Proposal: Quantifying Uncertainty Estimates and Risk for Carbon Accounting (QUERCA)

Quantifying uncertainty in carbon accounting is essential at scales ranging from individual projects to country-level compensation for reducing emissions from deforestation and forest degradation. Monte Carlo approaches are easy to apply but difficult to implement correctly, with some countries reporting total uncertainties smaller than the largest single source of error, which is clearly incorrect. The goal of this project is to develop and disseminate peer-reviewed tools and approaches for error propagation for use by carbon accounting technicians and researchers, especially those in developing countries. Ultimately, uncertainty will be needed to evaluate the adequacy of carbon reductions made under the Paris Accord.

- *Justification*: Accounting for uncertainty in carbon accounting is essential for assessing confidence in reductions of carbon emissions from deforestation and forest degradation. Quantifying uncertainty requires technical expertise in error propagation, which is currently lacking, as shown by some countries reporting errors an order of magnitude smaller than the individual sources of error. The reported uncertainty affects the maximum payment a country can receive for carbon reserves. Quantifying the risk associated with carbon mitigation through forest management is under-explored, raising the need for new, user-friendly tools to guide risk analyses.

- *Objective*: The initial goal of this project is to assess the need for assistance in carbon accounting by countries participating in REDD+ programs. We will take steps towards developing peer-reviewed tools and approaches for error propagation that are well documented and easy to use by carbon accounting technicians and researchers. Future goals of QUERCA will include building capacity among the users by sharing these tools and approaches via meetings, code sharing, bibliographies, and direct collaboration with the science team.

- *Deliverables:*
    - A survey instrument will be developed to assess needs for assistance in carbon accounting, with particular focus on uncertainty analysis.
    - The results of a survey of REDD+ countries will be disseminated on the internet and in the peer-reviewed literature.
    - Expanded web site developed under the QUEST RCN (www.quantifyinguncertainty.org)
    - Tutorials, tools and other materials, including the Stochastic Uncertainty Estimator

- *Relationship to SilvaCarbon logic model:* This cross-cutting component would utilize activity types 1, 2, 3, 6, and 7, having as outputs 1, 2, 4, 6, 7, and 9 and contribute to all 6 outcomes desired by the program.

- Budget

	Year 1
Salary Senior Personnel:	13,376
Salary Research Support Specialist	30,724
PhD Students (2@50% time)	28,960
Travel and Per Diem:	3,000
Tuition:	14,165
Estimated Direct Costs:	**90,225**
Estimated Indirect Costs (26%):	19,775
Total Estimated Costs:	**110,000**