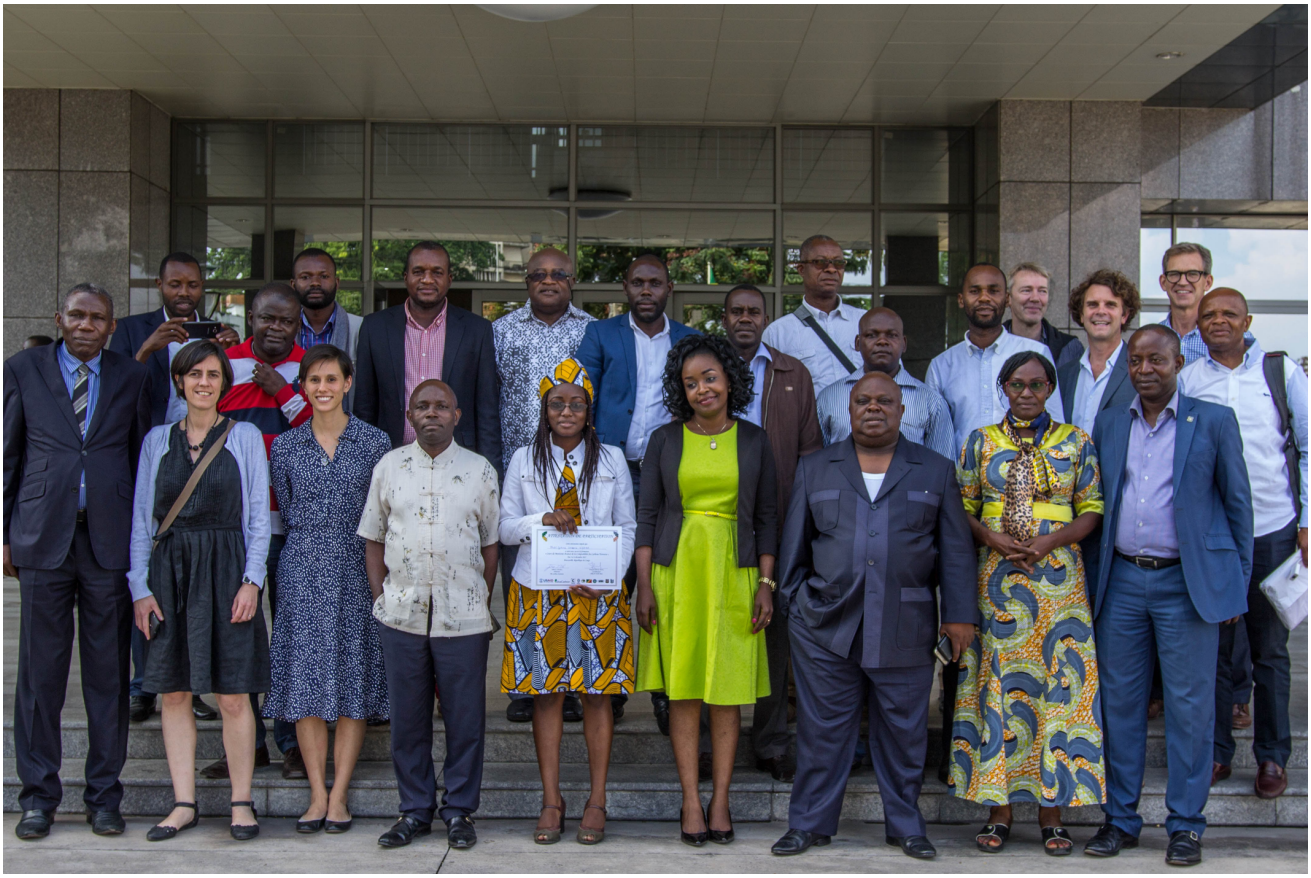
U.S. Forest Service International Programs
Central Africa

Building Academic Capacity in Terrestrial Carbon Accounting:
Republic of the Congo and Democratic Republic of the Congo

The Carbon Institute



Technical Assistance Mission Report

October 2018

USAID FROM THE AMERICAN PEOPLE

THE CARBON INSTITUTE

ghg management institute

CRESA Forêt-Bois
CENTRE REGIONAL D'ENSEIGNEMENT SPECIALISE EN AGRICULTURE FORET-BOIS

UNIVERSITE MARIEN NGOUABI

REDD+

Contributors to this Report

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Cover Photo: Participants pose for a photo after a two-day workshop facilitated by the U.S. Forest Service, The Carbon Institute, and CRESA Forêt-Bois, on advancing terrestrial carbon accounting capacity to advance the national REDD agenda. Brazzaville, Republic of the Congo, December 2017.

Photo by: Eva McNamara (IP)

Mission dates:

December 3, 2017 – December 14, 2017 (Brazzaville, Republic of the Congo)

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List of Acronyms

CAFI	Central African Forest Initiative
COMIFAC	Commission des Forêts d'Afrique Centrale
CRESA	Centre Régional d'Enseignement Spécialisé en Agriculture CRESA - Forêt-Bois
CTCN	Climate Technology Centre & Network
DRC	Democratic Republic of the Congo
ETF	Enhanced Transparency Framework (Paris Agreement)
FONAREDD	Fonds National REDD, Democratic Republic of Congo
GCF	Green Climate Fund
GHGs	Greenhouse Gases
GHGMI	The Greenhouse Gas Management Institute
GIS	Geographic Information Systems
IP	U.S. Forest Service International Programs
IPCC	Intergovernmental Panel on Climate Change
MRV	Measurement, Reporting and Verification
NGO	Non-Governmental Organization
OSFAC	Observatoire Satellital des Forêts d'Afrique Centrale
OSFACO	Observation Spatiale des Forêts d'Afrique Centrale et de l'Ouest
REDD+	Reducing Emissions from Deforestation and Degradation
RIFFEAC	Regional Network of Forestry and Environmental Training Institutions in Central Africa
RoC	Republic of the Congo
TCI	The Carbon Institute
USAID	U.S. Agency for International Development
USFS	U.S. Forest Service
WCS	Wildlife Conservation Society
WWF	World Wildlife Fund for Nature

Acknowledgements

We would like to especially thank Olivia Freeman for her exceptional leadership and support for the entire trip. From arranging meetings, to leading discussions, to interpreting and logistics, Olivia's professionalism and attention to details helped the trip succeed and paved the way for future collaborations between greenhouse gas professionals in Africa and beyond. She was also incredibly patient as we completed this report.

We are very grateful for all the support and work that Isaac Moussa and Richard Paton did to make the RoC trip a possibility and a success. Richard and Isaac have been superb advocates for building capacity and for supporting the local creation of talent to support government's conservation efforts.

We thank Mirey Attallah (FONAREDD) and Hilde Dahl (Norway) who gave excellent lectures and led discussions on using Terrestrial Carbon Accounting to real REDD+ challenges and to access conservation finance.

Alyssa Dongo was extremely helpful in arranging invitation letters and many logistics related to the border crossing and other administrative support.

We also thank Hubert Kinwa, the excellent interpreter who provided translation services for the DRC training.

We want to thank Felix Koubouana whose leadership in the mentoring trip to Brazzaville helped synthesize materials and discussions, and to guide participants to consider next steps. Felix also played an important role as lead instructor and facilitator in the DRC trainings.

Danielle Vaughan, Anup Joshi and Patrick Cage provided excellent support from the Greenhouse Gas Management Institute, administratively and developing materials.

We very much appreciate the active participation of Georges Claver Boundzanga (CN-REDD, Republic of the Congo) and for his support of international academic and government partnerships. We look forward to working with George's team in coming months and years.

A great big thank you to Jean Paul Kibambe (WCS and University of Kinshasa) for his key role in supporting the TCA Certificate course in DRC, and his support as a professor and lead instructor for the program in DRC.

Most importantly, we thank all the people mentioned in this report who took the time to brush up on their carbon accounting and teaching skills, share their expertise with us, and discuss possible academic and government partnerships in the region. It is an honor to have met so many women and men who are dedicated to their professions and to exploring collaboration with The Carbon Institute and CRESA.

1 Executive Summary

The Carbon Institute was invited by the U.S. Forest Service International Programs (USFS-IP) to help build capacity in the Republic of the Congo and the Democratic Republic of Congo to measure and manage carbon in natural ecosystems. This report covers two trips that accomplished three key objectives: 1) to mentor Republic of the Congo (ROC) terrestrial carbon accounting (TCA) professionals who had already received advanced training in TCA; 2) to conduct a scoping mission to explore new TCA teaching needs and opportunities in the Democratic Republic of the Congo (DRC), and 3) to carry out a new advanced TCA certificate program in DRC, tailored to national circumstances.

The importance of TCA for mitigating climate change and sustainably managing lands is critically important for three reasons. First, countries that wish to fight climate change need to understand where emissions and sequestration opportunities occur, to implement policies and projects. Second, as part of the Enhanced Transparency Framework (ETF) of the Paris Agreement, countries are required to conduct greenhouse gas inventories and have these reviewed in light of nationally determined contributions (NDCs) to the Paris Agreement. And finally, countries need strong terrestrial carbon accounting to attract conservation finance to measures that have a high change of lowering net emissions from the land use sector.

Overall, the two trips described in this report were a success. The first objective, to mentor and provide top-up training to RoC professionals delivered 264 people-hours of skill building. And the TCA mentoring also engaged key RoC government officials in exploring new partnerships and opportunities to build the capacity of RoC to carry out science that feeds into the country's and the international community's climate change goals. The second objective of a scoping trip in DRC to explore the needs for new TCA training demonstrated a clear need for more capacity within DRC to do robust greenhouse gas inventories in the land use sector. And third, the objective to run a new course that was co-taught primarily by national and regional experts completed 430 people hours of advanced TCA training and exercises. The collective work described in this report also emphasized the importance on endogenous TCA capacity building and the value of potential new work in building a regional (Central and West Africa) program to enhance south-south-north cooperation in filling national and international gaps in greenhouse gas (GHG) inventories in terrestrial ecosystems.

Next steps include enrolling professionals from the courses into The Carbon Institute's professional development program and supporting TCA teachers in the region through open-access curriculums and on-going free support through the free TCA Help Desk. Government and academic partners in the regional are also exploring the possibility of a Commission des Forêts d'Afrique Centrale (COMIFAC) concept/proposal. The contours of this idea are to build a regional network of academics and government that want to create a strong community of working and teaching TCA experts.

2 Introduction and Background

2.1 Building Capacity to Fight Forest Loss and Climate Change

The urgency around climate change and the opportunities for reducing greenhouse gas emissions from deforestation and degradation has moved terrestrial carbon management to a new level of importance.

In most countries of Central and West Africa, including Cameroon, the Democratic Republic of the Congo (DRC) and the Republic of the Congo (RoC), most greenhouse gas emissions come from the land-use sector (e.g.: deforestation, degradation, agriculture and urban expansion).

Although countries in the region have many qualified carbon professionals, they still lack a sufficient number of well-trained terrestrial carbon accountants. These carbon accountants are needed to understand greenhouse gas stocks and flows, to gain access to climate finance, to help inform mitigation plans and programs, and to report on pledges made internationally under the Paris Agreement.

The Paris Agreement on Climate Change represents a major step forward for global efforts to combat climate change. A central element of The Paris Agreement is for countries to estimate their greenhouse gas stocks and fluxes. Recognizing that many countries still face considerable challenges in measuring their GHGs, the Paris Agreement also prioritized financial and technical support for developing countries to better measure and manage greenhouse gases.

Why bother to measure carbon in natural ecosystems? First and foremost, we measure ecosystem carbon so we can understand where greenhouse gas emissions are occurring, explore opportunities to reduce greenhouse gas emissions, and generate the data to comply with international agreements and access results-based finance for REDD+.

Stage 1: Beginnings in Cameroon

The genesis of the most recent capacity building trip to the Republic of the Congo and the Democratic Republic of the Congo dates back to June 2015. After several discussions between the U.S. State Department, the U.S. Forest Service International Programs and The Carbon Institute, a grant was provided for The Carbon Institute, a partnership managed by the Greenhouse Gas Management Institute, to support carbon accounting capacity building in Cameroon. The Carbon Institute began partnering with Centre Régional d'Enseignement Spécialisé en Agriculture Forêt-Bois (CRESA-Forêt-Bois), an academic research center affiliated with the University of Dschang, based in Yaounde, Cameroon. USFS-IP had been assisting CRESA with developing a Master's degree program in climate change and also had provided scholarships for several government ministry officials to take sabbaticals from their work to further improve their technical expertise.

When The Carbon Institute began work in Cameroon with CRESA, the partners first worked to understand the existing Cameroonian capacity for terrestrial carbon accounting (TCA). Importantly, we focused on understanding both the technical capacity within different sectors and ministries, and also to understand the capacity of Cameroonian faculty at universities to teach TCA.

The Carbon Institute employs a "*train-the-trainer*" approach as central to its theory of change. Growing the technical capacity at the university level builds long-term capacity in the country, including the capacity to train a whole new generation of carbon professionals over the coming decades. This model invests in the long-term success of Cameroon (or Congolese or other country) by empowering national academic institutions to train the country's carbon workforce ensuring capacity-building is sustainable and not reliant on continuous foreign support.

During the initial partnership-building phase, The Carbon Institute and CRESA-Forêt-Bois worked with government colleagues to understand what *additional* skill development would help Cameroon better manage its ecosystems, better fulfill its international climate change obligations, and better access conservation finance. This information formed the basis of the curriculum developed for the first training phase in the first country.

The partners then developed and executed a 40-hour training program for 27 Cameroonian professionals, nominated by several ministries in Cameroon and identified as promising academic and government professionals during the earlier scoping trip. The training was provided by a suite of experienced faculty from both The Carbon Institute, Cameroon universities and government agencies.

The learning objectives for the training were chosen deliberately. The overarching goal was to provide learners with a start-to-finish (comprehensive) understanding of the most important steps to carry out good carbon accounting that makes a difference in the real world. Additionally, the learning objectives were based on: 1) the real concrete needs and gaps in existing TCA training we identified during our scoping work with government professionals, and 2) a successful accredited "Advanced Terrestrial Carbon Accounting Certificate" that The Carbon Institute staff had built and run with the University of California, San Diego.

A full report on the original TCA Certificate program is available online ("Raising the REDD+ Bar"). This report explains the creation of the six key modules for advanced TCA, and also the conclusion that providing the curriculum to developing countries and training their academics in deploying TCA courses in their own countries was a powerful way to close the terrestrial carbon accounting capacity gap.

The trainings in Cameroon covered six topics:

1) Terrestrial Carbon Accounting (TCA) Policy Context,

2) The Intergovernmental Panel on Climate Change (IPCC) Guidelines and Land Use Classification,

3) Geographic Information Systems (GIS) and Activity Data,

4) Field Measurements and Emission Factors,

5) Carbon Accounting Math, and Statistics, and

6) Communicating Terrestrial Carbon Accounting Results.

A report detailing the initial trainings in Cameroon is available from The Carbon Institute (*The Carbon Institute's Program Performance Report: United States Forest Service Support for Terrestrial Carbon Accounting Academic Partnership in Cameroon. October 2015*).

After the initial training described above, mentoring!

In total, more than 1,200 person-hours in advanced TCA training were provided, including 144 person-hours of advanced faculty mentoring to build TCA teaching competencies for Cameroonian lecturers.

Stage II: South-South Cooperation: Cameroon and the Republic of the Congo

Subsequent discussions with USFS-IP led to exploring the possibility of using the CRESA hub of excellence to provide training to other Central African countries. Given that Cameroon's faculty had been trained to carry out advanced TCA training it was a natural transition to bring the expertise of Cameroon to other Central African countries, alongside international experts from The Carbon Institute. Deploying the model used in Cameroon, an initial scoping trip to Brazzaville was planned to identify good faculty, the gaps in technical skills, and to develop a new training program that addressed immediate national needs of the Republic of the Congo.

From November 28 to December 3, 2016, Hiol Hiol and Niles visited many academics, RoC government professionals, USFS staff, U.S. embassy staff and others to prepare for a five-day TCA course to be held at CRESA for RoC participants in 2017. The scoping trip was very successful, and overlapped with considerable USFS personnel (Richard Paton, Isaac Moussa, Alex Neidermeier and Olivia Freeman) ensuring strong support from USFS for the deliverables under this grant. Niles and Hiol Hiol were also able to spend extensive time with USFS Congo representative Isaac Moussa, who became the key facilitator for choosing Congo participants, ensured the course materials were appropriate for Congo participants, and provided substantial support overall. Hiol Hiol and Niles and USFS participants were also lucky to have the U.S.

Embassy in Brazzaville host a reception about the partnership, which an estimated 40 people attended. The partners then held meetings with key government and academic representatives to introduce the TCA course, the regional hub model and to ensure the coursework aligned with national needs.

Nine RoC participants joined the five-day course hosted in Cameroon, by CRESA and received Certificates in Terrestrial Carbon Accounting. The 40-hours of instruction per student were taught by CRESA Forêt-Bois and Carbon Institute faculty. The weeklong TCA course closed with a graduation ceremony conducted by Dr. François Hiol Hiol, and attended by USFS staff from the RoC and Cameroon and a representative of Regional Network of Forestry and Environmental Training Institutions in Central Africa (RIFFEAC).

Stage III: Regional Hub of Excellence: into the Democratic Republic of the Congo

Following the weeklong course taught by Cameroonians to Republic of the Congo colleagues, the most recent trips – *the focus of this report* – were three fold:

1. To provide mentoring to "top up" the skills of Congolese TCA professionals (especially teachers) from the first training;
2. To conduct a scoping trip into DRC to see if there were sufficient support and demand and interest in having Cameroon, ROC, DRC and Carbon Institute professors extend the TCA training into the Democratic Republic of the Congo (DRC); and
3. To use a regional hub model to deliver nationally-relevant TCA capacity building in DRC, using a suite of African (primarily) lecturers from Cameroon, RoC, and DRC, with back-stopping and faculty mentoring from The Carbon Institute instructors.

As explained in this report, the mentoring trip in Brazzaville provided an opportunity to engage RoC instructors in improving their skills and teaching competencies in terrestrial carbon accounting. The RoC mentoring trip was immediately followed by a trip to Kinshasa to explore expanding the south-south-north model of cooperation and capacity building to the DRC. A series of partner consultations and scoping exercises were held over a four-day period in December 2017 that then led to the May 2018 first advanced Terrestrial Carbon Accounting (TCA) certificate in the Democratic Republic of the Congo. This DRC TCA certificate program was run primarily by African academics and also accredited by The Carbon Institute and the Greenhouse Gas Management Institute. The trainings consisted of twenty professionals learning comprehensive TCA over four days of intense learning to measure and better manage ecosystem carbon. Discussions have begun to explore possible regional collaborations on TCA with RIFFEAC and COMIFAC, based on interest and donor support.

2.2 Mission Objectives and Expected Outcomes

This report focuses on two recent trips: one conducted by Niles and Hiol Hiol to the Republic of the Congo (mentoring) and the Democratic Republic of the Congo in December 2017 (scoping), and a subsequent TCA training program held in May 2018 in Kisantu, Democratic Republic of the Congo.

The principle objectives of the trips were three-fold: 1) to conclude advanced terrestrial carbon accounting mentoring in RoC; 2) to conduct a scoping study for new academic/government TCA partnerships in DRC; and 3) to complete a successful new TCA training in DRC, using a regional hub model to ensure local long-term competencies in both knowing and teaching TCA in Central Africa.

In addition to these three primary objectives, The Carbon Institute also had a chance to engage Master's students from the region who were supported by USFS-IP, and participate in the certificate ceremony.

Figure 1: Giscard Angos Angos of CRESA Forêt-Bois teaching Geographic Information Systems during a five-day Advanced Terrestrial Carbon Accounting Course for Republic of the Congo learners, February 13-17, 2017. Photo Credit: The Carbon Institute, 2017.

The trip's outcomes in RoC were to conclude mentoring and strengthen the capacity of carbon academics in RoC. The larger goal was to give continued support tools and support to train RoC academics to proficiently teach TCA in the future. Another outcome was to build relationships and work towards new partnerships in RoC with The Carbon Institute to use enhanced TCA capacity to attract new conservation finance to the country.

In the DRC, outcomes included a successful scoping mission, to characterize TCA interest, capacity and needs, which confirmed a strong interest in a locally-run and taught TCA training. The TCA Certificate training program's primary outcome was to deliver comprehensive TCA training, taught primarily by African instructors, tailored to DRC's needs.

3 Mission activities

The work started after contract completion and engagement between USFS IP and The Carbon Institute to plan the trip, The mission had three main activities: 1) Provide advanced mentoring in terrestrial carbon accounting to **Republic of the Congo** graduates of the first certificate in carbon accounting, held in February 2017 at CRESA in Yaounde, Cameroon; 2) Explore replicating The Carbon Institute's international academic partnership on carbon accounting in **Democratic Republic of the Congo**, with CRESA as a regional hub of The Carbon Institute, by visiting a wide range of possible new DRC partners; 3) Conduct a comprehensive TCA training in DRC taught primarily by DRC, ROC and Cameroon instructors, who were

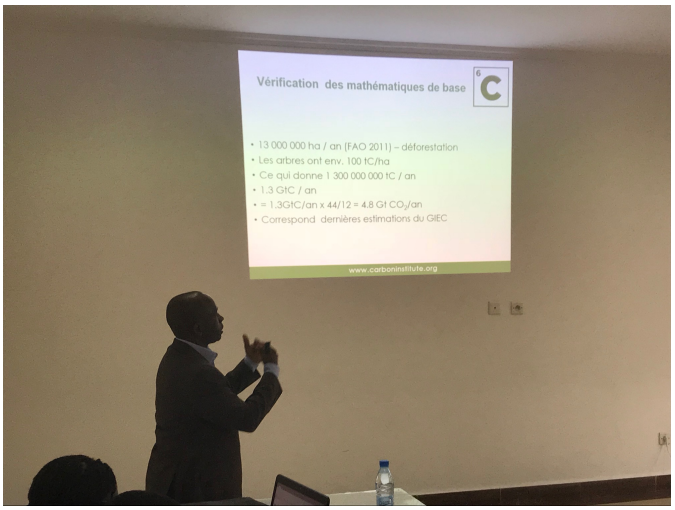
prepared for instruction through provision of curriculums, help "localizing" the lectures and exercises, overall faculty mentoring.

3.1 Advanced Terrestrial Carbon Accounting Mentoring – Republic of the Congo

Advanced mentoring of RoC academics and government officials took place in Brazzaville on December 5 & 6, 2017. On each day, 22 participants were involved in the mentoring and teaching (including instructors and USFS IP personnel). A total of 264 teaching-hours resulted.

The mentoring was organized around several guiding principles:

- The training programs would build off the earlier training in Cameroon, primarily for the original nine RoC participants.
- The instruction would be co-taught by The Carbon Institute (US-based) and CRESA (Cameroon-based) at an advanced level.
- Several of the modules were intended to provide the most recent updates from the United Nations Framework Convention on Climate Change (UNFCCC) negotiations, particularly related to the newest policy developments and the newest technical guidance on carbon accounting.
- The instruction should focus on using terrestrial carbon accounting (TCA) to attract climate-related finance for mitigation, not simply to do TCA in the abstract.



Figures 2: Professor Gaston Samba teaching a technical mentoring course, "Conceptual understanding of the main equation for calculating greenhouse gas inventories and forest reference levels". The course was co-developed by The Carbon Institute and Marien Ngouabi University and delivered to 22 professionals on December 5, 2017 in Brazzaville, Republic of the Congo. Photo Credit: The Carbon Institute, 2017

Below is a list of course material developed for the mentoring program. The courses were developed by The Carbon Institute and RoC professors. Courses were taught by a combination of Cameroonian, RoC and Carbon Institute staff. During the meeting, participants opted to hear more from CN-REDD about the national carbon calculations, and chose to receive the error propagation course electronically (provided as a PowerPoint only).

All the courses developed and taught are provided for free to all participants to use in future training programs. The courses were divided between policy and technical issues.

Policy

- Brief History of the UNFCCC process: A refresher and update from the most recent round of UN climate negotiations
- The Paris Agreement Rulebook: the importance of carbon accounting for meeting goals of the Paris Agreement
- The Talanoa Dialogue: A Review of Collective Efforts to Limit Warming to 2 degrees C
- Recent UNFCCC decision on gender and climate change
- Recent UNFCCC decision on indigenous peoples and climate change
- Using carbon accounting to access climate finance from donors: national, province and project-level
- Increased coordination for financing GHG mitigation and adaptation between the Climate Technology Centre & Network (CTCN) and the Green Climate Fund (GCF)

Technical

- Conceptual understanding of the main equation for calculating greenhouse gas inventories and forest reference levels
- Intergovernmental Panel on Climate Change Guidelines: a refresher
- Recent UNFCCC decision on agriculture and technical work of the UNFCCC
- Error propagation for calculating uncertainty for emission factors times activity data
- Intergovernmental Panel on Climate Change Guidelines updates and call for reviewers from developing countries

Over the course of the mentoring workshop, the active participation of George Boundzanga, the director of CN-REDD, and his staff, provided important policy engagement. Follow up conversations with Director Boundzanga and Camile Pinet, project manager of OSFACO (Observation Spatiale des Forêts d'Afrique Centrale et de l'Ouest) led to an informal agreement to work together in coming months to investigate additional capacity-building partnerships in RoC.


ATTESTATION DE PARTICIPATION

Cette attestation stipule que :

Gaston Samba

a suivi avec succès la formation

« Cours de Mentorat Avancé de la Comptabilité du Carbone Terrestre »

Du 5 et 6 décembre 2017

Brazzaville, République du Congo

John O. NILES
Directeur
The Carbon Institute

François HIOL HIOL
Coordinateur
CRESA Forêt-Bois

USAID SilvaCarbon

Figures 3: The Certificate of Participation for Gaston Samba, for his role in participating in the Mentoring Course in Terrestrial Carbon Accounting. The mentoring course was sponsored by the USFS IP and held in Brazzaville, Republic of Congo in early December 2017. Photo Credit: The Carbon Institute, 2017

3.1.1 Accomplishments

The major accomplishments of the mentoring program in the Republic of the Congo were:

- Enhanced capacity for multiple RoC professionals to do and teach TCA in the region.
- Active co-teaching of advanced terrestrial carbon accounting technical and policy topics to 22 professionals in RoC.
- A mentoring program that delivered 264 training hours.
- Dedicated resource page for curriculum for RoC academics and government archiving all materials for future use in the RoC.

3.1.2 Lessons Learned, Recommendations and Next Steps

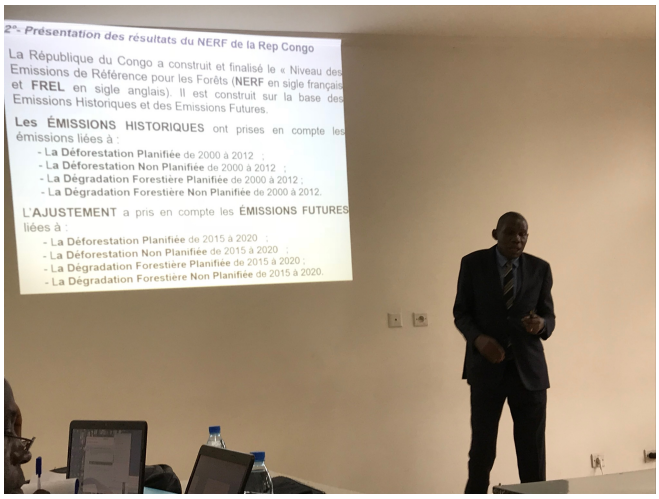
Lessons Learned and Recommendations:

- Initiate organization of TCA training programs earlier. As with many courses, the mentoring trip could have been planned earlier to allow more coordination before the training on courses, instructors and translation between English and French.
- We forgot to conduct evaluations of the courses that were taught at the mentoring program in Brazzaville. This was a significant oversight that does not allow us to produce quantitative information about the participants view of the training programs.
- Ensure there is substantial emphasis on real-world, and real-data practical lessons, and avoid where possible long lectures that do not engage learners.
- During recruitment, try to ensure a common level of pre-course competency.
- After recruitment and before active (in person learning), engage students to equip them with background materials to ensure they are well prepared for the intensive week-long course.

Next Steps:

- Follow up with all participants to conduct an evaluation of the topics and instruction.
- Follow up with Felix Koubana and Ifo Suspense to become active participants in The Carbon Institute work in Africa, as part of The Carbon Institute faculty. (Later, as the DRC course developed, Felix Koubouana was able to join as a teacher; Ifo Suspense was not able to join due to a scheduling conflict).
- Follow up on proposals and concepts with CN-REDD and OSFACO, to explore long-term partnerships in building and maintaining capacity to teach advanced carbon accounting.
- The Carbon Institute, CRESA and CN-REDD+ decided to explore cooperation in funding ideas for enhanced capacity building and use of TCA in RoC. The most promising opportunity is likely to be through the next Global Environmental Facility's 7th Replenishment, notably for the Capacity Building Initiative for Transparency (CBIT).
- Complete a follow-up evaluation, and ask participants how The Carbon Institute can support them in their work in coming years. This information will be provided to the USFS IP upon completion.
- Complete the archiving of all the presentations and share these with participants online.

- Increase coordination of TCA capacity building in RoC with RIFFEAC.



Figures 4: George Boundzanga, Director of CN-REDD, leading a hands-on carbon accounting exercise of the Republic of Congo's national REDD+ carbon accounting. Photo Credit: The Carbon Institute 2017.

3.2 Scoping trip for future Terrestrial Carbon Accounting Partnerships – Democratic Republic of the Congo

The second major objective was to meet with prospective students, teachers, government officials, and other people interested in collaborating on building TCA capacity in the DRC. Over the course of December 11 to 14, 2017, USFS IP, The Carbon Institute and CRESA-Forêt Bois met with more than two-dozen representatives from sixteen government, academic, civil society and the private sector organizations. These are summarized in Annex 1.

By their nature, scoping trips are not meant to yield any major measurable results. The Carbon Institute and the USFS IP designed the scoping trip meetings in DRC to be a listening tour, as well as an opportunity to explain our model for building capacity, and to explore possible new training programs and partnerships.

For a scoping trip, the people USFS and The Carbon Institute met with were almost universally very keen to explore new ways to build strong endogenous capacity in DRC in TCA.

The one exception to this enthusiastic reception was the meeting with FAO, who have been commissioned by the Norwegian government as part of the Central African Forest Initiative (CAFI) to facilitate the National Forest Monitoring System in the DRC. The representatives from FAO stated they thought the train-the-trainer model was useful and necessary, but that they were too busy to engage with The Carbon Institute on forward steps.

3.2.1 Accomplishments

Overall the scoping trip accomplished what we had set out to both learn and achieve. We had fruitful discussions with various academics interested in partnering as teachers and learners. We met with a range of government officials who expressed a strong interest in having additional capacity brought to bear on REDD+ programs, including FONAREDD. We met with a major REDD+ donor government (Norway) and also paid a courtesy visit to the USAID mission to keep them abreast of our plans. We also met with a pedagogical expert (from the Université de

Liège who is working in DRC) who was keen to support our work building local teaching capacity. Finally, we met with both private sector and civil society members who expressed strong interest in the TCA course overall, and interest in participating and possibly instructing. Overall, the scoping study concluded there was a strong interest in locally-taught TCA training in the DRC. The scoping mission also showed there was a strong cohort of professional learners and instructors to build DRC's first advanced TCA course.

3.2.2 Lessons Learned, Recommendations and Next Steps

Lessons Learned and Recommendations:

- Engaging the FAO was not going to be super useful in terms of support
- Provide existing Republic of the Congo French curriculums to interested DRC colleagues
- Identify ways to engage government and donors in any eventual TCA coursework

Next Steps:

- Conduct advanced TCA training in 2018 with a focus on building long-term capacity of both government professionals and academics.
- In terms of funding, it is also possible for The Carbon Institute and DRC partners to explore joint proposals (also to the GEF CBIT) as well as others.
- Continue advertising free TCA Help Desk to colleagues in the Democratic Republic of the Congo.
- Follow up on all the meetings, thanking everyone who met with the USFS IP and The Carbon Institute on possible new collaboration.
- For individuals likely to be champions for future cooperation between The Carbon Institute and the DRC, provide access to IPCC courses once they become available in French.
- Facilitate increased coordination of TCA capacity building in DRC with RIFFEAC.

3.3 Regional Hub Model and Comprehensive TCA training in the DRC

After a successful scoping trip in December 2017, there was sufficient enthusiasm (and USFS funding) to proceed with another advanced TCA certificate training in the DRC, hosted May 12-15 in Kisantu DRC. After the scoping trip, the participants were chosen to meet the theory of change (a train-the-trainer approach) covering both academics and government. We strived for gender parity in both instructors and students, although we were not able to achieve a 50% balance. For the most part, USFS IP was given the final choice (based on discussions and consultations with TCI) for teachers and learners. In general, The Carbon Institute was given the final choice in designing the syllabus, engaging and mentoring faculty and organizing the content of the trainings.

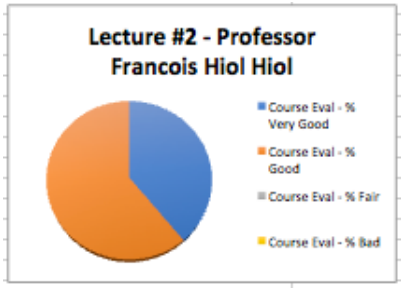
Figures 4: The Democratic of the Republic (DRC) first graduating class in advanced Terrestrial Carbon Accounting, 2018. Twenty graduates received certificates accredited by both Democratic Republic of the Congo and international organizations. Photo Credit: The Carbon Institute 2017

The three-and-a-half-day training for 20 learners produced 430 training hours. Overall, from the evaluations, the lecturers were well liked and appreciated by the participants. A detailed syllabus of the teachers and the courses is provided in Appendix 2.

Overall, DRC's TCA Certificate was expertly run by USFS IP for logistics and planning. The students were prepared and eager to learn. And most important, the TCA instructors from DRC, RoC, Cameroon and The Carbon Institute were well organized and gave valuable in-depth instruction and lessons that were overall, very well evaluated.

Course Evaluations and Comments:

The graphs and constructive criticism below are taken directly from course evaluations filled out by the students. In general, most lectures were evaluated as "very good" or "good" by evaluations.

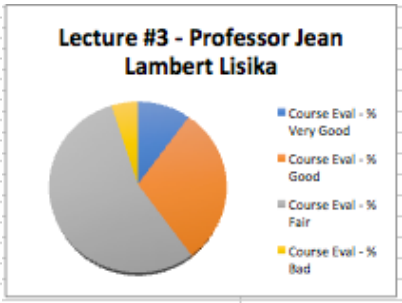


Lecture #2 Comments:

1. Captivate your audience by using more illustrations throughout the slideshow

2. Talk about other COPs, especially ones in which the host country participated

3. Be sure to define all key terms (Emissions;Carbon) to engage non-expert participants

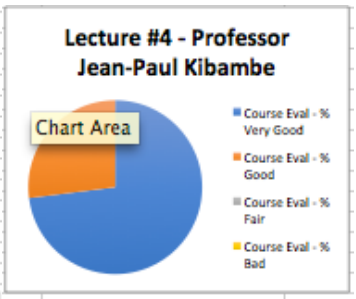


Lecture #3 Comments:

1. Try to balance the use of legal language with colloquial language in presentations

2. Minimize paragraph size and enhance presentations with graphics and images

3. Set clear goals for your students!

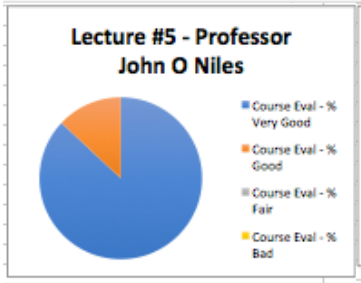


Lecture #4 Comments:

1. Try to present some of the more complex ideas in simpler terms

2. Add time for practical examples and explanations while reducing # of slides

3. Great job defining key words!

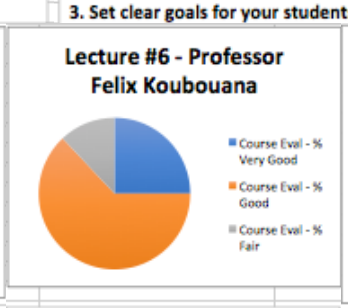


Lecture #5 Comments:

1. Allow additional time for practice exercises

2. Provide clear definitions for technical terminology

3. Perhaps work with a translator to help bridge the language barrier

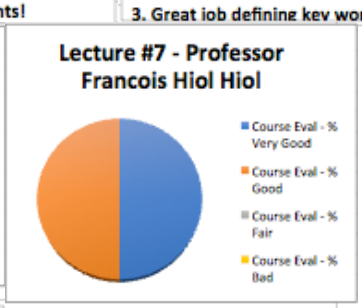


Lecture #6 Comments:

1. Try to really plan out and prepare for the presentation beforehand

2. Use examples that are relevant to specific careers enrolled in the course

3. Become an unimpeachable subject-matter expert!

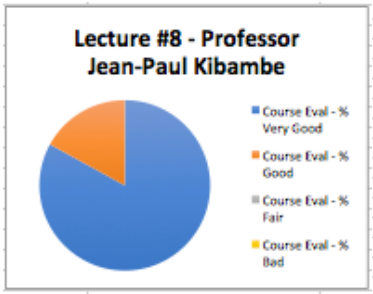


Lecture #7 Comments:

1. Try to shorten paragraphs and demonstrate points through graphics

2. Be sure to include concrete examples of principles discussed

3. Try to also share the broad evolution of progress throughout all COPs, not just Paris

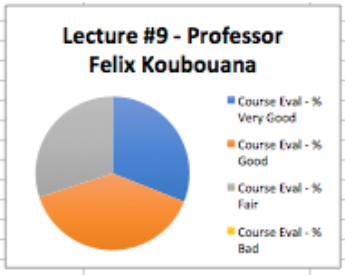


Lecture #8 Comments:

1. Allocate more time for practical examples

2. Try sending the course content to students in advance to enhance debates

3. Summarize key points at the end

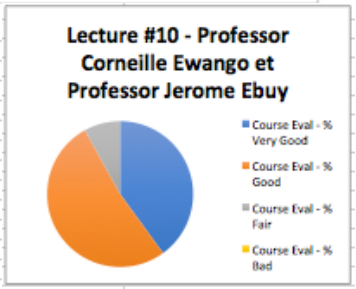


Lecture #9 Comments:

1. Work on your ability to explain complex topics in clear, simple ways

2. Add more graphics and practical examples to this presentation

3. Look into adding more content involving NERF!

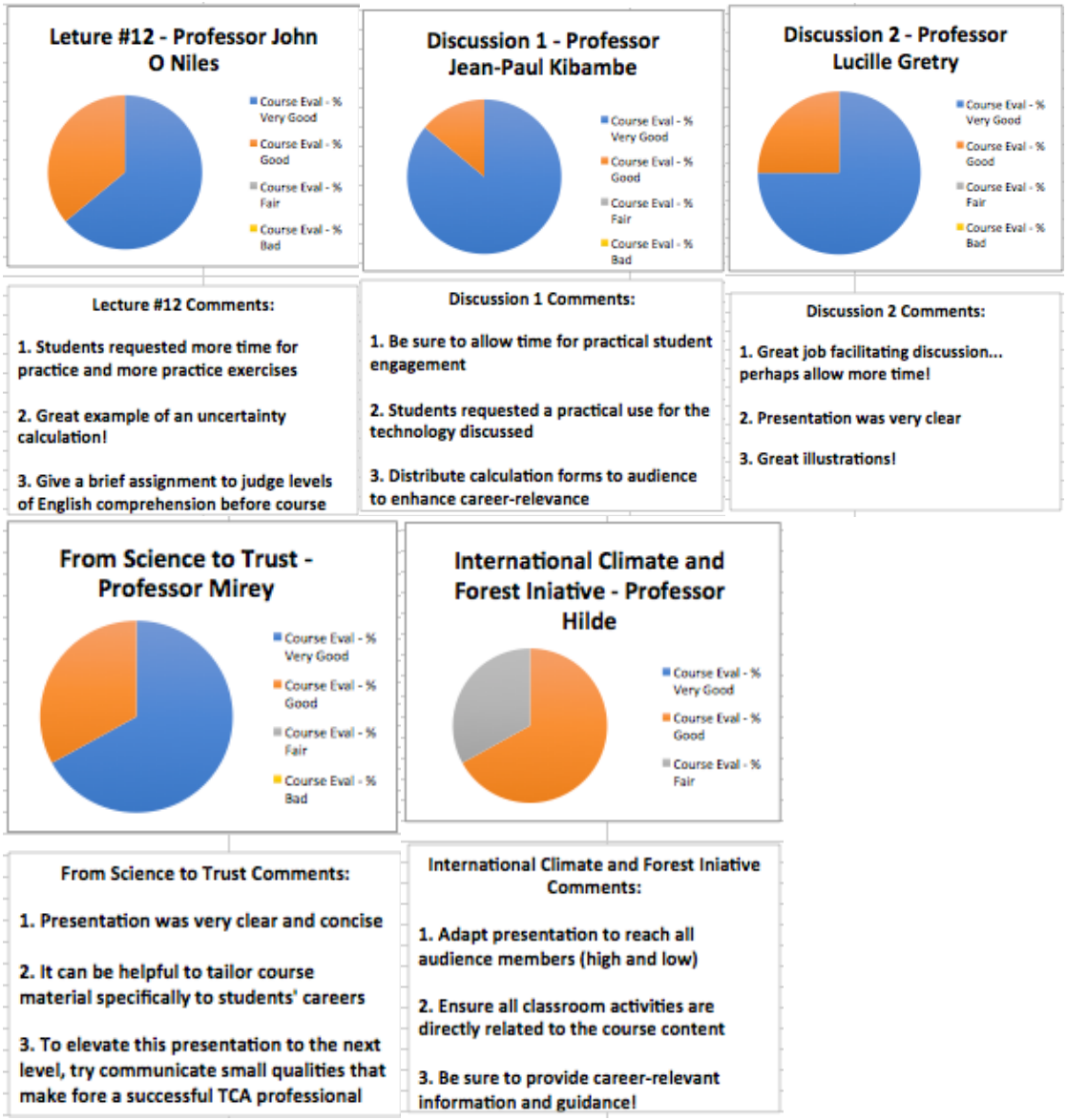


Lecture #10 Comments:

1. Begin presentation by defining key concepts and terminology

2. Consider sending lecture-related content to students beforehand

3. Be sure to allow time for students to practice and master concepts along the way



3.3.1 Accomplishments

- The Terrestrial Carbon Accounting certificate course in DRC produced a total of 430 instructional hours. It helped twenty individuals (including 9 government, 7 academics and 5 non-governmental professionals) achieve advanced knowledge in using terrestrial carbon accounting to inform better land management and to access conservation finance.
- The DRC certificate in TCA also helped build a network, with the appropriate academic resources (curriculums, exercises, syllabus) for future TCA in the country. Donors and government officials from DRC also seemed to appreciate more both the complexities and importance of GHG inventories for DRC.
- Jean Paul joins The Carbon Institute Council (as well as Francois and Lucie).
- New research and funding ideas.

3.3.2 Lessons Learned, Recommendations and Next Steps

Lessons Learned and Recommendations:

- Mentoring the policy makers and donor representatives on best practices in teaching deserves more importance.
- Careful tracking of evaluations and pre- and post-course evaluations can improve future courses.
- Chocolate treats provided before evaluations had a negligible impact on overall course evaluations, suggesting the results presented in terms of evaluations are robust.

Next Steps:

- Follow up with students, professional development, faculty and job boards.
- Provide on-going mentoring and feedback from the course to instructors.
- Explore forming a consortium for COMIFAC and RIFFEAC regional TCA capacity building concept.
- Promote the free curriculum and help desk.
- Explore providing additional on-line support in French to interested professionals from the DRC.
- Depending on funding and interest, explore work in another country or COMIFAC, to discuss with USFS-IP.

4 Conclusion

Overall, the trips were a success. Work in the Republic of the Congo and the Democratic Republic of the Congo proceeded well, the main objectives were met, and subsequent cooperation is underway to advance carbon accounting capacity to tackle climate change.

The mentoring and trainings in Republic of Congo (RoC) were well-organized and well-attended. Although evaluations had accidentally not been given, it was clear that the audience was engaged with the technical learning as well as the institutional roadmap work that Professor Koubouana helped facilitate. The involvement of higher-level government officials (notably George Boundzanga and his colleagues) helped provide a level of energy and relevance that inspired active learning and seeing how TCA is fundamental to government work and financing conservation.

A significant development from the mentoring sessions is the keen interest from the government of RoC to cooperate with The Carbon Institute to explore deeper cooperation and funding opportunities additional capacity building. A meeting on the last night between The Carbon Institute, CRESA, CN-REDD, and the French development organization OSFACO discussed ideas for to work together to build on the successes of the initial training, the mentoring, and the shared goal of using terrestrial carbon accounting to recruit conservation finance for REDD+ and related work in RoC.

Some key next steps include providing access to the French courses on the 2006 IPCC Guidelines, when the translation is completed (early 2018), and, exploring joint funding proposals with the GEF's Capacity Building Initiative for Transparency.

In the DRC, the main objectives of the scoping mission were met. Almost universally (with the exception of FAO), all the contacts asked were enthusiastic about the idea of partnering to do additional TCA training and building the academic capacities in DRC.

The training carried out on advanced TCA in DRC was also a success. Evaluations carried out on all lecturers provide a strong indication of which course lectures were well received and we also provided feedback to instructors.

5 Literature Cited and Recommended Reading

Raising the REDD+ Bar. Available here: http://ghginstitute.org/wp-content/uploads/2016/01/Raising-the-REDD-Bar_2013-TCA-Certificate.pdf

The Carbon Institute Curriculum Library. Available here: http://carboninstitute.org/resources-and-media/curriculum-library/

The Carbon Institute's Terrestrial Carbon Accounting Help Desk. Questions about carbon accounting (any topic) can be asked here, responses provided normally within 24 hours: http://carboninstitute.org/tcahelpdesk/

Previous Mission Reports: (available from either the USFS or The Carbon Institute upon request)

The Carbon Institute's Project Performance Report: United States Forest Service Support for Terrestrial Carbon Accounting Academic Partnership for Republic of Congo. For the Period August 1, 2016 to March 25, 2017.

The Carbon Institute's Program Performance Report: United States Forest Service Support for Terrestrial Carbon Accounting Academic Partnership in Cameroon. For the Period February 1 to September 30, 2015

6 Appendices

6.1 Appendix 1: Scoping Trip Mission Activities &Itinerary

Date	Activities
December 3	Arrival of John O Niles at Kinshasa
December 4	Crossing of Congo river by John O Niles and arrival of Francois Hoil Hoil at Brazzaville; Meetings with USFS representative in RoC, RoC CNIAF and CN-REDD
December 5	First day of training of trainers in carbon accounting for RoC, policy
December 6	Second day of training of trainers in carbon accounting for RoC; Road map for mentoring of RoC by the Carbon Institute, with CNIAF and CN-REDD
December 7	First day of networking event for USFS bursary recipients; Experience sharing in working with the students; Reflection on how to develop the students' network.
December 8	Second day of networking event for USFS bursary recipients; Experience sharing in working with the students; Reflection on how to develop the students' network "Roadmap/partnership" meetings with CN-REDD and CNIAF staff Meeting with potential partners IGNFI (Camille Pinet and Gabriel) and RIFFEAC (Claude Kafchaka) Meeting with a Dr IFO and his graduate students.
December 9	Trip from Brazzaville to Kinshasa (crossing River Congo)
December 11	Meeting with WCS; Meeting with OSFAC; Meeting with Wildlife Works Carbon; Meeting with USAID; Meeting with Norwegian Embassy; Meeting with FONAREDD
December 12	Meeting with Lucille GRETRY, University of Liège (Belgium), Responsible of Central Africa Platform based at Kinshasa; Meeting ERAIFT (Professors: Jean-Pierre MATE, Isaac Diansambu, Apolinaire Biloso) Meeting with the Department of Forestry of the Faculty of Agriculture in the University of Kinshasa, including Department Head and Dean; Meeting of GIS and RS lab of OSFAC in the University of Kinshasa
December 13	Meeting with WRI; Meeting of the Direction of Sustainable Development (DDD) of the

	Ministry of Environment and Sustainable Development; Meeting of legal NGO, CODED; Meeting with WWF; Meeting with FAO
December 14	Meeting with Direction for Forest Inventory and Zoning of the Ministry of Environment and Sustainable Development Planning for next steps Trip back to the US for John O Niles Trip back to Cameroon for François Hiol Hiol

6.2 Appendix 2: Syllabus for Democratic Republic of Congo Certificate in Terrestrial Carbon Accounting (May 8-11, 2018) including learning objectives, instructors, lectures and exercises

Syllabus for Certificate in Advanced Terrestrial Carbon Accounting, DRC, May 2018

The Reducing Emissions from Deforestation and forest Degradation (REDD+) framework of the United Nations Framework Convention on Climate Change (UNFCCC) pays countries to avoid deforestation and increase sequestration. The majority of long-term finance is performance-based, tied to verified changes in forest carbon stocks. Since the 2007 climate summit in Bali made REDD+ a reality, developing countries have unlocked billions of dollars for REDD+ readiness (capacity-building) and pay-for-performance programs. Sustainable finance for REDD+ is increasingly tied to actual emissions avoided and enhanced sequestration. Stronger greenhouse gas accounting (more accurate, transparent, higher-resolution) allows countries to access more funding and transition to sustainable land use. This course will improve policy understanding, technical skills, and communication skills in terrestrial carbon accounting. Participants will leave the course with the knowledge to maximize the Democratic Republic of the Congo's benefit from REDD+.

Learning Objectives:

By the end of this course, the participants will be able to:

1) Explain the policy (international and national) processes that help inform and guide the technical carbon accounting work;
2) Summarize the main elements of forest carbon accounting, including the main equations, terms and concepts and how to convert between carbon and carbon dioxide;
3) Explain the main elements of the Intergovernmental Panel on Climate Change guidelines for greenhouse gas inventories and be able to define key terms;
4) Calculate forest carbon stocks and generate emission factors by applying the basics of sampling design and forest measurements;
5) Apply basic GIS and image processing skills necessary to generate the activity data to develop Reference Levels;
6) Communicate technical information to unlock conservation support and finance.

Certificate in Advanced Terrestrial Carbon Accounting
Course Syllabus: May 8-11, 2018
Kisantu, Democratic Republic of the Congo

Tuesday, May 8, 2018: The Policy Context of Terrestrial Carbon Accounting

8:00 – 9:30	**Registration**
9:30 – 10:30	**6.3 Opening remarks:** Introductions and goals Chaired by Olivia Freeman U.S. Forest Service, with remarks by Nicodeme Tchamou (USAID), François Hiol Hiol (CRESA Forêt-Bois), Félix Koubana (ENSAF University of Marien Ngouabi), Jean-Paul Kibambe (University of Kinshasa /WCS), and John Niles (The Carbon Institute)
10:30 – 11:00	6.4 **Lecture #1:** Self-evaluations and self-assessments and goals for the course
11:00 - 11:30	Coffee Break
11:30 – 12:30	**Lecture #2:** Terrestrial Carbon Accounting Policy Context: The Origins of REDD: Policy Context: through Warsaw REDD+ Framework Francois Hiol Hiol
12:30 – 2:00	Lunch Break
2:00 – 3:00	**Lecture #3:** REDD and LULUCF in the Paris Agreement Jean Lambert Lisika
3:00 – 4:00	**Lecture #4:** Land Use in the Intended Nationally Determined Contributions (INDCs), focus on DRC Jean-Paul Kibambe

Wednesday, May 9, 2018: The Science of Terrestrial Carbon Classification and Forest Measurements

9:00 – 10:00	**Lecture #5:** Introduction to Climate Change and Estimating Forest Carbon John-O Niles
10:00 – 11:00	**Lecture #6:** Introduction to the IPCC, GHG Inventories, and Carbon Pools Felix Koubana
11:00 – 12:00	Coffee Break
11:00 – 12:00	**Lecture 7:** Forest and Land-use Classification and Stratification Rene Siwe
12:00 – 1:30	Lunch Break
1:30 – 2:30	**Lecture 8:** Remote Sensing and Terrestrial Carbon Accounting Jean-Paul Kibambe
2:30 – 3:00	Coffee Break
3:00 – 4:00	**Lecture 9:** Terrestrial Carbon Accounting: Experience from Republic of Congo Felix Koubana
4:00 – 4:30	**Discussion:** Using TCA to obtain finance, challenges and opportunities Olivia Freeman, moderator

Thursday, May 10, 2018: Real World Examples and Challenges

9:00 – 10:00	**Lecture 10:** Forest Measurements, allometric equations, and calculating aboveground biomass and emissions factors TBD, Kisingani professor
10:00 – 11:00	**Lecture 11:** Sampling design Rene Siwe
11:00 – 11:30	Coffee Break
11:30 – 12:30	**Lecture 12:** Statistics and math challenges John-O Niles
12:30 – 2:00	Lunch Break
2:00 – 3:00	**Discussion**: DRC carbon accounting reference levels and how to use carbon accounting to access finance Jean-Pau Kibambe
3:00 – 3:30	Coffee Break
3:30 – 4:30	**Discussion:** How was teaching during training and what are next steps? Lucille and Francois

Friday, May 11, 2018: Communication and Graduation Ceremony

9:00 – 10:30	**Discussion:** Communicating Terrestrial Carbon Accounting to get support and finance Mirey Atallah (FONAREDD) and Hilde Dahl, Ambassade de Norvège /CAFI
10:30 – 11:00	Coffee break and Evaluations
11:00 – 11:30	Closing ceremony and certificate distribution
12:00 – 1:00	Lunch
1:00	Return to hotel
2:00	Depart for Kinshasa

6.5 Appendix 3: Next Steps and Key Actions from Republic of the Congo

Date	Activity/Action
Jan 2018	Provide CN-REDD with follow up materials (curriculums and finance opportunities for Transparency Capacity Building)
Jan 2018	Communicate with participants, thanking them, providing teaching materials (including French versions of GHGMI's 2006 IPCC Guidelines courses to participants), welcome further cooperation
Jan 2018	Draft possible additional work for both RoC and DRC
2018	Explore additional resources and funds to do additional work
2018	Discuss possible follow up training in DRC with USFS IP, possible cooperation with RIFFEAC and COMIFAC

6.6 Appendix 4: Key Contacts

Wildlife Conservation Society

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+243998368091

Djengofrederic21@yahoo.com

6.7 Appendix 5: List of participants DRC Training May 2018

Name	Organization
Alyssa Dongo	U.S. Forest Service
Astrid Ntanga Mbuyi	FONAREDD
Augustin Lamulamu	FAO
Bonaventure Lele Nyami	Université de Kinshasa
Corneille Ewango	Université de Kisangani
Elvis Tshibasu Muanza	WWF
Ernestine Tipi Lonpi	ERAIFT
Eva McNamara	U.S. Forest Service
Felix Koubouana	ENSAF, Congo
Florentin MUGULA CIRHALA	DDD
Francois Hoil Hoil	CRESA Foret-Bois
Guy Cidibi	DIAF
Hassan Assani Ongala	CNREDD
Hilde Dahl	Ambassade Norvege
Hubert Kinwa	Interpret
Isaac Diansambu	ERAIFT
Jean Lambert Lisika	CODED
Jean-Paul Kibambe	Université de Kinshasa / WCS
Jérôme Ebuy	Université de Kisangani
John-O Niles	The Carbon Institute
José KAWANG KABAND	MEDD
Laurent Kalau	DIAF
Lucille Gretry	Université de Liège
Mirey Atallah	FONAREDD
Nanette Cindy	MEDD
Nicky Kingunia Ineet	DDD
Olivia Freeman	U.S. Forest Service

Pacifique Madibi Mubamba	WCS
Richie Ngombo	DIAF
Serge Kalawu	OSFAC