Manual on

Quality Control and Quality Assurance of National Forest Inventory (FRA Permanent Sample Plots)

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Ministry of Forests and Environment
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Kathmandu, Nepal

2017

1. Introduction

Department of Forest Research and Survey (DFRS) has been conducting Forest Resource Assessment (FRA) program all over the country since 2010. The first FRA reports were published during the FRA-I period (2010-2015). Since 2016, DFRS had been conducting re-measurement of permanent sample plots as a continuation of National Forest Inventory. In addition, an additional number of plots had been established and measured at different physiographic regions as per need to meet the accuracy level at sub national level.

Quality control and quality assurance (QAQC) to assess the error in field inventory data collection have been a key component of forest inventory. The information derived from the QAQC measurement has been a basis to evaluate the measurement consistency and even provide a basis to conduct a revisit to evaluate if any large error is observed. In summary, the QAQC works involves remeasurement of 10% of the total plots by independent experts to check the quality and consistency of the sample plot measurement.

2. Objective

The overall objective of the quality measurement is to assure the measurement to be precise and calculate the differences in the actual measurement and quality measurement to assess the correctness of the data collected by the field crew members.

The specific objectives of the quality measurement are:

- To re-measure at least 10 % of the total plots measured and submitted by the field crews
- To calculate the measurement errors in terms of species identification, number of trees (stand density) and basal area per hectare
- To assure that the FRA field manual has been thoroughly followed during the data collection
- To assure that all FRA data and variables are properly measured and recorded in the field form/tally sheet

3. Methodology

3.1 Plot Selection:

As soon as the field crews submit data to DFRS, all assessed FRA clusters (of which plots are measured) should be listed in an ascending order. The list should then be sorted by the number of forest plots in each cluster. Clusters with more than one forest plots and clusters with only one forest plots are categorized. Based on how many sample plots are required (i.e. at least 10 % of total plots) a “n” number of clusters should be selected as sample plots

from both categories. After the cluster list is prepared, individual plots (2 plots per cluster) within the clusters with more than one forest plot should be selected based on the median number of trees out of all plots. For clusters with a single forest plot, there isn't a need to choose. The selection procedures should always be performed in the meetings of the technical committee formed for this program.

3.2 Field Measurement:

Field measurement (re-measurement of selected sample plots) should concentrate more on those variables which are more permanency in nature and correctly re-measurable. In the field measurement, the plot & stand variables and tree with climber variables (Tally sheet form no. 2 and 3) should be measured against the original measurement using the FRA Field Manual 2010 (Modified in 2017, 2019 and 2021). The variables other than the aforementioned ones should however be observed and monitored thoroughly during the quality assessments.

3.3 Data Analysis:

Data collected in both quality measurement and original measurement for each tree should be prepared ready for analysis and comparison. Firstly, all tree data should be arranged against its original measurement (by field crews) in a sequential order. An assessment on comparison of results (in both per plot and per hectare) on the following variables should be done:

I. Species wrongly identified and/or missing herbarium samples for unidentified ones
II. Number of trees
III. Basal area

The average number of trees and basal area per hectare of original measurement against the QAQC measurement should be considered to calculate the variation. All calculated results should be then presented in terms of per hectare value averaged and compared against the original calculation to evaluate the deviation percentage in each category.