



**IFAR 2005 Professional Development Program  
Completion Report  
[800 words]**

**Instructions:**

Please submit the completion report by email, using this form, through the sponsoring CGIAR Center to [ifar@ifar4dev.org](mailto:ifar@ifar4dev.org) within two months after the completion of the fellowship.

*Please check if Thalwitz Scholarship*

*NO*

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**Name of Applicant**      Mukuralinda Athanase

**Sponsoring CGIAR World Agroforestry Centre (ICRAF)**

Supervisors

Dr. Louis Verchot (World Agroforestry Centre),

Omuto, C.T.(University of Nairobi),

Dr. Shepherd, K.D. (World Agroforestry Centre).

**I. Work Program goals achieved (maximum length: 200 words)**

This technical report is about the achievements of the project on spectral reflectance classification of soil fertility gradients in Kiruhura district, Rwanda (146.4 km<sup>2</sup>). It characterized soil quality indicators needed for developing a rapid data and information for use in land management decisions by farmers and for guiding national policy on appropriate site-specific land uses. The fundamental drive for this project was for the fact that basic data on soil quality indicators are scarce in Rwanda particularly in Kiruhura district because of the high cost of sampling and soil analysis through the conventional approach. This study identified soil quality indicators characterization, classification of soil fertility gradient and developed of a protocol for a national spectral library using visible near infrared spectroscopy combined with GIS and remote sensing for mapping of soil quality. In particular, the partial least squares calibration of soil spectral reflectance with soil chemical properties showed high correlation ( $r^2 > 60\%$ ) that enabled the use of spectra as surrogate variable in the spatial characterization of soil into poor, intermediate or good soil nutrient conditions. The results of this study are highly encouraging and form the basis to develop a national framework for assessment and monitoring of soil condition in Rwanda

**II. Plans for follow-up (maximum length: 200 words)**

The goal of this short-term project focused on identification of problems and opportunities; therefore, the follow-up will focus on identification of solution and their implementation. With colleagues at the Rwanda Research Agriculture Institute (ISAR) and other partners at the national level, we will develop a schedule to train / capacity building, to collect data and develop a proposal to classify soil fertility variation that can improve significantly land productivity and prevent environmental degradation. During the execution of this project, the Director General of ISAR expressed interest and encouraged the team to continue the project. This gives us an open door for vigorous collaboration with advanced institutions in GIS remote sensing and landscape analysis like the World Agroforestry Centre, University of Nairobi and CSIRO.

**III. Report budget utilization including whether budget was spent as planned (maximum length: 100 words)**

<b>Item</b>	<b>Cost planned</b>	<b>cost (\$ USA)</b>
Software CART & Satellites images	3600	3400
Field expense + transfer soil samples to Nairobi + International travel	2450	3011
Laboratory analysis	2200	1910.85
Living expense	1850	1678
<b>Total</b>	<b>10,000</b>	<b>9,999.85</b>

**Comments on budget**

The total budget received from IFAR was \$10,000 and total expense was 9,999.85. The budget was used as planned however, field expense were high, \$ 561 more than the amount initially planned due to the unforeseen high cost of fuel. The saving made on software, allowance expense and laboratory analysis permits to cover the extra cost of the field expense.

**IV. Assessment of the fellowship experience and general comments. (maximum length: 300 words)**

Assessment of the fellowship showed that the experience was very good in that it enabled me to develop effective collaboration with other institutions in the region. It also improved my knowledge and skill. The time was enough to complete work and we expect this experience to continue because capacity building in sub-Saharan Africa is a critical issue.

The formatting of the report is very restricted and it is difficult to import tables, graphics and photos which contain useful information. It will be in future interesting if there is flexibility in tables, figures and maximum words to allow showing maximum results.