TECHNICAL REPORT #1

Potential variables to be measured, mapped and interpreted

ABSTRACT

Technical Report 1 presents the potential variables to be measured, mapped and interpreted that have been identified through ITTO Project PD 764/14 Rev.3 (F): "Enabling Customary Landowners to Participate Effectively in Community Forest Management (CFM) Schemes within 6 pilot areas of Papua New Guinea (PNG)".

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Summary

Technical Report 1 presents the potential variables to be measured, mapped and interpreted that have been identified to enable customary landowners to participate effectively in community forest management (CFM) schemes within 6 pilot areas of Papua New Guinea (PNG).

This assignment was undertaken through extensive desk-top research by the project's software developer; leading to the identification of 6 important topics for CFM in PNG. The project's CFM partners and their target communities should first select their priority CFM topics, given their specific contexts and planned activities. Participatory data collection activities should start of gradually with one or two simple forms, and build in complexity over time.

This report was circulated for review amongst project partners and selected stakeholders, before the software development process commenced.

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1. Introduction

The Forest and Climate Action Framework of the Papua New Guinea Forest Authority (PNGFA) highlights the need for a multi-stakeholder approach to forest management programming that engages customary landowners at the local level and enhances the capacity of government institutions at the national level. Recognizing that customary landowners are generally well informed about the quality of their forests, this project aims to design a model community-based land ownership mapping and forest resource assessment system that supports Community Forest Management (CFM) schemes within five pilot areas of Papua New Guinea (PNG). The project - *Enabling Customary Landowners to Participate Effectively in Community Forest Management Schemes* - will enable clans and communities in PNG to meaningfully participate in forest management decision-making processes and partake in associated development opportunities.

The collection and mobilization of data will be central to community efforts to map and register land claims, to share information about the state of their forests with PNGFA and potentially other entities in the future. This project aims to empower local communities to gather spatially explicit land tenure and forest data to support land registration processes, programs to Reduce Emissions from Deforestation and forest Degradation (REDD+), and other Payments for Ecosystem Services (PES) programs. This document presents a comprehensive list of potential variables related to these processes and programs.

With appropriate technology and adequate capacity building, local communities can collect data for the majority of these variables. Alternatively, government staff, external consultants, non-governmental or community-based organization (NGO/CBO) staff can conduct data collection. To thoroughly address all variables listed within the document, to aggregate, process, quality control and analyze the data, local communities will most likely need to work with the support of or in close collaboration with other entities.

The project has four principle beneficiaries:

- **Selected landowner groups** that will participate in the design, testing, implementation and monitoring of data collection tools with support from their local CFM partners, as well as ongoing training and awareness services; leading to:
  - increased understanding about the goods and services their forests provide,
  - increased capacity to participate in feasible CFM schemes,
  - improved forest management practices and security over their resources in the long-term, and
  - formalized landownership arrangements as and when required by specific clan groups.
- **Selected local CFM partners** who will participate in the design, testing, implementation and monitoring of the CFM data management system with their pilot landowner groups; leading to:
  - improved forest management practices and long-term resource security in their pilot areas, and
  - increased access to CFM tools, services and opportunities.
- **PNGFA**, which will supervise the establishment of the CFM data management system, operate the national web-based platform, and coordinate the development of policy and planning guidelines for CFM; leading to:
  - improved coordination with other government agencies responsible for CFM activities, and
  - increased information flows from the forest that will support policy implementation, including forest planning processes.
- **Registered private sector entities** that engage in markets for environmental goods and services and help provide financial incentives for sustainable forest management.

Data collection for the project can be conducted at five different levels of community engagement (Figure 1). Most of the selected local CFM partners are currently operating at the first level: Land tenure mapping and forest resource assessments are largely externally driven by partner NGOs, with local clans providing their knowledge of the area to facilitate. Within the context of this project, the third level of engagement – collaborative monitoring with external data interpretation – is the goal for addressing most REDD+ and PES variables. However, for some technically complex variables (e.g. estimating carbon stocks in soil, litter and dead biomass), community engagement may remain relatively low, at the first or second level. For land tenure and land use mapping, this project aims to achieve the fourth level of community engagement: Collaborative monitoring with local data interpretation.

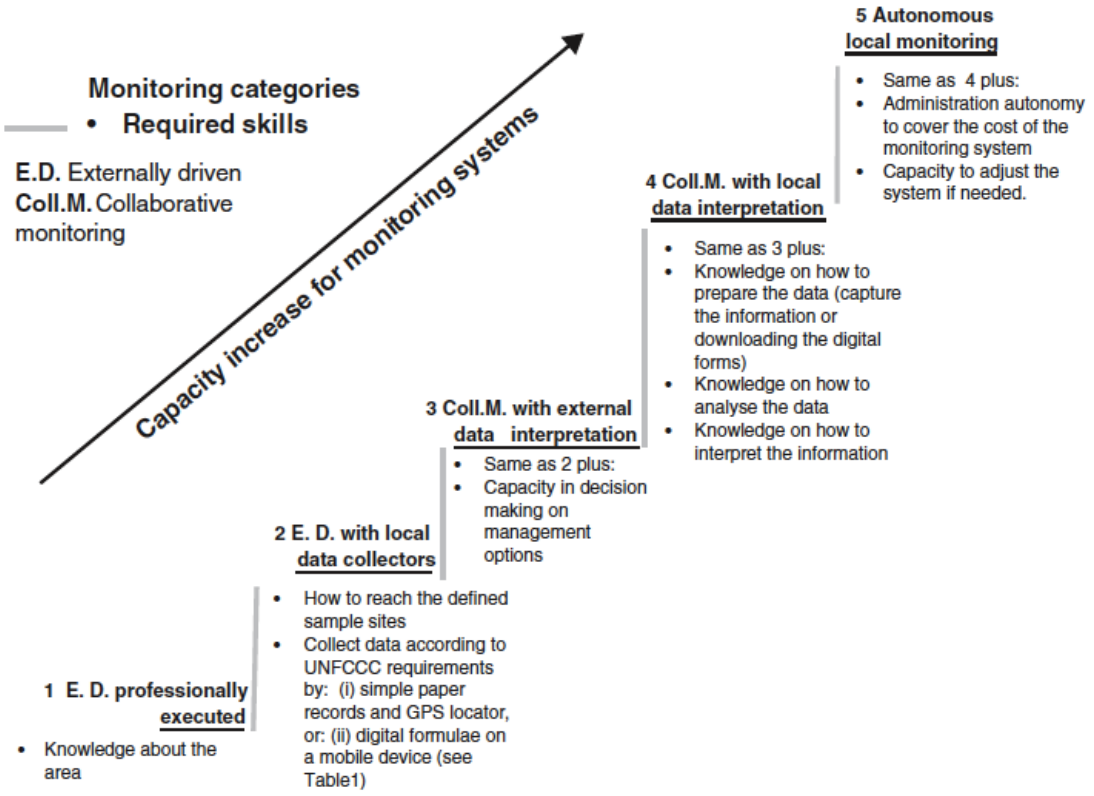


*Figure 1: Levels of community engagement in land monitoring **

Larrazabal et al. 2012

Technical Report 1 presents a wide variety of potential variables, covering 6 important CFM topics that relate to the PNG context:

- **The clan membership and video FPIC topic** will help document community engagement in this or other CFM-related projects, as well as the benefit sharing agreements.
- **The land tenure and community boundaries topic** will facilitate the land group registration process with the PNG Department of Lands & Physical Planning (DLPP).
- **The land use and land cover topic** will support improved community forest management.
- **The forest biomass topic** will focus on above-ground biomass in vegetation and underpin forest carbon accounting.
- **The socio-economic** and **biodiversity topics** will help evaluate the impact of REDD+ and other CFM interventions on the social, economic and biodiversity conditions in project areas.

2. Context

The Intergovernmental Panel on Climate Change 2003 Good Practice Guidelines define forest as "all land with woody vegetation consistent with thresholds used to define forest land in the national GHG inventory, subdivided into managed and unmanaged, and also by ecosystem type." It also includes systems with vegetation that currently fall below, but are expected to exceed, the threshold of the forest land category. PNG's national forest definition is "land spanning more than 1 hectare, with trees higher than 3 meters and the canopy cover of more than 10 percent." This excludes land that is predominantly under agricultural or urban land use. Forest land in PNG is divided into Natural and Plantation forest and subdivided based on the vegetation and plantations types.

Table 1: Papua New Guinea land use classification scheme

IPCC Land use category	Sub-type category	Sub-division category
Forest land	Natural forest	Low altitude forest on plains and fans, Low altitude forest on uplands, Lower montane forest, Montane forest, Montane coniferous forest, Dry seasonal forest, Littoral forest, Seral forest, Swamp forest, Savanna, Woodland, Scrub, Mangrove
	Plantation forest	Eucalyptus, Araucaria, Pinus, Acacia, Terminalia, Teak, Rubber, Other Forest Plantation
Cropland	Subsistence Agriculture	Shifting, Permanent
	Commercial Agriculture	rice, spices, tea, sugar, coffee, palm oil, cocoa, coconut, cocoa/coconut, other
Grassland		herbland, rangeland, other
Wetland		river, lake, dam, nipa swamp, other swamp
Settlement		village, hamlet, large settlement, infrastructure
Other land		bare, sand, rock
No data		cloud, sea, other reasons

PNG's forest area is one of the largest and most biodiverse forests in the world. Most of the country's forests are under customary ownership and they serve an important role in sustaining the traditional livelihoods of most of the population. Although most, 60%, of PNG's forests are relatively intact and undisturbed, they have been under increasing pressure from logging, commercial and small-scale agricultural expansion, fire and mining (PNG CCDA 2017). According to the most recent assessment, 2.4 million ha of forest was degraded between 2000 and 2015. Large-scale commercial logging was the leading cause of forest degradation affecting 11.9% of PNG's forest area, followed by gardening (7.9%), fire (3%), small scale logging operations (0.2%) and fuelwood collection (by approximately 85% of the population though the spatial extent is unknown). Over this same time period, 261,528 ha, approximately 0.7% of the forest area, has been converted to other land uses, namely shifting cultivation (accounting for 63% of deforestation) and large-scale oil palm plantations (30% of deforestation).

Considering the aforementioned drivers of deforestation and forest degradation, CFM activities in PNG might be geared toward reducing emissions from degradation through reduced impact logging or the introduction of fuel efficient stoves, community driven monitoring of illegal logging operations or oil palm plantations that illegally extend beyond the lands zoned or titled for such activities, and reforestation projects that enhance forest carbon stocks. The variables outlined below apply to these and additional types of projects.

3. Potential variables

3.1 Clan membership and consent

Customary landowners must be consulted and their permission must be obtained before any new developments or project take place on their land. Consent to new activities is obtained through the process of Free Prior and Informed Consent (FPIC). A process of social mapping and land investigations should be carried out to identify the true landowners and how the group makes formal decisions. The project FPIC process should engage with the appropriate group members and disclose the potential risks and benefits of the proposed project or activity clearly and openly to enable the landowner group to make an informed decision regarding their acceptance or rejection of the proposition. Data for the following variables can be recorded to document the FPIC process, as well as the benefit sharing agreement and recourse for violating the agreement.

1. Basic Information

1.	Name of province	
2.	Name of district	
3.	Name of villages that clan lands occur within	
4.	Name of clan	
5.	Name of clan representative(s)	
6.	Contact information for clan representative	
7.	Clan location	*Coordinates of center point*

2. Raising awareness on the project goals, objectives, risks and benefits
   Information regarding consultations and awareness raising events with clan members

#	Task	Date(s)	Location	Facilitator name	Organization name	Participant names	Topics addressed
1.	Meeting with clan representatives						
2.	Village/focus group meetings						
3.	Other meetings or interviews						

3. Video FPIC testimonials

1.	Name of clan	
3.	Name of clan representative(s)	
3.	Video testimonial of clan representative explaining - The project goals - The project risks - The potential project benefits - How the benefit sharing mechanism works - Options available for ending the project agreement to the clan assembly	*Video (e.g. MP4) recorded on a smart phone or other device*
4.	Date	
5.	Location	*Coordinates*

3.2 Land tenure and community boundaries

Papua New Guinea's Forestry Act of 1991 enables the country to enter into Forest Management Agreements with landowners to enable them to grant rights to a 'future production forest' within the domain of the customary landowners and to a logging company seeking timber harvesting rights (Filer 2009). The Resource Acquisition process has four main steps (Babon and Gowae 2013):

- Forest resource inventory *
- Landowner awareness program *
- Land group incorporation, which involves
    - Community resource mapping *
    - Community visioning
    - Shared goal setting
    - Identification of conservation areas and ancestral areas *
    - Resolving boundary issues *
- Forest management agreement

The starred items can be supported with community-based data collection as follows:

1. Basic Information

1.	Name of province		
2.	Name of district		
3.	Name of villages that clan lands occur within		
4.	Name of clan		
5.	Names of clan members		
6.	Name of clan representative		
7.	Contact information for clan representative		
8.	Land group boundaries		*Mapped (gpx/shp) polygon*
9.	Conservation area boundaries		*Mapped (gpx/shp) polygon*
10.	Ancestral area boundaries		*Mapped (gpx/shp) polygon*
11.	For all surrounding clans	Name of neighboring clan	
12.		Direction from clan center	
13.		Name of neighboring clan representative	*Degrees*
14.		Contact information for neighboring clan representative	

3. Landowner awareness program

Information regarding consultations and awareness raising events with clan members

#	Task	Date(s)	Location	Facilitator name	Organization name	Participant names
1.	Meeting with officials					
2.	Village/focus group meetings					
3.	Other interviews					

4. Forest resource inventory and community resource mapping
   Forest and land cover/use - Land categories in the village (approx. area in hectares).

	Land category (code-land)	Total area (ha)	Ownership (ha)			
			State	Community	Private	Open access (de facto)
Forest:						
1.	Natural forest					
2.	Managed forests					
3.	Plantations					
Agricultural land:						
4.	Cropland					
5.	Pasture (natural or planted)					
6.	Agroforestry					
7.	Silvipasture					
8.	Fallow					
Other land categories:						
9.	Shrubs					
10.	Grassland					
11.	Residential areas, infrastructure					
12.	Wetland					
13.	Other, specify					
14.	Total land					

Poverty and Environment Network (PEN) questionnaire V1, Q9

5. Forest and land cover/use – What are the main forest types, users and products in the village?

Type of forest	Ownership	Approx. area (ha)	Main users (max. 3)			Main products (max. 3)		
			Rank 1	Rank 2	Rank 3	Rank 1	Rank 2	Rank 3

Poverty and Environment Network (PEN) questionnaire V1, Q10.
Additional relevant variables are listed in the Social and Economic safeguards section.

6. Identification of conservation areas and ancestral areas

1.	Conservation areas	Name	
		Location	*Mapped (gpx/shp) polygon*
		Note	
2.	Clan boundary line according to…	Name	
		Location	*Mapped (gpx/shp) polygon*
		Note	

7. Resolving boundary issues

1.	Names of clans with contest boundaries	Clan A	
		Clan B	
		Clan C	
2.	Clan boundary line according to…	Clan A	*Mapped (gpx/shp) line*
		Clan B	*Mapped (gpx/shp) line*
		Clan C	*Mapped (gpx/shp) line*
3.	Date of meeting to resolve boundary disagreement		
4.	Participant names from each clan involved	Clan A	
		Clan B	
		Clan C	
5.	Agreement (if applicable) from meeting to resolve boundary dispute		
6.	Agreed boundary		*Mapped (gpx/shp) line*

3.3 Land use and land cover

The land use and land cover data can be used to assess the extent and effectiveness of community-based forest management practices at the beginning and over the course of the project, including key indicators such as the area and percent of forest land under different tenure regimes, the rights and responsibilities associated with community-based forest management regimes, changes in the quantity of forest resources used and changes in the area and condition of forest under management (Table 2). These variables can also be used to generate ground-truthing data for remote sensing-based approaches to forest monitoring.

*Table 2: Criteria and indicators to assess the extent and effectiveness of community-based forestry **

Indicator number	Criteria and indicators
Criterion 1: Extent and type of CBF	
1.1	Context within which CBF operates
1.1a	Policy objectives of each CBF regime in the country
1.1b	Area and percent of forest land under different tenure regimes
1.1c	Number of people and groups involved in CBF regime
1.2	Institutionalization of CBF in government and civil society
1.2a	Institutionalization of CBF regimes into government policy, legislation, planning and programs
1.2b	Civil society organizations (apart from CBF membership groups) to represent CBF stakeholders
1.3	Level of empowerment of local stakeholders for CBF regime
1.3a	Rights associated with CBF regimes
1.3b	Responsibilities associated with CBF regimes
1.3c	Characterization of CBF regimes by generic type
Summary of enabling environment for CBF regime	
Summary of indicators assessing the enabling environment for the CBF regime	

Indicator number	Criteria and indicators
Criterion 2: Effectiveness of CBF	
2.1	Natural capital
2.1a	Change in area and condition of forest for CBF regimes
2.1b	Change in level of threats for CBF regimes
2.1c	Change in quantity of forest products harvested for CBF regimes
2.2	Social, institutional and human capital
2.2a	Change in key indicators of social/institutional and human capital, equity and inclusiveness for CBF regime
2.3	Financial capital
2.3a	Change in availability of forest goods and services for subsistence use, income generation to households and community groups for CBF regime
Summary of effectiveness of CBF Overall effectiveness of CBF regimes	
Comparison of the effectiveness of the various CBF regimes	
Overall effectiveness of CBF regimes compared with other forest tenure regimes	

* FAO (2019)

The subsequent variables are presented as survey prompts – the vast majority of which are from the Poverty and Environment Network (PEN) assessment. PEN was launched in September 2004 by the Center of International Forestry Research (CIFOR) to conduct a tropics-wide, methodologically uniform collection of socio-economic and environmental data at household and village levels across 24 countries. The first global round of data collection was conducted between 2006 and 2010 to understand the role of forests for poverty alleviation, the extent to which they may lift people out of poverty, or serve as safety nets during periods of extreme hardship. The assessment also sought to understand how different forest management regimes and policies affect the benefits local communities, especially the poor, receive (Angelsen and Dokken 2015).

The entire PEN questionnaire has been reproduced under the socio-economic variables section, however, several parts of the questionnaire are particularly relevant to understanding land use, including the classification of land parcels, as well as land use practices applied at the household, forest user group (FUG), village and/or clan level that ultimately impact forest condition.

1. Forest and land cover/use - Land categories in the village (approx. area in hectares).

	Land category (code-land)	Total area (ha)	Sample site coord. (lat, long)	Ownership (ha)			
				State	Community	Private	Open access (de facto)
Forest:							
1.	Natural forest						
2.	Managed forests						
3.	Plantations						
Agricultural land:							
4.	Cropland						
5.	Pasture (natural or planted)						

	Land category (code-land)	Total area (ha)	Sample site coord. (lat, long)	Ownership (ha)			
				State	Community	Private	Open access (de facto)
Forest:							
6.	Agroforestry						
7.	Silvipasture						
8.	Fallow						
Other land categories:							
9.	Shrubs						
10.	Grassland						
11.	Residential areas, infrastructure						
12.	Wetland						
13.	Other, specify						
14.	Total land						

Poverty and Environment Network (PEN) questionnaire V1, Q9.1 Also item 7 above.

2. Forest and land cover/use – What are the main forest types, users and products in the village?

Type of forest	Ownership	Approx. area (ha)	Main users (max. 3)			Main products (max. 3)		
			Rank 1	Rank 2	Rank 3	Rank 1	Rank 2	Rank 3

Poverty and Environment Network (PEN) questionnaire V1, Q10. Also item 8 above.

3. Does the village practice any form of active and deliberate forest management?

#	Type of management	Code
1.	Planting of trees	
2.	Cutting down undesired (competing) trees	
3.	Protecting certain desired (patches of) trees in the forest to promote the natural regeneration of these species	
4.	Protecting areas of forest for particular environmental services, like water catchment	
5.	Establishing clear use rights for a limited number of people to particular forest products (e.g., honey trees)	
6.	Extension/education about forest management	
7.	Enacted bylaw (e.g., no bush burning in or near forest)	
8.	Mapping/inventory forest resources (e.g. mapping Brazil nut stands)	
9.	Other, specify	

Codes:
0 = no, not at all;
1 = yes, but only to a limited extent;
2 = yes, they are common.

4. Forest resource base

Note: The questions should be asked in a village meeting or focus group for each of the categories in turn (i.e. column by column, and not row by row).

#			Fire-wood or charcoal	Timber or other wood	Food from the forest	Medicine from the forest	Forage from the forest	Other
1.	What is the most important product (MIP) for the livelihood of the people in the village (in this category) *(name)*							
2.	*(code-product)*							
3.	How has availability of the MIP changed over the past 5 years? *Codes:* *1 = declined;* *2 = about the same;* *3 = increased*							
4.	If the availability of the MIP in this category has declined, what are the reasons? Please rank the most important reasons, max. 3 (leave rest blank).	Reason or action	Rank 1-3	Rank 1-3	Rank 1-3	Rank 1-3	Rank 1-3	Rank 1-3
		1. Reduced forest area due to small-scale clearing for agriculture						
		2. Reduced forest area due to large-scale projects (plantations, new settlements, etc.)						
		3. Reduced forest area due to people from outside buying land and restricting access						
		4. Increased use of MIP due to more local (village) people collecting more						
		5. Increased use of MIP due to more people from other villages collecting more						
		6. Restrictions on use by central or state government (e.g., for forest conservation)						
		7. Local restrictions on forest use (e.g., community rules)						
		8. Climatic changes, e.g., drought and less rainfall						
		9. Other, specify:						
		10. Timber harvesting						
		11. Charcoal burning						
		12. Brick burning						

		Reason or action	Rank 1-3	Rank 1-3	Rank 1-3	Rank 1-3	Rank 1-3	Rank 1-3
		13. Poor harvesting practices						
		14. Product attacked/consumed by forest dwelling vermin						
		15. Bush burning						
		16. Increased marketing potential for product						
5.	If the availability of the MIP in this category has increased, what are the reasons? Please rank the most important reasons, max. 3.	1. Less clearing of forests for agriculture (incl. pastoralism)						
		2. Fewer local (village) people collecting less						
		3. Fewer people from other villages collecting less						
		4. Reduced use from large-scale commercial users/projects						
		5. Changes in management of forests						
		6. Climatic changes, e.g., more rainfall						
		7. Forest clearing that increases supply of product (e.g. fuelwood)						
		8. Tree planting						
		9. Other, specify:						
		10. More illegal access of protected area						
		11. Improved access rights to product						
		12. More secondary forest (as people clear land and forest regenerates)						
6.	What would be most important to increase the benefits (use or income) from the MIP? Please rank the most important reasons, max. 3.	1. Better access to the forest/MIP, i.e., more use rights to village						

		Reason or action	Rank 1-3	Rank 1-3	Rank 1-3	Rank 1-3	Rank 1-3	Rank 1-3
		2. Better protection of forest/MIP (avoid overuse)						
		3. Better skills and knowledge on how to collect/use it						
		4. Better access to credit/capital and equipment/technology						
		5. Better access to markets and reduced price risk						
		6. Invest in planting trees/forest product						
		7. Develop forest user groups/collective action in harvesting						
		8. Control fire						
		9. Other, specify:						

1) Select the most important product for the village that do not fall into any of the other five categories.
2) "Most important" is defined as the most important for the wellbeing of the village, whether it be through direct use in the home, or through sale for cash, or both.

5. Forest institutions

Note: (1) The questions should be asked in a village meeting or focus group for each of the categories in turn (i.e., column by column, and not row by row). (2) The MIP in each category should be identical to those in the table above.

#		Fire-wood or charcoal	Timber or other wood	Food from the forest	Medicine from the forest	Forage from the forest	Other
1.	What is the most important product (MIP) for the livelihood of the people in the village (in this category)? (name)						
2.	(code-product)						
3.	In what type of forest do you get the MIP? (code-forest)						
4.	What is the ownership status of this forest (code-tenure)						
5.	Are there customary rules regulating the use of the MIP in the village? Codes: 0=none/very few; 1=yes, but vague/unclear; 2=yes, clear rules exist If code '0', go to 7.						
6.	If 'yes': are the customary rules regarding forest use enforced /respected by the population of the village?						

#		Fire-wood or charcoal	Timber or other wood	Food from the forest	Medicine from the forest	Forage from the forest	Other
7.	Are there government rules that regulate forest use? Codes: 0=none/very few; 1=yes, but vague/unclear; 2=yes, clear rules exist If code '0', go to 9.						
8.	If 'yes' (code '1' or '2' above): are the government rules enforced/respected by the members in the village?						
9.	Do the villagers require any permission to harvest the MIP? Codes: 0=no; 1=yes, users have to inform the authorities; 2=yes, written permission needed If code '0', go to next section.						
10.	If 'yes' (code '1' or '2' above): does the user have to pay for the permission?						
11.	If 'yes': who issues this permit? Codes: 1=village head; 2=FUG; 3=forest officer (forest departments); 4=other government official; 9=other, specify:						

Codes: 0=no/very little; 1=to a certain extent by some groups of villagers; 2=to a certain extent by everyone; 3=yes, but only by some groups of villagers; 4=yes, by everyone; 9=no particular rules exist.

6. Forest User Groups (FUG) – Existence
   How many forest user groups (FUG) are there in the village?

7. Information about each FUG (use one column per FUG).

#			FUG 1	FUG 2	FUG 3
1.	When was the group formed? (yyyy)				
2.	How was the group formed? Codes: 1=local initiative; 2=initiative from NGO; 3=initiative from government, e.g., Forest Department; 4=other, specify:				
3.	Is the FUG's main purpose related to the management of a particular forest area or of particular forest product(s)? Codes: 1=area; 2=product(s); 3=both				
4.	If for a product (code 2 or 3above), what is the (main) product? (code-product)				
5.	How many members are there in the group?				
6.	How many times per year does the FUG have meetings?				
7.	Does the group have a written management plan?				
8.	What are the main tasks of the FUG? Select as many as appropriate: 1-0 code	1. Setting rules for use			
		2. Monitoring and policing			
		3. Silviculture & management			
		4. Harvesting forest products			
		5. Selling forest products			
		6. Tree planting			
		7. Tourism (i.e. maintaining tourist infrastructure; guiding tourists etc.)			

#		FUG 1	FUG 2	FUG 3	
		8. Education/extension support			
		9. Other, specify			
		10. Savings and credit			
9.	Has any development project been implemented in the village over the past 5 years using proceeds from the FUG?				
10.	Has anyone in the village been violating the rules of the FUG over the past 12 months? If 'no', go to 14.				
11.	If 'yes': did the FUG impose any penalties on those violating the rules? If 'no', go to 14				
12.	If 'yes': what type of penalties? Codes: 1=fee (cash payment); 2=returning collected products; 3=labour (extra work); 4=exclusion from group; 5=warning; 9=other, specify				
13.	Which group of forest users have most commonly violated the rules over the past 5 years? Codes: 1=members of FUG; 2=non-FUG members in the village; 3=people from other villages; 9=other, specify				
14.	Overall, on a scale from 1-5 (1 is highest, 5 is lowest) how effective would you say that the FUG is in ensuring sustainable and equitable forest use?				

3.4 Forest biomass

Data requirements for forestry projects will vary based on project type. Community-based forest management and/or REDD+ projects may be geared towards: (1) reducing emissions from deforestation; (2) reducing emissions from forest degradation; (3) the conservation of forest carbon stocks; (4) sustainable management of forest, including reduced impact logging and forest law enforcement; (5) enhancement of forest carbon stocks; and/or (6) afforestation/reforestation. The project type largely dictates what carbon pools should be measured to thoroughly account for changes in forest condition due to local activities. However, some carbon pools may be omitted from assessment and monitoring for practical reasons. Table 3 indicates which carbon pools will be significantly impacted and should be monitored by various types of projects under the Verified Carbon Standard.

Table 3: Pools to be considered by project activities for REDD, avoiding deforestation and improving forest management

Project type	Living biomass			Dead organic matter			
	Above ground trees	Above ground non-tree	Below ground	Litter	Dead wood	Soil	Wood products
Convert logged to protected forests	Y	N	O	N	Y	O	Y
Convert low-productive forests to productive forests	Y	N	O	N	O	N	O
Conventional logging to RIL: A. with no effect on total timber extracted	Y	N	O	N	Y	O	N

Project type	Living biomass			Dead organic matter			
	Above ground trees	Above ground non-tree	Below ground	Litter	Dead wood	Soil	Wood products
Conventional logging to RIL: B. with >25% reduction in timber extracted	Y	N	O	N	Y	O	Y
Extend rotation age	Y	N	O	N	O	N	O
Planned or unplanned conversion of forest to non-forest, with final land cover of annual crop	Y	O	O	N	O	O	Y
Planned or unplanned conversion of forest to non-forest, with final land cover of pasture grasses	Y	O	O	N	O	N	Y
Planned or unplanned conversion of forest to non-forest, with final land cover of perennial crop	Y	Y	O	N	O	N	Y
Conversion of logged to protected forests	Y	N	O	N	Y	O	Y
Conversion of low-productive forests to productive forests	Y	N	O	N	O	N	O

(Estrada/CIFOR 2011)

Y: Pool shall be included in the baseline and monitoring plan for the project. N: Pool need not be measured because it is not subject to significant changes or potential changes are transient in nature. O: Pool is optional: it shall be included if its carbon stock is significantly reduced by the project; and may be included if its carbon stock is significantly increased by the project.

Papua New Guinea's most recent Forest Reference Level includes estimates for carbon found in above- and below-ground biomass, but the remaining carbon pools are excluded. Litter, deadwood and soil organic carbon should be measured for Tier 1 level reporting, however country specific carbon stock values for these pools do not yet exist. Soil can account for 50-75% of total forest carbon stocks, while deadwood and litter only 10-40% and roughly 1.5% respectively. Accounting for these carbon pools is challenging and it is unlikely that local communities could contribute substantially to their measurement, even with the support other entities.

Communities can, however, contribute greatly to the creation of Activity datasets - spatially explicit data on land use and land use change that can also include data on specific land use practices that impact forest, cropland, and grassland condition and associated carbon stocks. Activity data is often generated with remote sensing and/or modelling methods. However, such methods always require reliable, spatially explicit training data, which local communities are well-positioned to contribute to. Related variables are provided in the Land use and land cover section above.

There are also numerous examples of local communities in Latin America, Africa and Asia collecting some forest inventory data that can be used to estimate above- and below-ground biomass and carbon stocks in trees. Some associate variables are listed below (Verplanke and Zahabu 2009).

It is important to note that the assessment and monitoring of forest carbon in a project area is a multifaceted process. Before collecting ground-based data to estimate biomass in trees, project boundaries must be identified and the project area should be stratified. This can be based on activity

data, but also biophysical conditions that influence the natural variability of forest vegetation. Ideally, additional carbon pools should be measured. And a quantitative analysis of variability and uncertainty should inform the selection of the type, number and location of plots to assess in the field (Pearson et al. 2013). These steps, along with data aggregation, cleansing/quality control and analysis, are likely to remain driven by other entities, but potentially in closer collaboration with local communities.

Plot data

Date:	
Name of recorders:	
Names of other members of the field team:	
Location:	Coordinates
Plot number:	
Land use class:	
Land use subdivision:	
Canopy cover percentage at center:	
Degradation, # of tree stumps:	
Natural regeneration, # of seedlings (above *x* cm)	
Additional notes regarding plot condition:	

Tree data

#	Tree species (local name)	Tree species code for scientific name	Diameter at breast height (cm)*	Height (m)

* Diameter thresholds are often applied to avoid measuring every tree throughout the entire plot. Thresholds, along with plot size, shape, and distribution/sampling design vary with field methodology followed. See GOFC-GOLD Sourcebook for more information (Achard et al. 2011).

3.5 Socio-economics

The project will work with customary landowners and community-based organizations in seven provinces (Table 4). People living in the pilot areas are generally disadvantaged relative to those living in other parts of the country with regards to household income, local qualifications, and access to markets and government services. On the other hand, each local community appears well organized and self-reliant, with large areas of forest owned and managed by local clan groups. The project's local partners provide an important link with the outside world; opening up new opportunities for enhancing rural livelihoods. The purpose of socio-economic monitoring is to understand precisely how and to what extent new CFM projects and practices impact the partnering clans at the individual, household and clan level.

Table 4: Partner organizations, clans and villages

#	Partner organizations	Partner Clans and Villages	Pre-project	Full project
1.	Research and Conservation Foundation (RCF)	Mengino and Abigarama villages, Eastern Highlands; Haia village Gulf/Simbu	✓	✓
2.	Organization for Industrial, Spiritual, Cultural Advancement (OISCA)	East New Britain	-	✓
3.	Foundation for People and Community Development (FPCD)	Awane Sub-clan and Yate Sub-clan, Madang	✓	✓

#	Partner organizations	Partner Clans and Villages	Pre-project	Full project
4.	Milne Bay Provincial Administration (MBPA) with Papua New Guinea Forest Authority	23 Wards across Milne Bay	✓	✓
5.	Forest Management and Product Certification Service (FORCERT)	Bairaman, Lau, Mauna, Tavolo and Minda villages, East and West New Britain	✓	✓
6.	Tree Kangaroo Conservation Program (TKCP)	Morobe	✓	-
7.	Wildlife Conservation Society (WCS)	Manus	✓	-

The livelihood strategies of households within the project areas are closely intertwined with forest resources and forest lands with cropland potential. Households' livelihoods are currently supported by the sale of cash crops such as cocoa, vanilla, copra and coffee, the sale of timber, and income from seafood sales (Table 5). CFM activities can have positive, as well as negative impacts on livelihood strategies. Some potential indicators are provided in Table 6, but it is also important to use stakeholder-identified or community-based indicators, as communities have their own priorities for improving their lives and their own definitions of what constitutes a success or failure. Stakeholder-identified indicators may not necessarily match those selected by other entities (Catley et al. 2007). Gathering data on socio-economic variables regularly (annually, quarterly) is a key step to bolstering positive impacts and mitigating adverse results to drive CFM initiative to benefit all clan members.

Table 5: Overview of partner communities' long- and short-term financial strategies

Community	Timber sales	Cocoa sales	Coffee sales	Vanilla sales	Peanut sales	Copra sales	Betel nut sales	Tobacco sales	Seafood sales	Gardening	Hunting	Collecting firewood	Collecting wild fowl eggs	Collecting nuts	Contract labor (for oil & gas companies)	Tourism	Local businesses
Awane Sub-clan	✓	✓								✓	✓	✓	✓				
Yate Sub-clan	✓	✓								✓	✓	✓	✓	✓			
Mengino and Abigarama villages			✓	✓	✓							✓			✓	✓	
Haia village	✓			✓	✓										✓		
23 Milne Bay wards	✓					✓			✓								
Bairaman, Lau, Mauna and Tavolo villages	✓	✓							✓	✓							✓
Minda village		✓				✓	✓	✓	✓	✓	✓	✓					

Table 6: Examples of potential output, outcome, and impact indicators

Indicator Types	Possible Examples
Output Indicators	- numbers of jobs created - number of people trained - number of trees planted - number of participants in environmental education workshops
Outcome Indicators	- number of households adopting a new livelihood activity - percentage or absolute increase in household income from carbon payments - reduction in hours spent by women collecting firewood or water - percentage of carbon beneficiaries agreeing that they get a fair payment (this implies a viable project and an effective benefit-sharing system) - percentage of women on the project stakeholder committee - number of village management committees functioning effectively - ecological and economic zoning completed - establishment of improved monitoring systems for protected areas
Impact Indicators	- percentage of reduction in infant mortality - percentage of reduction of households living on < $2 per day - percentage of local population changing from a negative to a positive attitude to forest conservation measures - significant increase in female participation in decision-making - reduction in domestic violence - percentage of increase in the population of an endangered species - number of hectares of a rare ecosystem preserved

* Richards et al. 2011

The subsequent variables are presented as survey prompts from the Poverty and Environment Network (PEN) assessment. PEN was launched in September 2004 by the Center of International Forestry Research (CIFOR) to conduct a tropics-wide, methodologically uniform collection of socio-economic and environmental data at household and village levels globally. The assessment methodology has since been used by FAO, the World Bank and other organizations to understand the role of forests in poverty alleviation, the extent to which they may lift people out of poverty, or serve as safety nets during periods of extreme hardship. The assessment also sought to understand how different forest management regimes and policies affect the benefits local communities, especially the poor, receive (Angelsen and Dokken 2015).

For this CFM project, the PEN questionnaire could be used in its entirety, or (recommended) a phased approach could be used in which the project seeks to gather data for only the key variables. And additional modules could be addressed through subsequent projects.

a. Country and survey information (C1)

1. Name of the country
2. Name of region(s) (province, state, etc.)
3. Name of district(s)
4. Information about the date timing of the surveys.

#	*Survey*	*Date (yyyymmdd)*
1.	Start of surveys	
2.	Completion of all surveys	
3.	Start of Village Survey 1 (V1)	
4.	Start of Village Survey 2 (V2)	

#	*Survey*	*Date (yyyymmdd)*
5.	Start of Annual Household Survey 1 (A1)	
6.	Start of Annual Household Survey 2 (A2)	
7.	Start of Quarterly Household Survey 1 (Q1)	
8.	Start of Quarterly Household Survey 2 (Q2)	
9.	Start of Quarterly Household Survey 3 (Q3)	
10.	Start of Quarterly Household Survey 4 (Q4)	

b. Village survey 1 (V1)

5. Information regarding consultations and quality control (Control information).

#	Task	Date(s)	By who?	Status OK? If not, give comments
1.	Meeting with officials			
2.	Village/focus group meetings			
3.	Other interviews			
4.	Checking questionnaire			
5.	Coding questionnaire			
6.	Entering data			
7.	Checking & approving data entry			

6. Geographic and climate variables

1.	What is the name of the village?	Name and village code
2.	What are the GPS coordinates of the centre of the village?	UTM format
3.	What is the latitude of the village?	degrees
4.	What is the longitude of the village?	degrees
5.	What is the altitude (masl) of the village?	masl
6.	What has been the average annual rainfall (mm/year) in the district during the past 20 years	mm/year
7.	What is the coefficient of variation in rainfall for the past 20 years?	To be filled in if data are readily available

7. Demographics

1.	In what year was the village established?	
2.	What is the current population of the village?	persons
3.	How many households live currently in this village?	households
4.	What was the total population of the village 10 years ago?	persons
5.	How many households lived in the village 10 years ago?	households
6.	How many persons (approx.) living here now have moved to the village in the past 10 years (in-migration)?	persons
7.	How many persons (approx.) have left the village over the past 10 years (outmigration)?	persons
8.	How many different groups (ethnic groups, tribes or castes) are living in the village?	

8. Infrastructure

1.	How many households (approx.) in the village have access to electricity (from public or private suppliers)?		households		
2.	How many households (approx.) in the village have access to (= use) piped tap water?		households		
3.	How many households (approx.) have access to formal credit (government or private bank operating in the village)?		households		
4.	Are informal credit institutions such as savings clubs and money lenders present in the village?		1-0		
5.	Is there any health centre in the village?		1-0		
6.	Does the village have at least one road useable by cars during all seasons? If 'yes', go to 8.		1-0		
7.	If 'no': what is the distance in kilometers to the nearest road usable during all seasons?		km		
8.	Is there a river within the village boundaries that is navigable during all seasons? If 'yes', go to 10.		1-0		
9.	If 'no': what is the distance to the nearest river that is navigable during all seasons?		km		
10.	What is the distance from the village centre to the nearest… (in km and in minutes by most common means of transport)		km	min	transport
		A. district market			
		B. market for major consumption goods			
		C. market where agric. products are sold			
		D. market where forest products are sold			

9. Forest and land cover/use - Land categories in the village (approx. area in hectares).

	Land category (code-land)	Total area (ha)	Ownership (ha)			
			State	Community	Private	Open access (de facto)
Forest:						
1.	Natural forest					
2.	Managed forests					
3.	Plantations					
Agricultural land:						
4.	Cropland					
5.	Pasture (natural or planted)					
6.	Agroforestry					
7.	Silvipasture					
8.	Fallow					
Other land categories:						
9.	Shrubs					
10.	Grassland					
11.	Residential areas, infrastructure					
12.	Wetland					
13.	Other, specify					
14.	Total land					

10. Forest and land cover/use –

What are the main forest types, users and products in the village?
Note: (1) The purpose is to link forest types, users and products. See the Technical Guidelines for further elaboration. (2) The total forest area should be the same as in the above table.

Type of forest	Ownership	Approx. area (ha)	Main users (max. 3)			Main products (max. 3)		
			Rank 1	Rank 2	Rank 3	Rank 1	Rank 2	Rank 3

By "main users" is meant those who have acquired the highest value of forest products (subsistence and cash) from a
given forest type in the past 12 months.
Codes: Choose the most appropriate among the following groups (as some do overlap):
1 = villagers that are members of FUG;
2 = villagers not members of FUG;
3 = subsistence oriented users in the village;
4 = small-scale commercial users in the village;
5 = large-scale commercial users in the village;
6 = subsistence oriented users from outside the village;
7 = small-scale commercial users from outside the village;
8 = large-scale commercial users from outside the village;
9 = other, specify

11. Does the village practice any form of active and deliberate forest management?

#	Type of management	Code
1.	Planting of trees	
2.	Cutting down undesired (competing) trees	
3.	Protecting certain desired (patches of) trees in the forest to promote the natural regeneration of these species	
4.	Protecting areas of forest for particular environmental services, like water catchment	
5.	Establishing clear use rights for a limited number of people to particular forest products (e.g., honey trees)	
6.	Extension/education about forest management	
7.	Enacted bylaw (e.g., no bush burning in or near forest)	
8.	Mapping/inventory forest resources (e.g. mapping Brazil nut stands)	
9.	Other, specify	

Codes:
0 = no, not at all;
1 = yes, but only to a limited extent;
2 = yes, they are common.

12. Forest resource base

Note: The questions should be asked in a village meeting or focus group for each of the categories in turn (i.e. column by column, and not row by row).

#			Fire-wood or charcoal	Timber or other wood	Food from the forest	Medicine from the forest	Forage from the forest	Other
1.	What is the most important product (MIP) for the livelihood of the people in the village (in this category) *(name)*							
2.	*(code-product)*							
3.	How has availability of the MIP changed over the past 5 years? *Codes:* *1 = declined;* *2 = about the same;* *3 = increased*							
4.	If the availability of the MIP in this category has declined, what are the reasons? Please rank the most important reasons, max. 3 (leave rest blank).	Reason or action	Rank 1-3	Rank 1-3	Rank 1-3	Rank 1-3	Rank 1-3	Rank 1-3
		1. Reduced forest area due to small-scale clearing for agriculture						
		2. Reduced forest area due to large-scale projects (plantations, new settlements, etc.)						
		3. Reduced forest area due to people from outside buying land and restricting access						
		4. Increased use of MIP due to more local (village) people collecting more						
		5. Increased use of MIP due to more people from other villages collecting more						
		6. Restrictions on use by central or state government (e.g., for forest conservation)						
		7. Local restrictions on forest use (e.g., community rules)						
		8. Climatic changes, e.g., drought and less rainfall						
		9. Other, specify:						
		10. Timber harvesting						
		11. Charcoal burning						
		12. Brick burning						

		Reason or action	Rank 1-3	Rank 1-3	Rank 1-3	Rank 1-3	Rank 1-3	Rank 1-3
		13. Poor harvesting practices						
		14. Product attacked/consumed by forest dwelling vermin						
		15. Bush burning						
		16. Increased marketing potential for product						
5.	If the availability of the MIP in this category has increased, what are the reasons? Please rank the most important reasons, max. 3.	1. Less clearing of forests for agriculture (incl. pastoralism)						
		2. Fewer local (village) people collecting less						
		3. Fewer people from other villages collecting less						
		4. Reduced use from large-scale commercial users/projects						
		5. Changes in management of forests						
		6. Climatic changes, e.g., more rainfall						
		7. Forest clearing that increases supply of product (e.g. fuelwood)						
		8. Tree planting						
		9. Other, specify:						
		10. More illegal access of protected area						
		11. Improved access rights to product						
		12. More secondary forest (as people clear land and forest regenerates)						
6.	What would be most important to increase the benefits (use or income) from the MIP? Please rank the most important reasons, max. 3.	1. Better access to the forest/MIP, i.e., more use rights to village						

		Reason or action	Rank 1-3	Rank 1-3	Rank 1-3	Rank 1-3	Rank 1-3	Rank 1-3
		2. Better protection of forest/MIP (avoid overuse)						
		3. Better skills and knowledge on how to collect/use it						
		4. Better access to credit/capital and equipment/technology						
		5. Better access to markets and reduced price risk						
		6. Invest in planting trees/forest product						
		7. Develop forest user groups/collective action in harvesting						
		8. Control fire						
		9. Other, specify:						

1) Select the most important product for the village that do not fall into any of the other five categories.
2) "Most important" is defined as the most important for the wellbeing of the village, whether it be through direct use in the home, or through sale for cash, or both.

13. Forest institutions

Note: (1) The questions should be asked in a village meeting or focus group for each of the categories in turn (i.e., column by column, and not row by row). (2) The MIP in each category should be identical to those in the table above.

#		Fire-wood or charcoal	Timber or other wood	Food from the forest	Medicine from the forest	Forage from the forest	Other
1.	What is the most important product (MIP) for the livelihood of the people in the village (in this category)? (name)						
2.	(code-product)						
3.	In what type of forest do you get the MIP? (code-forest)						
4.	What is the ownership status of this forest (code-tenure)						
5.	Are there customary rules regulating the use of the MIP in the village? Codes: 0=none/very few; 1=yes, but vague/unclear; 2=yes, clear rules exist If code '0', go to 7.						
6.	If 'yes': are the customary rules regarding forest use enforced /respected by the population of the village?						

#		Fire-wood or charcoal	Timber or other wood	Food from the forest	Medicine from the forest	Forage from the forest	Other
7.	Are there government rules that regulate forest use? Codes: 0=none/very few; 1=yes, but vague/unclear; 2=yes, clear rules exist If code '0', go to 9.						
8.	If 'yes' (code '1' or '2' above): are the government rules enforced/respected by the members in the village?						
9.	Do the villagers require any permission to harvest the MIP? Codes: 0=no; 1=yes, users have to inform the authorities; 2=yes, written permission needed If code '0', go to next section.						
10.	If 'yes' (code '1' or '2' above): does the user have to pay for the permission?						
11.	If 'yes': who issues this permit? Codes: 1=village head; 2=FUG; 3=forest officer (forest departments); 4=other government official; 9=other, specify:						

Codes: 0=no/very little; 1=to a certain extent by some groups of villagers; 2=to a certain extent by everyone; 3=yes, but only by some groups of villagers; 4=yes, by everyone; 9=no particular rules exist.

14. Forest User Groups (FUG) – Existence
    How many forest user groups (FUG) are there in the village?

15. Information about each FUG (use one column per FUG).

#			FUG 1	FUG 2	FUG 3
1.	When was the group formed? (yyyy)				
2.	How was the group formed? Codes: 1=local initiative; 2=initiative from NGO; 3=initiative from government, e.g., Forest Department; 4=other, specify:				
3.	Is the FUG's main purpose related to the management of a particular forest area or of particular forest product(s)? Codes: 1=area; 2=product(s); 3=both				
4.	If for a product (code 2 or 3above), what is the (main) product? (code-product)				
5.	How many members are there in the group?				
6.	How many times per year does the FUG have meetings?				
7.	Does the group have a written management plan?				
8.	What are the main tasks of the FUG? Select as many as appropriate: 1-0 code	1. Setting rules for use			
		2. Monitoring and policing			
		3. Silviculture & management			
		4. Harvesting forest products			
		5. Selling forest products			
		6. Tree planting			

#			FUG 1	FUG 2	FUG 3
		7. Tourism (i.e. maintaining tourist infrastructure; guiding tourists etc.)			
		8. Education/extension support			
		9. Other, specify			
		10. Savings and credit			
9.	Has any development project been implemented in the village over the past 5 years using proceeds from the FUG?				
10.	Has anyone in the village been violating the rules of the FUG over the past 12 months? If 'no', go to 14.				
11.	If 'yes': did the FUG impose any penalties on those violating the rules? If 'no', go to 14				
12.	If 'yes': what type of penalties? Codes: 1=fee (cash payment); 2=returning collected products; 3=labour (extra work); 4=exclusion from group; 5=warning; 9=other, specify				
13.	Which group of forest users have most commonly violated the rules over the past 5 years? Codes: 1=members of FUG; 2=non-FUG members in the village; 3=people from other villages; 9=other, specify				
14.	Overall, on a scale from 1-5 (1 is highest, 5 is lowest) how effective would you say that the FUG is in ensuring sustainable and equitable forest use?				

Note: Any FUGs in the village should be further discussed in the village narrative.

c. Village survey 2 (V2)

16. Information regarding consultations and quality control (Control information).

#	Task	Date(s)	By who?	Status OK? If not, give comments
1.	Meeting with officials			
2.	Village/focus group meetings			
3.	Other interviews			
4.	Checking questionnaire			
5.	Coding questionnaire			
6.	Entering data			
7.	Checking & approving data entry			

17. Geographic and climate variables

1.	What is the name of the village?	Name and village code
2.	What was the total rainfall in the village for the past 12 months?	mm/year
3.	If rainfall data not available (question 2): How was the rainfall past 12 months compared with a normal year (=average last 20 years)? Codes: 1=well below normal (< 50 %); 2=below normal (50-90%); 3=normal (90-110%); 4=above normal (110-150%); 5=well above normal (> 150%)	

18. Risk

	Has the village faced any of the following crises over the past 12 months? Codes: 0=no; 1=yes, moderate crisis; 2=yes, severe crisis	
1.	Flood and/or excess rain	
2.	Drought	
3.	Wild fire (in crops/ forest/grasslands etc)	
4.	Widespread crop pest/disease and/or animal disease	
5.	Human epidemics (disease)	
6.	Political/civil unrest	
7.	Macro-economic crisis	
8.	Refugee or migration infusion	
9.	Other, specify	
10.	Wildlife predation on livestock	
11.	Conflicts over forest resources (theft)	
12.	Land conflicts within village	
13.	Bridge/road washed out	
14.	Harassment from forest officials	

19. Wages and prices

1.	What was the typical daily wage rate for unskilled agricultural/casual adult male/female labour during the peak/slack season in this village over the past 12 months? (Lc$/day)		Male	Female
		Peak		
		Slack		
2.	What is the main staple food in the village? (code-product)			
3.	What was the price of a kg of the main staple food during the past 12 months before and after the main agricultural harvest? (Lc$/kg)		Before harvest	After harvest
4.	What is the sales value of one hectare of good agricultural land in the village (i.e., not degraded, not too steep, and suitable for common crops, and within 1km of the main road or settlement) (Lc$/hectare)			

20. Forest services

1.	Has the village (as a community or individuals in the village) received any direct benefits (in kind or in cash) related to forest services over the past 12 months? Codes: 0=no; 1=yes, directly to households; 2=yes, directly to village (e.g., development project); 3=yes, both to household and village		
2.	If the village has received payment (code 2 or 3 above), please indicate the amount the village has received.	Payments related to:	Amount
		1. Tourism	
		2. Carbon sequestration	
		3. Water catchment	
		4. Biodiversity conservation	
		5. Compensation from timber company	
		6. Compensation from mining company	
		7. Tree planting/afforestation	
		8. Other, specify	
3.	Has the village received any forestry-related external support (technical assistance, free inputs, etc.) from government, donors, NGOs) over the past 12 months?		

Note: If any such payment or assistance has been received it should be elaborated in the village narrative.

d. Annual household survey 1 (A1)

21. Control information

Task	Date(s)	By who?	Status OK? If not, give comments
Interview			
Checking questionnaire			
Coding questionnaire			
Entering data			
Checking & approving data entry			

22. Identification - Identification and location of household

		Name	ID
1.	Household name and code		
2.	Village name and code		
3.	District name and code		
4.	Name and PID (see B. below) of primary respondent		
5.	Name and PID (see B. below) of secondary respondent		
6.	GPS reference point of household (UTM format)		
7.	Distance of the household from the centre of village (in minutes of walking and in km)	min	km

23. Household composition - Who are the members of the household?

Note: Recall the definition of households in the Technical Guidelines.

Personal Identification number (PID)	Name of household member	Relation to household head	Year born (yyyy)	Sex (0=male 1=female)	Education (number of years completed)
1.					
2.					
3.					
4.					

1) Codes: 1=spouse (legally married or cohabiting); 2=son/daughter; 3=son/daughter in law; 4=grandchild; 5=mother/father; 6=mother/father in law; 7=brother or sister; 8=brother/sister in law; 9=uncle/aunt; 10=nephew/niece; 11=step/foster child; 12=other family; 13=not related (e.g., servant). 2) One may ask about age, and the calculate 'year born' when entering data.

24. Household composition – additional information regarding the head of the household.

1.	What is the marital status of household head? Codes: 1=married and living together; 2=married but spouse working away; 3=widow/widower; 4=divorced;; 5=never married; 9=other, specify	
2.	How long ago was this household formed (see definition of household)	years
3.	Was the household head born in this village? clf 'yes', go to 5.	1-0
4.	If 'no': how long has the household head lived in the village?	years
5.	Does the household head belong to the largest ethnic group/caste in the village?	1-0

25. Land - Please indicate the amount of land (in hectares) that you currently own and have rented in/out.

	Land category	Total area (ha)	Ownership (ha)	Main products grown/harvested in the past 12 months Max 3 (code-product)		
				Rank 1	Rank 2	Rank 3
Forest:						
1.	Natural forest					
2.	Managed forests					
3.	Plantations					
Agricultural land:						
4.	Cropland					
5.	Pasture (natural or planted)					
6.	Agroforestry					
7.	Silvipasture					
8.	Fallow					
9.	Other vegetation types/land uses (residential, bush, grassland, wetland, etc.)					
10.	Total land owned (1+2+3+…+9)					
11.	Land rented out (included in 1-9)					
12.	Land rented in (not included in 1-9)					

26. Assets and savings - Please indicate the type of house you have?

1.	Do you have your own house?	Codes: 0=no; 1=own the house on their own; 2=own the house together with other household(s); 3=renting the house alone; 4=renting the house with other household(s); 9=other, specify
2.	What is the type of material of (most of) the walls?	Codes: 1=mud/soil; 2=wooden (boards, trunks); 3=iron (or other metal) sheets; 4=bricks or concrete; 5=reeds/straw/grass/fibers/bamboo; 9=other, specify
3.	What is the type of material of (most of) the roof?	Codes: 1=thatch; 2=wooden (boards); 3=iron or other metal sheets; 4=tiles; 9=other, specify:
4.	How many m2 approx. is the house?	m2

27. Assets and savings - Please indicate the number and value of implements and other large household items that are owned by the household.

#		No. of units owned	Total value (current sales value of all units, not purchasing price)
1	Car/truck		
2	Tractor		
3	Motorcycle		
4	Bicycle		
5	Handphone/phone		

#		No. of units owned	Total value (current sales value of all units, not purchasing price)
6	TV		
7	Radio		
8	Cassette/CD/ VHS/VCD/DVD/ player		
9	Stove for cooking (gas or electric only)		
10	Refrigerator/freezer		
11	Fishing boat and boat engine		
12	Chainsaw		
13	Plough		
14	Scotch cart		
15	Shotgun/rifle		
16	Wooden cart or wheelbarrow		
17	Furniture		
18	Water pump		
19	Solar panel		
99	Others (worth more than approx		
1	Car/truck		
2	Tractor		
3	Motorcycle		
4	Bicycle		
5	Handphone/phone		
6	TV		
7	Radio		
8	Cassette/CD/ VHS/VCD/DVD/ player		
9	Stove for cooking (gas or electric only)		
10	Refrigerator/freezer		
11	Fishing boat and boat engine		
12	Chainsaw		
13	Plough		
14	Scotch cart		
15	Shotgun/rifle		
16	Wooden cart or wheelbarrow		
17	Furniture		
18	Water pump		
19	Solar panel		
99	Others (worth more than approx.. 50 USD purchasing price)		

28. Assets and savings - Please indicate the savings and debt the household has.

1.	How much does the household have in savings in banks, credit associations or savings clubs?	Lc$
2.	How much does the household have in savings in non-productive assets such as gold and jewelry?	Lc$
3.	How much does the household have in outstanding debt?	Lc$

29. Forest resource base

1.	How far is it from the house/homestead to the edge of the nearest natural or managed forest that you have access to and can use?	1. … measured in terms of distance (straight line)?	km
		2. … measured in terms of time (in minutes of walking)?	min
2.	Does your household collect firewood? If 'no', go to 8.		1-0
3.	If 'yes': how many hours per week do the members of your household spend on collecting firewood for family use? (adult time should be reported; child time = 50 % of adult time)		hours
4.	Does your household now spend more or less time on getting firewood than you did 5 years ago?		Codes: 1=more; 2=about the same; 3=less
5.	How has availability of firewood changed over the past 5 years?		Codes: 1=declined; 2=about the same; 3=increased If code '2' or' 3', go to 7.
6.	If declined (code '1' on the question above), how has the household responded to the decline in the availability of firewood? Please rank the most important responses, max 3.	Response	Rank 1-3
		1. Increased collection time (e.g., from further away from house)	
		2. Planting of trees on private land	
		3. Increased use of agricultural residues as fuel	
		4. Buying (more) fuelwood and/or charcoal	
		5. Buying (more) commercial fuels (kerosene, gas or electricity)	
		6. Reduced the need for use of fuels, such as using improved stove	
		7. More conservative use of fuelwood for cooking and heating	
		8. Reduced number of cooked meals	
		10. Use of improved technology	
		11. Increased use of non-wood wild products (ex. reeds)	
		12. Restricting access/use to own forest	
		13. Conserving standing trees for future	
		14. Making charcoal	
		9. Other, specify	
7.	Has your household planted any woodlots or trees on farm over the past 5 years? If 'no', go to next section.		1-0

8. .	If yes: what are the main purpose(s) of the trees planted? Please rank the most important purposes, max 3.	Purpose	Rank 1-3
		1. Firewood for domestic use	
		2. Firewood for sale	
		3. Fodder for own use	
		4. Fodder for sale	
		5. Timber/poles for own use	
		6. Timber/poles for sale	
		7. Other domestic uses	
		8. Other products for sale	
		9. Carbon sequestration	
		10. Other environmental services	
		11. Land demarcation	
		12. To increase the value of my land	
		13. To allow my children and/or grandchildren to see these trees	
		19. Other, specify	

30. Forest User Groups (FUG)

Note: The enumerator should first explain what is meant by a FUG, cf. the Technical Guidelines.

1.	Are you or any member of your household a member of a Forest User Group (FUG)? If 'no', go to 11.	1-0
2.	Does someone in your household normally/regularly attend the FUG meetings? If 'no', go to 5.	1-0
3.	If 'yes': in your household, who normally attends FUG meetings and participates in other FUG activities?	Codes: 1=only the wife; 2=both, but mainly the wife; 3=both participate about equally; 4=both, but mainly the husband; 5=only the husband; 6=mainly son(s); 7=mainly daughter(s); 8=mainly husband & son(s); 10=mainly wife & daughter(s); 9=other arrangements not described above
4.	How many person days (= full working days) did the household members spend in total on FUG activities (meetings, policing, joint work, etc) over the past 12 months?	days
5.	Does your household make any cash payments/contributions to the FUG? If 'no', go to 7.	1-0
6.	If 'yes': how much did you pay in the past 12 months?	Lc$
7.	Did your household receive any cash payments from the FUG (e.g., share of sales) in the past 12 months? If 'no', go to 9.	1-0
8.	If 'yes': how much did you receive in the past 12 months?	Lc$

9.	What are your reasons for joining the FUG? Please rank the most important reasons, max 3.	Reason	Rank 1-3
		1. Increased access to forest products	
		2. Better forest management and more benefits in future	
		3. Access to other benefits, e.g., government support or donor programmes	
		4. My duty to protect the forest for the community and the future	
		5. Being respected and regarded as a responsible person in village	
		6. Social aspect (meeting people, working together, fear of exclusion, etc.)	
		7. Forced by Government/chiefs/neighbours	
		8. Higher price for forest product	
		10. Better quality of forest product	
		11. Receipt of direct payments	
		12. Makes harvest of forest products more efficient	
		13. Know forest resource better (e.g. # Brazil nut trees)	
		14. Learn new skills/information	
		15. Reduce conflicts over resource	
		16. More secure land title	
		9. Other, specify	
10.	Overall, how would you say the existence of the FUG has affected the benefits that the household gets from the forest?		Codes: 1=large negative effect; 2=small negative effect; 3=no effect; 4=small positive effect; 5=large positive effect
11.	If you don't participate in FUG, why? Please rank the most important reasons, max 3	Reason	Rank 1-3
		1. No FUG exists in the village	
		2. I'm new in the village	
		3. FUG members generally belong to other group(s) (ethnic, political party, religion, age, etc.) than I do	
		4. Cannot afford to contribute the time	
		5. Cannot afford to contribute the required cash payment	

		Reason	Rank 1-3
		6. FUG membership will restrict my use of the forest, and I want to use the forest as I need it	
		7. I don't believe FUG is very effective in managing the forest	
		8. Lack of forest products	
		10. Not interested in the activities undertaken by existing FUGs	
		11. Corruption in FUG	
		12. Interested in joining but needs more information	
		13. FUG exists in village, but household is unaware of its presence	
		14. Forest authorities	
		9. Other, specify	

e. Annual household survey 2 (A2)

31. Control information

Task	Date(s)	By who?	Status OK? If not, give comments
Interview			
Checking questionnaire			
Coding questionnaire			
Entering data			
Checking & approving data entry			

32. Identification

		Name	ID
1.	Household name and code		
2.	Village name and code		
3.	District name and code		
4.	Name and PID (see B. below) of primary respondent		
5.	Name and PID (see B. below) of secondary respondent		

33. Crisis and unexpected expenditures

Has the household faced any major income shortfalls or unexpectedly large expenditures during the past 12 months?

#		How severe? *	How did you cope with the income loss or costs? Rank max. 3 **		
1.	Serious crop failure		Rank 1	Rank 2	Rank 3
	Serious illness in family (productive age-group adult unable to work for more than one month during past 12 months, due to illness, or to taking care of ill person; or high medical costs)				

	Serious crop failure		Rank 1	Rank 2	Rank 3
3.	Death of productive age-group adult				
4.	Land loss (expropriation, etc				
5.	Major livestock loss (theft, drought, etc				
6.	Other major asset loss (fire, theft, flood, etc				
7.	Lost wage employment				
8.	Wedding or other costly social events				
9.	Other, specify:				
10.	Payment for sale of hh products arrive later than expected				
11.	Delayed income from forest products				
12.	Fine from environmental regulation agency				

** Codes severity:*

0=no crisis;

1=yes, moderate crisis;

2=yes, severe crisis.

*** Codes coping:*

1. Harvest more forest products

2. Harvest more wild products not in the forest

3. Harvest more agricultural products

4. Spend cash savings

5. Sell assets (land, livestock, etc.)

6. Do extra casual labour work

7. Assistance from friends and relatives

8. Assistance from NGO, community org., religious org. or similar

9. Get loan from money lender, credit association, bank etc.

10. Tried to reduce household spending

11. Did nothing in particular

12. Spent savings / retirement money

13. Reduced number of meals taken

14. Borrowed against future earnings

15. Sold food that would otherwise be used for household consumption

16. Rented out land

17. Started new business

18. Changed to different type of livestock

19. Other, specify:

20. Harvested premature crops.

21. Changed cropping patterns or types of crops planted

34. Forest services

Has the household over the past 12 months received any cash or in kind payments related to the following forest services?

#	Principal purpose	Have received? (1-0)	If yes, amounts (values) received (Lc$) (if nothing, put '0')
1.	Tourism		
2.	Carbon projects		
3.	Water catchments projects		
4.	Biodiversity conservation		
5.	Others, specify:		
6.	Tree planting		
7.	Timber concessions		

35. Forest clearing

#					
1.	Did the household clear any forest during the past 12 months? If 'no', go to 9.		1-0		
2.	If YES:	How much forest was cleared?	ha		
3.		What was the cleared forest (land) used for? *Codes: 1=cropping; 2=tree plantation; 3=pasture; 4=non-agric uses (Rank max 3)*	Rank 1	Rank 2	Rank 3
4.		If used for crops (code '1' in question above), which principal crop was grown? *(code-product)* Rank max 3	Rank 1	Rank 2	Rank 3
5.		What type of forest did you clear?	code-forest		
6.		If secondary forest, what was the age of the forest?	years		
7.		What was the ownership status of the forest cleared?	code tenure		
8.		How far from the house was the forest cleared located?	km		
9.	Has the household over the last 5 years cleared forest? If 'no', go to 11.		1-0		
10.	If 'yes': how much forest (approx.) has been cleared over the last 5 years? Note: This should include the area reported in question 2.		ha		
11.	How much land used by the household has over the last 5 years been abandoned (left to convert to natural re-vegetation)?		ha		

36. Welfare perceptions and social capital

1.	All things considered, how satisfied are you with your life over the past 12 months?		Codes: 1=very unsatisfied; 2=unsatisfied; 3=neither unsatisfied or satisfied; 4=satisfied; 5=very satisfied
2.	Has the household's food production and income over the past 12 months been sufficient to cover what you consider to be the needs of the household?		Codes: 1=no; 2=reasonable (just about sufficient); 3=yes
3.	Compared with other households in the village (or community), how well-off is your household?		Codes: 1=worse-off; 2=about average; 3=better-off
4.	How well-off is your household today compared with the situation 5 years ago? If 1 or 3, go to 5. If 2, go to 6.		Codes: 1=less well-off now; 2=about the same; 3=better off now
5.	If worse- or better-off: what is the main reason for the change? Please rank the most important responses, max 3.	Reason: Change in …	Rank 1-3
		1. off farm employment	
		2. land holding (e.g., bought/sold land, eviction)	
		3. forest resources	
		4. output prices (forest, agric,…)	
		5. outside support (govt., NGO,..)	
		6. remittances	
		7. cost of living (e.g., high inflation)	
		8. war, civil strife, unrest	
		9. conflicts in village (non-violent)	
		10. change in family situation (e.g. loss of family member/a major bread-winner)	
		11. illness	
		12. access (e.g. new road,…)	

		Reason: Change in …	Rank 1-3
		13. increased/reduced land area for agric. production	
		14. religious awakening (i.e., found religion, converted to a new religion, born again or saved)	
		15. started a new business/lost or less business	
		16. livestock (gain or loss)	
		17. material assets, incl. house (gain or loss)	
		18. increased regulations	
		20. education / increased knowledge	
		21. more engaged in marketing/trade	
		22. political stability	
		23. crop failure/raiding	
		24. changed drinking habits (started/stopped drinking alcohol)	
		25. changes in natural resources (fish, etc.)	
		26. working for themselves (no longer under a patron)	
		27. more time to work	
		28. Joined cooperative	
		29. Forced to travel for family matters	
		30. Fire destroyed everything	
		31. Change in job	
		19. other (specify)	
6.	Do you consider your village (community) to be a good place to live?		Codes: 1=no; 2=partly; 3=yes
7.	Do you in general trust people in the village (community)?		Codes: 1=no; 2=partly, trust some and not others; 3=yes
8.	Can you get help from other people in the village (community) if you are in need, for example, if you need extra money because someone in your family is sick?		Codes: 1=no; 2= can sometimes get help, but not always; 3=yes

37. Enumerator/researcher assessment of the household

Note: This is to be completed by the enumerator and/or the PEN partner. If the enumerator doing the A2 (and Q4) is not the one who has been doing previous quarterly surveys, those who have had the most exposure to the household should fill in questions 2-5.

1.	During the last interview, did the respondent smile or laugh?	Codes: (1) neither laughed nor smiled (somber); (2) only smiled; (3) smiled and laughed; (4) laughed openly and frequently.
2.	Based on your impression and what you have seen (house, assets, etc.), how well-off do you consider this household to be compared with other households in the village?	Codes: 1=worse-off; 2=about average; 3=better-off
3.	How reliable is the information generally provided by this household?	Codes: 1=poor; 2=reasonably reliable; 3=very reliable
4.	How reliable is the information on forest collection/use provided by this household?	Codes: 1=poor; 2=reasonably reliable; 3=very reliable

5.	If the forest information is not so reliable (code 1 above), do you think the information provided overestimate or underestimate the actual forest use?	Codes: 1=underestimate; 2=overestimate; 3= no systematic over- or underestimation; 4=don't know.

f. Quarterly household surveys (Q1-Q4)

Note: (1) All incomes are asked for the past month (past 30 days), except for the last sections on crops, livestock and other income sources where the recall period is 3 months. (2) The researcher should list the most common products in the various tables, based on RRAs and pre-testing of the questionnaire. After asking about these pre-listed products, the enumerator should ask if there are any other products not mentioned that the household has harvested/collected over the past 1 (3) month(s).

38. Control information

Task	Date(s)	By who?	Status OK? If not, give comments
Interview			
Checking questionnaire			
Coding questionnaire			
Entering data			
Checking & approving data entry			

39. Identification

		Name	ID
1.	Household name and code		
2.	Village name and code		
3.	District name and code		
4.	Name and PID (see B. below) of primary respondent		
5.	Name and PID (see B. below) of secondary respondent		

40. Direct forest income (income from unprocessed forest products)
What are the quantities and values of raw-material forest products the members of your household collected for both own use and sale over the past month?
Note: (1) Income from plantations is defined as forest income, while agroforestry income is categorized as agric. Income. (2) The quantities of unprocessed forest products used as inputs in making processed forest products should only be reported in section C, table 2, and not in the table below.

1.	Forest product	Code product
2.	Collected by whom?	Codes: 1=only/mainly by wife and adult female household members; 2=both adult males and adult females participate about equally; 3=only/mainly by the husband and adult male household members; 4=only/mainly by girls (<15 years); 5=only/mainly by boys (<15 years); 6=only/mainly by children (<15 years), and boys and girls participate about equally; 7=all members of household participate equally; 8=none of the above alternatives; 9=person employed by and living with the household.

3.	Collected where?	Land type	Code land
4.		Ownership	Code tenure
5.	Quantity collected (7+8)		
6.	Unit		
7.	Own use (incl. gifts)		
8.	Sold (incl. barter)		
9.	Price per unit		
10.	Type of market		Code market
11.	Gross value (5*9)		
12.	Transport/ marketing costs (total)		
13.	Purch. inputs & hired labour		
14.	Net income (11-12-13)		

Note: Answers in columns 3 and 4 should be consistent with land categories reported in village questionnaire (V1D01) and in the annual household questionnaire (A1C).

41. Forest-derived income (income from processed forest products) - What are the quantities and values of processed forest products that the members of your household produced during the past month?

1.	Product	Code product
2.	Who in the household did the work?	Codes: 1=only/mainly by wife and adult female household members; 2=both adult males and adult females participate about equally; 3=only/mainly by the husband and adult male household members; 4=only/mainly by girls (<15 years); 5=only/mainly by boys (<15 years); 6=only/mainly by children (<15 years), and boys and girls participate about equally; 7=all members of household participate equally; 8=none of the above alternatives.
3.	Quantity produced (5+6)	
4.	Unit	
5.	Own use (incl. gifts)	
6.	Sold (incl. barter)	
7.	Price per unit	
8.	Type of market	Code market
9.	Gross value (3*7)	
10.	Purchased inputs & hired labour	
11.	Transport/ marketing costs	
12.	Net income excl. costs of forest inputs (9-10-11)	

42. Forest-derived income (income from processed forest products) - What are the quantities and values of unprocessed forest products used as inputs (raw material) to produce the processed forest products in the table above?
Note: Avoid double counting with section B: only products used an inputs are recorded in the table below, and these quantities should not be included in what is recorded in section B.

1.	Processed (final) products		Code product
2.	Unprocessed forest product used as input		Code product
3.	Quantity used (5+6)		
4.	Unit		
5.	Quantity purchased		
6.	Quantity collected by household		
7.	Collected where?	Land type	Code land
8.		Ownership	Code tenure
9.	Who in the household collected the forest product? *		
10.	Price per unit		
11.	Value (3*10)		

* Codes as in the table above.
Note: (1) The products in column 1 should be exactly the same as those in column 1 in the table above. Note: Columns 7,8,9 should be left blank if no collection by household. (2) Column 10 (price) should be asked even if only from collection, but if not available, see the Technical Guidelines on valuation. (3) Answers in columns 7 and 8 should be consistent

43. Fishing and aquaculture - How much fish did your household catch exclusively from the wild (rivers, lake, sea) during the past month?

1.	Type of fish (list local names)*		
2.	Collected where?	Land type	Code land
3.		Ownership	Code tenure
4.	Total catch (kg) (5+6)		
5.	Own use (incl. gifts)		
6.	Sold (incl. barter)		
7.	Price per kg		
8.	Gross value (4*7)		
9.	Costs (inputs, hired labour, marketing)		
10.	Net income (8-9)		

Note: Answers in columns 2 and 3 should be consistent with land categories reported in the village questionnaire (V1D01) and in the annual household questionnaire (A1C).

44. Fishing and aquaculture - How much fish did your household catch from ponds (aquaculture) in the past month?

1.	Type of fish (list local names)	
2.	From where? *	
3.	Total catch (kg) (4+5)	
4.	Own use (incl. gifts)	
5.	Sold (incl. barter)	
6.	Price per kg	
7.	Gross value (3*6)	
8.	Costs (inputs, hired labour, marketing, etc.)	
9.	Net income (7-8)	

** Codes: 1=Pond owned by households; 2=Pond owned by group of which household is a member; 3=Pond owned by community/village; 4=Pond owned by others and persons can buy fishing rights (include costs in column 7); 9=Other, specify*

45. Non-forest environmental income - In addition to forest products and fish included in the previous tables, how much of other wild products (e.g., from grasslands, fallows, etc.) did your household collect in the past month?

1.	Type of product		Code product
2.	Collected where?	Land type	Code land
3.		Ownership	Code tenure
4.	Quantity collected (6+7)		
5.	Unit		
6.	Own use (incl. gifts)		
7.	Sold (incl. barter)		
8.	Price per unit		
9.	Gross value (4*8)		
10.	Costs (inputs, hired labour, marketing, etc.)		
11.	Net income (9-10)		

Note: Answers in columns 2 and 3 should be consistent with land categories reported in the village questionnaire (V1D01) and in the annual household questionnaire (A1C).

46. Wage income - Has any member of the household had paid work over the past month?
Note: One person can be listed more than once for different jobs.

1.	Household member	PID
2.	Type of work	code-work
3.	Days worked past month	
4.	Daily wage rate	
5.	Total wage income	

47. Income from own business (not forest or agriculture) - Are you involved in any types of business, and if so, what are the gross income and costs related to that business over the past month? Note: If the household is involved in several different types of business, you should fill in one column for each business.

		Business 1	Business 2	Business 3
1.	What is your type of business? *			
2.	Gross income (sales)			
Costs:				
3.	Purchased inputs			
4.	Own non-labour inputs (equivalent market value)			
5.	Hired labour			
6.	Transport and marketing cost			
7.	Capital costs (repair, maintenance, etc.)			
8.	Other costs			
9.	Net income (2 - items 3-8)			
10.	Current value of capital stock			

** Codes: 1=shop/trade; 2=agric. processing; 3=handicraft; 4=carpentry; 5=other forest based; 6=other skilled labour; 7=transport (car, boat,…); 8=lodging/restaurant; 9=brewing; 10=brick making; 11=landlord/real estate; 12=herbalist/traditional healer/witch doctor; 13=quarrying; 14= contracted work (cleaning/maintenance); 15=renting out equipment; 19=other, specify*

48. Income from agriculture - Crops - What are the quantities and values of crops that household has harvested during the past 3 months?

1.	Crops	code-product
2.	Area of production	m2
3.	Total production (5+6)	
4.	Unit (for production)	
5.	Own use (incl. gifts)	
6.	Sold (incl. barter	
7.	Price per unit	
8.	Total value (3*7)	

49. Income from agriculture - Crops - What are the quantities and values of inputs used in crop production over the past 3 months (this refers to agricultural cash expenditures)?
Note: (1) Take into account all the crops in the previous table. (2) See codes-list (section 3.2) for additional codes.

#	Inputs	Quantity	Unit	Price per unit	Total costs
1.	Seeds				
2.	Fertilizers				
3.	Pesticides/herbicides				
4.	Manure				
5.	Draught power				
6.	Hired labour				
7.	Hired machinery				
8.	Transport/marketing				
19.	Other, specify				
20.	Payment for land rental				

50. Income from livestock - What is the number of ADULT animals your household has now, and how many have you sold, bought, slaughtered or lost during the past 3 months?
Note: See codes-list (section 3.3) for additional codes.

#	Livestock	Beginning number (3 months ago)	Sold (incl. barter), live or slaughtered	Slaughtered for own use (or gift given)	Lost (theft, died,..)	Bought or gift received	New from own stock	End number (now) (2-3-4-5+6+7)	Price per adult animal	Total end value (8*9)
1.	Cattle									
2.	Buffalos									
3.	Goats									
4.	Sheep									
5.	Pigs									
6.	Donkeys									
7.	Ducks									
8.	Chicken									
9.	Horses									
10.	Guinea pigs									

#	Livestock	Beginning number (3 months ago)	Sold (incl. barter), live or slaughtered	Slaughtered for own use (or gift given)	Lost (theft, died,..)	Bought or gift received	New from own stock	End number (now) (2-3-4-5+6+7)	Price per adult animal	Total end value (8*9)
11.	Rabbit									
12.	Turkey									
13.	Guinea fowl									
19.	Other, specify									

51. Income from livestock - What are the quantities and values of animal products and services that you have produced during the past 3 months?

#	Product/service	Production (4+5)	Unit	Own use (incl. gifts)	Sold (incl. barter)	Price per unit	Total value (2*6)
1.	Meat *						
2.	Milk **						
3.	Butter						
4.	Cheese						
5.	Ghee						
6.	Eggs						
7.	Hides and skin						
8.	Wool						
9.	Manure						
10.	Draught power						
11.	Bee hives						
12.	Honey						
13.	Curdled milk						
14.	Soap						
19.	Other, specify						

* Make sure this corresponds with the above table on sale and consumption of animals.

** Only milk consumed or sold should be included. If used for making, for example, cheese it should not be reported (only the amount and value of cheese)

52. Income from livestock - What are the quantities and values of inputs used in livestock production during the past 3 months (cash expenditures)?
Note: The key is to get total costs, rather than input units.

#	Inputs	Unit	Quantity	Price per unit	Total costs (3*4)
1.	Feed/fodder				
2.	Rental of grazing land				
3.	Medicines, vaccination and other veterinary services				
4.	Costs of maintaining barns, enclosures, pens, etc.				
5.	Hired labour				
6.	Inputs from own farm				
9.	Other, specify				

53. Income from livestock - Please indicate approx. share of fodder, either grazed by your animals or brought to the farm by household members.

Type of grazing land or source of fodder		Approx. share (%)
Land type (code-land)	Ownership (code-tenure)	
Total		100%

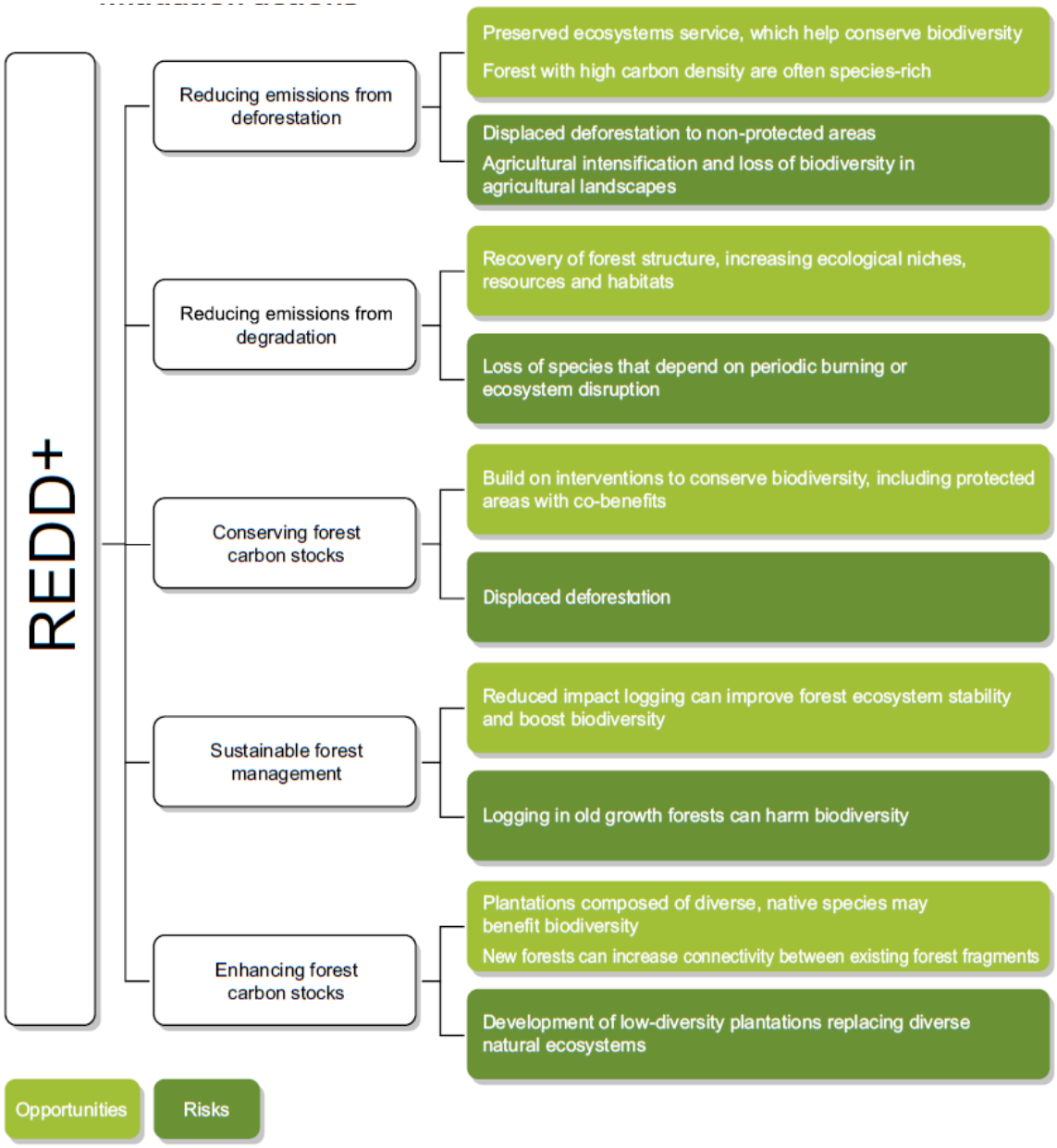
54. Other income sources - Please list any other income that the household has received during the past 3 months.

#	Type of income	Total amount received past 3 months
1.	Remittances	
2.	Support from government, NGO, organization or similar	
3.	Gifts/support from friends and relatives	
4.	Pension	
5.	Payment for forest services	
6.	Payment for renting out land (if in kind, state the equivalent in cash)	
7.	Compensation from logging or mining company (or similar)	
8.	Payments from FUG	
9.	Other, specify	

3.6 Biodiversity

Community Forest Management presents both opportunities and risks to biodiversity (Swan and McNally 2011). Community use and management of forest resources can impact species diversity and abundance directly or indirectly by changing the condition of forest ecosystems, forest composition and structure, and the ecosystem services forests provide (IAIA 2005). Monitoring biodiversity outcomes is an important component of managing productive landscapes for multiple public goods and services. A review of potential biodiversity impacts of REDD+ projects is shown in Figure 2 with positive impacts shown in light green and negative impacts in dark green.

*Figure 2: Biodiversity opportunities and risks presented by REDD+ mitigation actions **



* Miles and Dickenson (2010); Pistorius et al. (2010);

Biodiversity monitoring can be geared toward assessing four types of indicators: (1) the extent and intensity of the anthropogenic **pressures** that cause biodiversity loss; (2) the condition and **status** of biodiversity; (3) the **benefits** societies derive from biodiversity; and (4) the **response** to biodiversity loss – the implementation of policies or actions to prevent or reduce biodiversity loss. The household surveys presented above in the Socio-economic section cover many variables geared toward assessing pressures, benefits, and the responses (the latter mainly through community-based forest user groups). Thus variables in biodiversity form can be more focused on assessing the status of biodiversity, to – for example – understand the extent and distributes of plant or animal species of special ecological, cultural or economic interest (Latham et al. 2014).

There are four main methods to collect primary data on key species: animal trapping, camera trapping, conducting bio-acoustic surveys, recording sighting and other evidence of animal presence at points, along transects, or within plots. The method used will partially be determined by the species or taxa targeted for monitoring. For example, plot-based assessments are only suitable for amphibians, reptiles and invertebrates, while camera traps can be used for birds and mammals. The method selected will also depend on the human, technical and financial resources available for biodiversity monitoring (Table 7).

Table 7: Relative level of resources required to implement each method 1 = Low 2 = Medium 3 = High

Method	Resources required		
	Human	Technical	Financial
Animal Trapping Methods	3	3	2
Point and Line Transects	2	2	2
Camera Trapping	2	2	3 *
Bioacoustic Surveys	2	2	3 *
Quadrats & Plots	3	3	2
Remote Sensing	1	3	2 **

* Initial cost of equipment plus ongoing replacement costs
** Software and high resolution satellite images depending on requirements
Human resources = personnel requirements, including labour required for both training and implementation, and skilled personnel required
Technical resources = specifications of method requirements including specialist equipment or analytical software
Financial resources = the cost of the monitoring process, including the cost of acquiring specialist skills, data handling and equipment

For this CFM project, the best option for most partner communities will be to record sightings and other evidence of animal presence at points, along transects, or within plots. The following data should be recorded:

1. Species name
2. Date of observation
3. Time of day
4. Observer's name
5. Location (coordinates)
6. Location description
7. Life cycle stage (e.g. young, breeding, dead)
8. If dead, cause of death (e.g. snare, poison, gun, etc)
9. Type of "sighting" (e.g. physical sighting, call heard, tracks, droppings, etc)

4. Conclusion

A wide variety of potential variables, covering 6 important CFM topics, have been identified to enable customary landowners to participate effectively in forest management decision-making processes and engage in associated development opportunities.

With appropriate technology and adequate capacity building, local communities can collect data for the majority of these variables. To thoroughly address all variables listed within the document, local communities will most likely need to work with the support of, or in close collaboration with, other entities.

Not all of the variable listed in this document will be relevant for all project partners and locations. Indeed, collecting data for all variables would be an enormous undertaking, likely beyond the scope of this project. To avoid over-burdening partners and communities, and also to avoid collecting data that is never used, partner organizations should work with participating communities to identify their priority CFM topics, given their specific contexts and planned activities. In particular, participatory data collection activities should:

- **Start of gradually** with one or two simple forms.
- **Build in complexity over time** and only after successfully completing a first, simple phase of data collection and data management.

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