

STANDARD OPERATING PROCEDURE 3 (SOP3): DATA COLLECTION

Version	1.1	Date of Issue	14/06/2021
Purpose	This SOP details how to set up and execute data collection for sample based visual interpretation using primarily remotely sensed data for collecting sample information.		

Procedure	
Step 1: Planning the data collection	<p>Sub-step 1a. The Coordinator estimates the necessary level of effort for the data collection using the following formula</p> <p><i>Minutes to interpret 1 sample unit * number of sample units = required level of effort for data collection</i></p> <p>Sub-step 1b. The Coordinator identifies the persons who may be involved in the data collection as Interpreters. The minimum qualifications for participating in the data collection are: BSC Natural Resource Management, geography and resource management, Remote Sensing GIS and forest Inventory. The person shall have knowledge in visual interpretation of satellite imagery.</p> <p>The Coordinator records the names and contact information of all the participants in the data collection and training using Forms 3 and 4. The form shall be stored with the climate change unit, RMSC, and ICT of the Forestry Commission.</p> <p>Sub-step 1c. Based on the outcomes of sub-step 1a and 1b, the Coordinator decides on the format and modality for the data collection and on a timeline.</p> <p>Sub-step 1d. The Logistics Manager arranges logistics, including space for data collection, sufficient time for data collection, salary arrangements.</p>
Step 2: Preparation of the classification manual	<p>Sub-step 2a. The Coordinator compiles a classification manual based on the results of applying SOP 2 for interpreters. The Coordinator makes it available in electronic and hard-copy formats. The classification manual will include at least the following information:</p> <ul style="list-style-type: none"> ● The tabular list of available data sources ● The definition of the spatial support of the sampling unit ● The classification scheme with detailed definitions ● The interpretation key with example illustrations in a synthetic format that is easy to refer to (one class per page) ● The decision tree ● The validation rules applied ● The definition of the level of confidence of the interpretation <p>The classification manual shall be stored with the climate change unit, RMSC, and ICT of the forestry commission and the approved platform for the national forest monitoring system.</p>
Step 3: Training and calibration	<p>Sub-step 3a. As a first step in the data collection, the Coordinator and the Trainer organize and prepare a training event for the persons identified in sub-step 1b as Interpreters, who have confirmed their participation. The training should cover the following topics as a minimum:</p> <ul style="list-style-type: none"> ● The classification manual ● Reviewing location specific examples from all the classes in the classification system with visualization from multiple data sources available

	<ul style="list-style-type: none"> • the software used for the data collection and how to ensure the data management and storage • the data sources available • quality management practices • knowledge of the landscape • conversant with the classification scheme <p>Sub-step 3b. The Trainer implements the training event following these basic principles:</p> <ul style="list-style-type: none"> • environment for active participation, where participants can share questions and opinions • encourage communication between the interpreters • record attendance of the interpreters • assess the capacity of the Interpreters at the end of the training and record the results. <p>Sub-Step 3c. The Coordinator and the Trainer prepare a report summarizing the training actions taken, the attendance and the results of the assessment of capacity. The report shall be prepared using Form 4. The report shall be stored with the climate change unit, RMSC, and ICT of the forestry commission</p>
<p>Step 4: Distribute the sample units among interpreters</p>	<p>Sub-Step 4a. The coordinator shall involve the GIS and mapping unit and the inventory and mensuration unit of RMSC to decide on a fraction of sample units to be assessed multiple times by all Interpreters for cross-checking. The sample units that are duplicated have a unique identification.</p> <p>Sub-Step 4b. The Coordinator allocates sample units to Interpreters based on a random allocation modality. The Coordinator uses a standardized naming structure to distribute the samples to the interpreters.</p> <p>Sub-Step 4c. The Coordinator records the number of sample units, the interpreter assigned to assess those samples and the file location using Form 3. The form shall be stored with the climate change unit, RMSC, and ICT of the forestry commission.</p>
<p>Step 5: Data collection by interpreters</p>	<p>Sub-Step 5a. The Interpreters assess the sample units, using the interpretation key as a guide for assessing different land use classes and transitions. The Interpreters consult one another and the Coordinator if they have any doubts about the image interpretation.</p> <p>Sub-Step 5b. The coordinator collects the data from all Interpreters at defined intervals (intervals can be defined by number of samples or by time intervals) and arranges for cross-validation based on a set of samples that were assessed by two or more interpreters. For performing the cross- validation, the Coordinator will</p> <ul style="list-style-type: none"> • Establish a reference interpretation for each of the cross-validation sample units. The reference interpretation will be the basis for establishing the performance of individual interpreters. It is to be established through a majority rule with a tiebreaker. • Calculate agreement for each interpreter with the reference interpretation. • For each pair interpreter, create a confusion matrix using Form 3. • Based on the confusion matrices, calculate the overall agreement with the reference, for each interpreter, as follows: <p style="text-align: center;"><i>Agreement between interpreter and the majority = Sum of counts in call on the diagonal / Sum of all counts</i></p> <ul style="list-style-type: none"> • Report the overall agreement per interpreter using Form 3. • Analyze the per-class agreement amongst interpreters using Form 3. <p>Sub-Step 5c. During the data collection, the Coordinator organizes regular discussions and group assessment of samples with all the interpreters to ensure a mutual understanding of the interpretation</p>

	<p>techniques.</p> <p>Sub-Step 5d. The Coordinator notes challenges and limitations during the data collection as well as potential sources of bias during the data collection.</p>
<p>Step 6: Data assembly</p>	<p>Sub-Step 6a. After the data collection is completed, the Coordinator compiles data tables for archiving, which will include the following information:</p> <ul style="list-style-type: none"> ● A database of the sample data collected by the interpreters including: <ul style="list-style-type: none"> ○ The geographical coordinates in ESPG: 4326 (WGS 84) ○ The unique identification code for each sample unit ○ The interpretation of all sample units including the previous interpretation(s) of the sample unit in the case this was revised or corrected ● The interpretation of sample units conducted by the Coordinator ● Metadata regarding the interpreter that collected the sample data, when the data was collected, which data sources were used <p>A description of the column names from the database are included with the database. Each sample in the consolidated database notes the round of data collection. The database can be amended to include additional rounds of data collection. Multiple versions are recorded and explanations between versions are included in the documentation.</p> <p>Sub-Step 6b. The Coordinator checks that all necessary metadata and sample information is archived and included in the final database. The Coordinator will store the data collection report and the data tables digitally using the following naming convention Data_collection_date[year/month/day]_version number. Everything is stored in the following location: It shall be stored with the climate change unit, RMSC, and ICT of the forestry commission and the approved platform for the national forest monitoring system.</p>

Quality management	
<p>QA / QC procedures</p>	<p><i>Note: multiple re-measurements for all samples are not considered in this SOP template. Some modifications would need to be introduced in countries where such multiple re-measurements for all samples are planned.</i></p> <p>Sub-step Q1. The Coordinator excludes impossible transitions through logical checks built into response design.</p> <p>Sub-step Q2. Involve an external member to assess the implementation of the data collection procedure and ensure that all quality management procedures are in place.</p> <p>Sub-step Q3. The Coordinator conducts ongoing hot, cold and auxiliary data checks during data collection and conduct regular review meetings among all interpreters.</p> <p>Auxiliary data checks: use an external data source, such as externally created maps, to compare to the sample unit classification. Discrepancies between the two datasets can be flagged for rechecking. Confirmed differences between the two datasets can be documented to showcase why sample-based area estimation may give difference results than other data sources.</p> <p>Cold checks: sample units that are randomly selected from the data produced by interpreters. The decisions made by the interpreters are reviewed by the coordinator or group of interpreters meeting together. If the error by the interpreter reflects a systematic error in their interpretation, it is discussed directly with the interpreter and the affected sample units are corrected.</p>

	Hot checks: sample units that are flagged as low confidence. These marked sample units should be further reviewed by the coordinator or group of interpreters meeting together. Once reviewed, labels that are deemed to be incorrect on these sample units should be adjusted by the interpreter.
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Version Log

Version	Author/s	Material changes from previous version	Release Date
1.1	Mr.Yakubu Mohammed Mr.Thomas Gyambrah Mr. Jacob Amoako Tessia Boateng Dr. Marieke Sandker Ms.Yelena Finegold		14/06/2021