



Vital Signs Protocol

Rapid Roadside Assessments

Version 2.0

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1. INTRODUCTION

The goal of the Tier 2b Rapid Roadside Assessments is to provide validation information on **land-use** and **vegetation cover** to analysts developing land-cover maps. The maps are created using satellite data, and need to be tested against the real, on-the-ground land cover and land use to ensure they are realistic and accurate.

Rapid roadside assessments are used to capture key qualitative and semi-quantitative data, supported by photographs, for a large number of sites across the landscape in a quick, efficient manner. E-Plots provide the detailed, quantitative information which rapid roadside assessments cannot, but the sample size of rapid assessments is high enough (several thousand, eventually) to validate land cover classes with acceptable statistical certainty.

The Rapid Roadside Plot (RRP) assessments should be done at regular distance or time intervals as observation teams are traveling in the field (perhaps one per hour, or one every 20 km along the road), and should take 10 minutes to complete. The data entry sheet (Appendix 1) illustrates the scope of information that will be recorded.

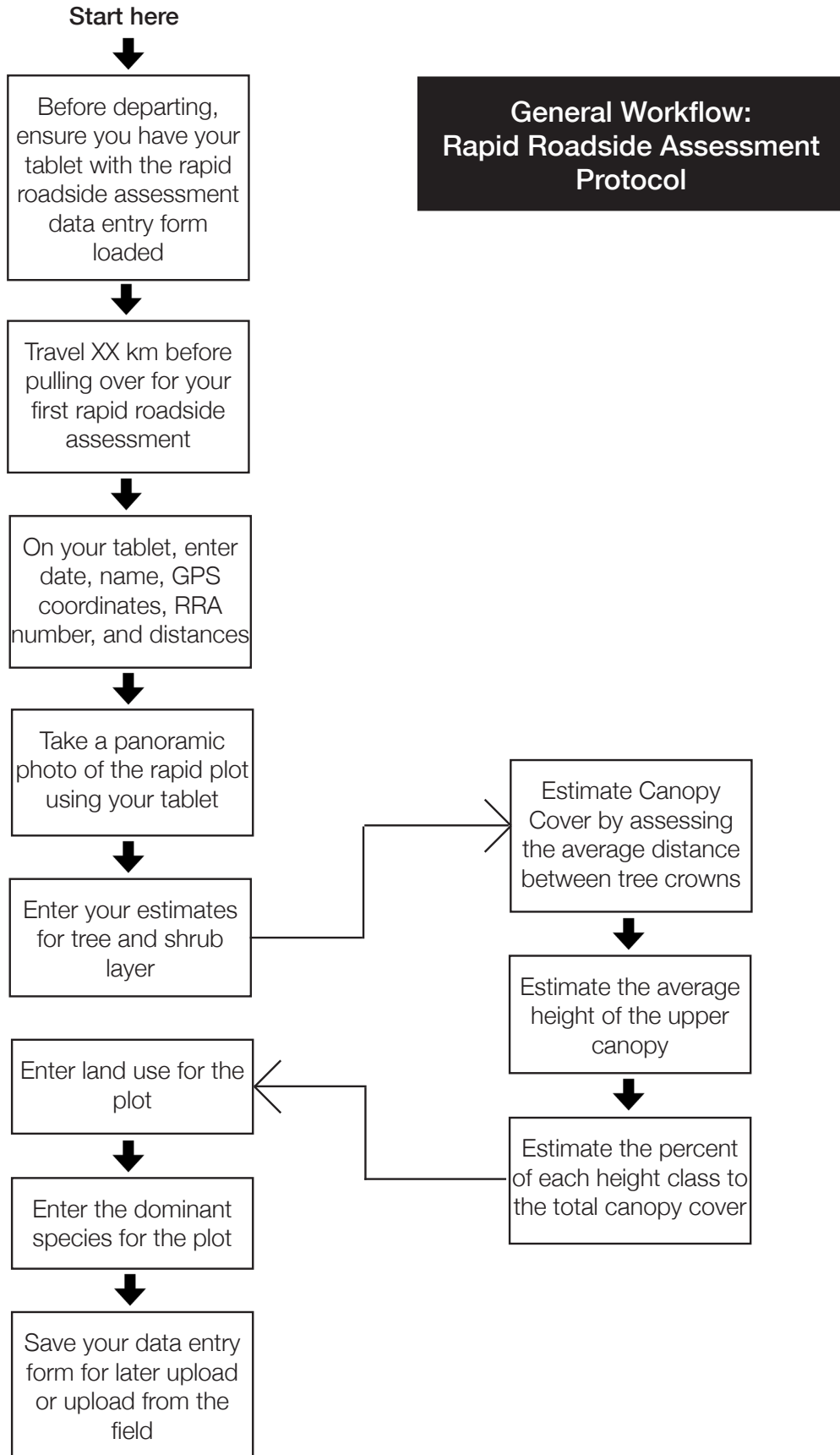
1.1 Definitions of Key Technical Terms

Land Cover: “The observed (bio)physical cover on the earth’s surface” (definition used by the Land Cover Classification System of the FAO). The observer should be careful not to confuse ‘land cover’ with ‘land use.’ Land cover describes what is covering the surface of the land: for example, vegetation, man-made features and as other surfaces, e.g. bare rock or bare soil.

Land Use: The manner in which land is being used, characterized by the “arrangements, activities and inputs people undertake in a certain land cover type to produce, change or maintain it” (LCCS, FAO). For example, where the land cover of an area may be grassland or open savanna, the land use type may be “nature conservation” or “cattle farming.”

Vegetation type: A collective term for the class of vegetation covering an area of ground, for example grassland, savanna, woodland or forest.

Canopy Cover: the area of ground covered by a canopy of plants. It is measured at the area covered by the vertical projection of the outermost perimeter of the canopy (small openings in the canopy are included). It may be recorded per plant (e.g. 3 m²) or as a proportion of an area containing several plant canopies (e.g. 20% canopy cover)



Tree: a woody plant taller than your knee (0.5 m) and with a stem greater than 50 mm in diameter. A diameter of 50 mm is about the size of your wrist, depending on hand size, and your thumb and finger should just be able to wrap around the stem. This allows you to quickly decide which individuals should be considered. It may have one or many stems.

Shrub: a perennial woody plant that is not a tree as defined above.

Herbaceous Layer: the non-woody vegetation layer, consisting of grasses and forbs (flowering plants). The plants may be annual or perennial.

Crop: species that are cultivated and harvested for food, fodder, clothing or other forms of production, e.g. maize, cotton or soybeans. Can be short-lived or perennial; if the latter, it is usually a ‘tree crop’.

GPS: a Global Positioning System that uses space-based satellites to provide the user with the geographic coordinates of a specific location.

1.2 Standard Conventions Used in this Document

The following conventions are used throughout this document:

- The use of bold in the text indicates a critical point. **Please pay special attention to terms, sentences and paragraphs marked in bold** as they are key to the understanding of the protocol.

2. ROLES AND RESPONSIBILITIES

The following table introduces the roles and responsibilities of the members of a Vital Signs field team:

Role	Responsibility
Country Director	<ul style="list-style-type: none">• Supports team with a complete understanding of the protocol manual• Trains technicians• Leads technicians in fieldwork and sampling and assists with measurements as required
Technical Manager	<ul style="list-style-type: none">• Supervises teams• Ensures equipment is well-managed and team is safe

	<ul style="list-style-type: none"> • Ensures consistency and quality of measurements • Ensures data are uploaded to the VS server daily (or weekly if internet access is limited) • Ensure back-ups and data entry sheets are properly archived
Technicians	<ul style="list-style-type: none"> • Perform rapid roadside assessments and record measurements • Clean and store equipment
Africa Field Director	<ul style="list-style-type: none"> • Helps train technicians and ensure consistency of protocol implementation across Vital Signs countries • Reviews data when uploaded • Approves protocol updates and sends out update notifications to field teams
Protocol Manager	<ul style="list-style-type: none"> • Receives and archives comments about the protocol from the field team • Updates and re-circulates the protocol

3. EQUIPMENT LIST

The following equipment is required to carry out the activities described in this manual. **Before traveling to the field to carry out sampling, use this list to ensure you have all the equipment needed for the day.**

Record the information directly into the form on the tablet. In the event that the RRP cannot be captured on a tablet in the field (for example, if the tablet is broken or its battery is flat), a paper form can be used. The data should be entered into the tablet as soon as possible. If you have to use a digital camera, make sure the photograph is loaded onto the tablet and selected when asked on the tablet form.

If a tablet is used to record data, at least one on-site backup to a laptop and, preferably, at least one off-site backup should be made at the end of each day.

General Supplies

- Tablet with data collection form loaded
- As backup: digital camera, GPS, paper forms and pencil
- Clipboards, notebooks and pens

4. RAPID ROADSIDE PLOT DATA ENTRY

The rapid roadside plot assessment records the **GPS coordinates, canopy cover, tree height, dominant species** and **land use**.

4.1 Entering Metadata

When you arrive at a designated rapid roadside plot, pull over onto the side of the road and park the vehicle. Enter the following information into your tablet within the RRP form:

- Date
- Observer Name
- GPS Coordinates: latitude and longitude
- Rapid Roadside Assessment Number
- Distance from the closest notable town just passed through (one that can be located on a map), and the name of the next closest town on your route.

4.2 Taking a Panoramic Photograph

With the tablet, take a 360° panoramic photograph of the rapid assessment plot from the point where you recorded the GPS coordinates, starting off pointing north and turning clockwise.

You can use a digital camera capable of taking a 360° photo if the tablet is unavailable, but then ensure that you **load this photo to the tablet** so you can select and upload the photo when entering data on the tablet. If there is only a digital camera with no panoramic capability, take eight standard, horizontal format photos in sequence (with the lens set on 'wide angle') aiming N, NE, E, SE, S, SW, W, and NW, and stitch them into a panoramic photo back at headquarters using a panoramic mosaic software.

In some (rare) situations only one side of the road may be usable as a RRP. You have two choices. The preferred action is to walk 50 to 100 m into the usable side and take the GPS location, a 360° photo and do the RRP there. If that is also not possible, take a 180° panorama from the road.

Photographs should be captured in large JPG format – equivalent to a file size of approximately 2-4 MB.

In a similar manner to all electronic field data, photograph files need to be saved and backed-up every day.

4.3 Making Tree and Shrub Layer Estimates

Three semi-quantitative estimates of features of the tree and shrub layer are required in order to classify the land cover: **Canopy Cover**, **Average Height of the Upper Canopy**, and **Percentage of Each Height Class contribution to the Total Canopy Cover**.

A list of the 1 to 5 dominant species (you can record them in local language or in scientific (latin) binomials) is very helpful. If you do not know the name of the plant, take a sample and one or more photos for later identification and give the species a temporary code or 'nickname' until you have a proper identity.

4.3.1 Estimating Canopy Cover

Canopy cover is estimated by assessing the average distance between tree crowns. Look at the tree crowns in the landscape, and use the following guidelines to determine canopy cover:

- If tree crowns are **two diameters apart**, canopy cover equals **9%**
- If tree crowns are **one diameter apart**, canopy cover equals **20%**
- If tree crowns are **half a diameter apart**, canopy cover equals **35%**
- If tree crowns are **touching**, canopy cover equals **75%**

You can use this as a framework to estimate the canopy cover (your accuracy will not be better than $\pm 5\%$) or to place it into a canopy cover class (0-9%, 10-39%, 40-59%, 60-100%), which correspond to the cutoffs between different vegetation types (grassland, savanna, woodland and forest, respectively).

4.3.2 Estimating Average Height of the Upper Canopy

The average height of the upper canopy is estimated as being in one of five classes, which correspond to cutoffs between different vegetation types:

- Less than 1 meter (low shrubland)
- Between 1 and 2 meters (shrubland)
- Between 2 and 5 meters (bushland or thicket)
- Between 5 and 20 meters (savanna, woodland or forest, depending on height)
- Greater than 20 meters (tall forest)

Estimate the average height of only the upper canopy, not the average canopy height of all trees and shrubs in the landscape. A useful technique is to consider the upper canopy height at 6-8 points around you (N, NE, E, SE...) and then record the average estimate across the set of points.

You can also imagine a very large sheet of light but stiff board settling down onto the canopy. How high above the ground will it come to rest?

4.3.3 Estimating Percentage contribution of Each Height Class to Total Canopy Cover

The percentages you record next to each height class must add up to 100. Again, a useful technique is to consider the contribution of each height class of trees and shrubs to the total projected canopy cover at 6-8 points around you (N, NE, E, SE...), then to record the average estimate across the set of points.

4.4 Judging the Land-Use

The predominant types of land-use within 50 m of the rapid assessment point needs to be recorded. It may differ on opposite sides of the road, and note that one land cover can have more than one land use. Look at the landscape for clues and select one or more of the following, or add your own description:

- Protected (eg national park, forest reserve etc)
- Livestock grazing (look for cattle, goats etc or their dung)
- Woody harvesting (look for cut stumps, piles of firewood or charcoal)
- Short duration cropping (there will be current or recent fields)

- Tree crops (species such as bananas or mango will be present)
- Habitation and business (buildings present)

4.5 Recording Dominant Species

Dominant tree, herbaceous and crop species within 50 m of the rapid assessment point need to be recorded. The emphasis should be on listing the 1 to 5 dominant species quickly and efficiently. The order in which the species are listed does not matter, as long as each species is recorded using a traceable name that can later be linked to a species code or scientific name.

5. APPENDICES

Appendix 1: Rapid Roadside Assessment Data Entry Sheet

Vital Signs Africa: Rapid Roadside Assessment Data Entry Sheet							
Date:		Observer name:		GPS coordinates			
				Lat:	Long:		
Rapid Road Assess no.	Photograph file name:			Distance (km) from _____ to _____, ____ km			
TREE / SHRUB LAYER							
Tree / shrub total projected canopy cover (tick one)	< 10%	10 – 39%	40 – 59%	> 60%			
General guide to above: tree crowns that are 2 crown diameters apart = 9 % canopy cover, 1 diameter apart = 20%, ½ a diameter apart = 35%, crowns touching = 75%							
Average height of upper canopy (tick one)	< 1m	1 - 2m	2 - 5m	5 - 20m	> 20m		
% Contribution of height class to total projected canopy cover	__ %	__ %	__ %	__ %	__ %		
LAND-USE							
Select one or more (tick)	Protected	Livestock grazing	Wood harvesting	Short duration cropping	Tree crops	Habitation / business	Other
DOMINANT SPECIES (within 50m of observation point)							
Tree species				Herbaceous and crop species			

Appendix 2: Rapid Roadside Assessment Data Dictionary

Rapid Road Side Assessment Form							
Version: 1.0							
	Form Value	Definition	Data Type	Values List	Example	Empty Value	Rules/Comments
	Country	The VS country three-letter abbreviation.	string	None	TAN	Required	
	Rapid Road Side Assessment no.	A unique alphanumeric code assigned to each rapid roadside assessment in a country. Prefixed by R, sequential number 0 to 9999	alphanumeric	None	R0001	Required	
	Tier 2b Rapid Roadside Assessment code	A unique i.d. code for rapid road side assessment in each country. The code contains two components: "3-letter country code - Rapid Roadside Assessment Number" For example, TAN-R0004 refers to rapid road side assessment number 4 in Tanzania. The id numbers will be assigned automatically.	formula	None	TAN_R0004	Required	
Date of Road Side Assessment	Year	The year of assessment.(YYYY)	numeric	{>=2013}	2014	Required	
	Month	The month of the assessment (MM)	numeric	{1-12}	03	Required	
	Day	The day of the assessment (DD)	numeric	{1-31}	19	Required	
Observers name	First Name	The first name of the person recording information onto the Field Form.	string	None	Mark	Required	Will be generated by pick list on tablet
	Last Name	The last name of the person recording information onto the Field Form.	string	None	Musumba	Required	Will be generated by pick list on tablet
Geog. co-ord's of the rapid assessment	Assessment Latitude	Latitude of the point at which the rapid roadside assessment is taken in decimal degrees	numeric	90 to -90	-10.41199	Required	Decimal degrees, five decimal points, negative south
	Assessment Longitude	Longitude of the point at which the rapid roadside assessment is taken in decimal degrees	numeric	0 to 360	84.00677	Required	Decimal degrees, five decimal points
Location information	Distance from marker (km)	Distance in kilometers from a town/marker towards another town or marker	numeric	None	24	Required	precision of 0.1 km required
	Name of marker	Name of the marker (e.g. town or road junction) to which the distance measurement above relates	string	None	Arusha	Required	
	Towards marker	Direction of travel on road	string	None	E	Required	e.g. 'towards Dar es Salaam' or E
Photo	Photograph file name	The file name of the photograph as assigned by the tablet or camera after the capture of the image	string	None	IMG_4026.jpg	Required	A panoramic photograph needs to be taken at the point at which the rapid road side assessment is been undertaken. Note that the camera will generate a standard info file of metadata itself, including latitude longitude, date, and exposure values.

Rapid assessment of the tree / shrub layer	Average height of upper canopy (m)	The observer is required to pick one of the following five canopy height classes (<1m, 1-2m, 2-5m, 5-20m or >20m)	integer	{<1m, 1-2m, 2-5m, 5-20m or >20m}	1	Required	The observer should only choose one of the 5 upper canopy height class options
	Percentage contribution of height class to total projected canopy cover (<1m)	The observer is required to estimate the percentage contribution of woody plants in the <1m height class to total projected canopy (within 50m of the point at which the rapid road side assessment is undertaken)	numeric	{0-100}	20	Required	There are relative cover, not absolute. They should be rescaled to sum to 100%
	Percentage contribution of height class to total projected canopy cover (1-2m)	The observer is required to estimate the percentage contribution of woody plants in the 1-2m height class to total projected canopy (within 50m of the point at which the rapid road side assessment is undertaken)	numeric	{0-100}	30	Required	There are relative cover, not absolute. They should be rescaled to sum to 100%
	Percentage contribution of height class to total projected canopy cover (2-5m)	The observer is required to estimate the percentage contribution of woody plants in the 2-5m height class to total projected canopy (within 50m of the point at which the rapid road side assessment is undertaken)	numeric	{0-100}	20	Required	There are relative cover, not absolute. They should be rescaled to sum to 100%
	Percentage contribution of height class to total projected canopy cover (5-20m)	The observer is required to estimate the percentage contribution of woody plants in the 5-20m height class to total projected canopy (within 50m of the point at which the rapid road side assessment is undertaken)	numeric	{0-100}	30	Required	There are relative cover, not absolute. They should be rescaled to sum to 100%
	Percentage contribution of height class to total projected canopy cover (>20m)	The observer is required to estimate the percentage contribution of woody plants in the >20m height class to total projected canopy (within 50m of the point at which the rapid road side assessment is undertaken)	numeric	{0-100}	20	Required	There are relative cover, not absolute. They should be rescaled to sum to 100%
	Tree / shrub projected canopy cover	The observer is required to pick one of the following four total projected canopy cover classes (<10%, 10-39%, 40-59%, >60%)	integer	{<10%, 10-39%, 40-59%, >60%}	10-39%	Required	The observer should only choose one of the four projected canopy cover classes
Land-use	The observer is required to pick one or more of the following six land-use classes (Protected, Livestock grazing, Wood harvesting, Short duration cropping, Tree crops, Other and / or Habitation / business)	integers	{Protected, Livestock grazing, Wood harvesting, Short duration cropping, Tree crops, Other, Habitation / business}	Protected	Required	The observer may choose more than one of the land-use classes	
Dominant species	Tree Code	4 letter alphanumeric code e.g. acse for Acacia senegal	string	None	acse	NULL	It can happen that no tree species occur within 50m of the observation point
	Herbaceous/crop code	4 character alphanumeric code e.g. maiz for maize	string	None	maiz	NULL	It can happen that no herb or crop species occur within 50m of the observation point
Code translation	Genus	Genus name. The Latin binomial species name corresponding to the 4-letter code	string	None	Panicum	NULL	These codes are likely to vary from observer to observer and over time. In the tablet version, they will be generated by a pick-list
	Species	Species name. The Latin binomial species name corresponding to the 4-letter code	string	None	maximum	NULL	These codes are likely to vary from observer to observer and over time. In the tablet version, they will be generated by a pick-list