for detail plan, activities.	May 2022 May 2023	
3	Prepare materials for rattan species identification, commercial rattan species.	01 set of documents that are easy to understand and applicable to forest owners, local people, rattan harvesters	May 2022	

No.	Activities	Deliverables	Timeline	Consultant days
4	Prepare materials for rattan growth study and inventory	01 set of documents that are easy to understand and applicable to forest owners, local people, rattan harvesters	May 2022	
5	Prepare documents for sustainable rattan harvest skills, and sustainable management	01 set of documents that are easy to understand and applicable to forest owners, local people, rattan harvesters.	May 2022	
6	Prepare equipment and tools for rattan specimen collection	Set of tools and equipment used to preserve rattan specimens for DNA analysis	May 2022	
II	Rattan inventory in potential WPFMBs in Central Viet Nam			
1	Training on rattan species identification, and commercial rattan species inventory	06 training courses in identified WPFMBs List of trainees	May-June 2022 May-June 2023	
2	Training on rattan growth study and stock	06 training courses in identified WPFMBs List of trainees	May-June 2022 May-June 2023	
3	Training on sustainable rattan harvest and management	06 training courses in identified WPFMBs List of trainees	May 2022 May 2023	
4	Growth study for selected rattan species. (2022)	Data of 5 rattan species for growth study in 2 WPFMBs; 180 canes/ species. 990 inventory sample plots	May-June 2022 May-June 2023	
5	Rattan stock and growth study (2023)	Data of 6 species for stock and 5 rattan species for growth study in 2 WPFMBs	May-July 2023	
6	Collect specimens for DNA	Standard sample set of 6 rattan species for DNA analysis.	May-June 2022	
7	Data analysis, rattan growth.	Overall average growth and annual growth according to	Jul-Aug 2023	

No.	Activities	Deliverables	Timeline	Consultant days
		height levels of 5 selected rattan species		
8	Data analysis, rattan stock and sustainable harvest plan	Rattan stock and volume for sustainable harvest of 6 identified species	Jul-Aug 2023	
9	Draft reports	Draft reports on rattan stock and sustainable rattan harvest plan in WPFMBs	Jul-Aug 2023	
10	Technical workshop to share and get inputs from stakeholders in the provinces.	Notes and update reports	Aug 2023	
11	FINAL reports	Final reports Sustainable rattan harvest plan of potential commercial rattan species in inventory WPFMBs	Aug 2023	
III	Equipment			
1	Equipment for DNA analysis	36 sets	May 2022	
2	Materials for rattan species identification	120 sets	May 2022	

VI. CAPACITY REQUIREMENTS

- ✓ *At least 10 years of working experience in forestry, preferably in the field of sustainable forest management and forest certification.*
- ✓ *Experience in social and environmental aspects related to requirements for sustainable forest management.*
- ✓ *Having good working relationships with provincial agencies in the forestry sector such as Forest Protection Department, Protection Forest Management Board and local authorities.*
- ✓ *Priority is given to people with experience in forestry in Central Viet Nam.*
- ✓ *Experience in inventorying forest resources, especially on rattan.*

Annex 1. List of 6 prioritized rattan species for study

Latin name	Common name	Synonyms
<i>Calamus horrens</i>	Mây nước, mái	<p>Calamus tenuis Roxb. <i>Calamus amarus</i> Lour., <i>Calamus royleanus</i> Griff., <i>Calamus heliotropium</i> Buch.-Ham., <i>Calamus horrens</i> Blume, <i>Calamus stoloniferus</i> Teijsm. & Binn., <i>Palmijuncus amarus</i> (Lour.) Kuntze, <i>Palmijuncus heliotropium</i> (Buch.-Ham.) Kuntze, <i>Palmijuncus horrens</i> (Blume) Kuntze, <i>Palmijuncus royleanus</i> (Griff.) Kuntze, <i>Palmijuncus tenuis</i> (Roxb.) Kuntze, <i>Rotang royleanus</i> (Griff.) Baill.</p>
<i>Calamus jenkinsianus</i>	Mây nước, mây rừng, mây trâu, mây nước gai đen, mây nước ghé, song trâu	<p>Calamus jenkinsianus Griff. <i>Calamus margaritae</i> Hance <i>Calamus nutantiflorus</i> Griff. <i>Daemonorops jenkinsiana</i> (Griff.) Mart. <i>Daemonorops margaritae</i> (Hance) Becc. <i>Daemonorops nutantiflora</i> (Griff.) Mart. <i>Daemonorops pierreana</i> Becc. <i>Daemonorops schmidtiana</i> Becc. <i>Palmijuncus jenkinsianus</i> (Griff.) Kuntze <i>Palmijuncus margaritae</i> (Hance) Kuntze <i>Palmijuncus nutantiflorus</i> (Griff.) Kuntze</p>
<i>Calamus viminalis</i>	Mây cát, song cát	<p>Calamus viminalis Willd. <i>Calamus buroensis</i> Mart. ex Walp. <i>Calamus extensus</i> Mart. <i>Calamus fasciculatus</i> Roxb. <i>Calamus fasciculatus</i> subvar. <i>andamanicus</i> Becc. <i>Calamus fasciculatus</i> subvar. <i>bengalensis</i> Becc. <i>Calamus fasciculatus</i> subvar. <i>cochinchinensis</i> Becc. <i>Calamus fasciculatus</i> subvar. <i>pinangianus</i> Becc. <i>Calamus litoralis</i> Blume <i>Calamus phuocbinhensis</i> A.J.Hend. & N.Q.Dung <i>Calamus pseudorotang</i> Mart. <i>Calamus siamensis</i> Becc. <i>Calamus siamensis</i> var. <i>malaianus</i> Furtado <i>Calamus viminalis</i> var. <i>fasciculatus</i> (Roxb.) Becc. <i>Palmijuncus fasciculatus</i> (Roxb.) Kuntze <i>Palmijuncus litoralis</i> (Blume) Kuntze <i>Palmijuncus pseudorotang</i> (Mart.) Kuntze <i>Palmijuncus viminalis</i> (Willd.) Kuntze <i>Rotang viminalis</i> (Willd.) Baill.</p>
<i>Calamus eugenei</i>	Mây nước mỡ, mây nước gai vàng	<p>Daemonorops poilanei J.Dransf</p>

<i>Calamus rudentum</i>	song đá, mây ngọt	<i>Calamus rudentum</i> Lour. <i>Calamus albus</i> Pers. <i>Palmijuncus rudentum</i> (Lour.) Kuntze <i>Rotang albus</i> Baill. <i>Rotang rudentum</i> (Lour.) Baill.
<i>Calamus tetradactylus</i>	Mây nếp, mây tằm, mây ruột gà	<i>Calamus tetradactylus</i> Hance <i>Calamus batoensis</i> A.J.Hend. & N.Q.Dung <i>Calamus bonianus</i> Becc. <i>Calamus cambojensis</i> Becc. <i>Calamus crispus</i> A.J.Hend., N.K.Ban & N.Q.Dung <i>Calamus flavinervis</i> A.J.Hend. & N.Q.Dung <i>Calamus solitarius</i> T.Evans, Sengdala, Viengkham, Thamm. & J.Dransf. <i>Palmijuncus tetradactylus</i> (Hance) Kuntze

Annex 2. A visual guide to collecting rattan issues for DNA



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guide.pdf