LEAF's Regional Climate Change Curriculum Development Training Workshop

August 2013 Workshop Report

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Introduction

In August 2013 the Lowering Emissions in Asia's Forests (LEAF) program, in collaboration with the U.S. Forest Service (USFS), brought together academics from American and Asian universities that have been collaborating since October 2012 to develop climate change curricula for forestry and natural resources management courses and programs in the four Mekong countries of Thailand, Laos, Cambodia, and Vietnam, and thereafter in Malaysia and Papua New Guinea (PNG). The 10-day training workshop on Regional Climate Change Curriculum Development (RECCCD), held in Bangkok, Thailand, aimed to test some of the developed materials, review and revise the curricula, develop strategies for integrating the curricula into the Asian universities' existing programs, and discuss how LEAF and USFS can continue to support Asian universities in these efforts (Appendix A1). This report summarizes the workshop, its main outputs, and recommended next steps.

Background

LEAF, funded by USAID/Regional Development Mission for Asia (RDMA), aims to strengthen the capacity of targeted countries to achieve meaningful and sustained reductions in greenhouse gas emissions from the forestry-land use sector, and allow these countries to benefit from the emerging international Reducing Emissions from Deforestation and Degradation (REDD+) framework. One of LEAF's objectives is to build and institutionalize technical capacity for economic valuation of forest ecosystem services and monitoring changes in forest carbon stocks at the project and national levels. To meet this objective, LEAF is working with universities in the region on developing curricula in REDD+ and related climate change fields. The US Forest Service (USFS) has provided strategic technical support to LEAF in the these efforts by engaging a team of U.S. forestry education specialists to work with LEAF and Mekong universities on developing climate change curricula and conducting training on how to teach and integrate these topics into existing forestry and natural resources management (NRM) degree programs and non-degree training courses. This effort is supporting a direct exchange of ideas between U.S. and Mekong academics on climate change science, lesson planning and teaching techniques. This work began with a Scoping Trip in October 2012 (Phase 1), continued with the collaborative development of four climate change modules from October 2012 to August 2013 (Phase 2), and then brought the U.S. and Asian academics back together in August 2013 to finalize some of the materials and determine next steps (Phase 3)

Summary of Phase 1: Scoping Trip

To begin the collaboration between U.S. and Mekong academics, in October 2012 four U.S. academics/research scientists and two USFS International Programs (IP) staff conducted a scoping trip to the region to meet with Mekong professors and visit universities to understand their climate change education needs and reach consensus with Mekong partners on the topical areas on which to focus curricula development efforts. During the visit LEAF hosted a two-day workshop for the U.S. scoping team members and Mekong university faculty to assess the training needs, discuss challenges and opportunities of integrating climate change topics in to current forestry and natural resource management programs, prioritize climate change areas, identify the key range of K-S-A (knowledge, skills and attitudes) and target groups for module outline development. The team also visited Kasetsart University in Bangkok, Vietnam Forestry University outside of Hanoi, and Dalat University in the Central Highland of Vietnam. Additionally, the team met with USAID/RDMA, USAID/Vietnam, and The Center for People and Forests (RECOFTC). RECOFTC became a key partner on the LEAF program and assigned one of their staff to contribute to the RECCCD efforts (Appendix A2).

The result of this scoping trip was the decision to develop four climate change modules:
- Basic climate change (BCC)
- Social and environmental soundness (SES)
- Land use planning and climate change (LUPCC)
- Carbon measurement and monitoring (CMM)

During the two-day workshop initial teams per module- composed of a U.S. co-lead, a Mekong co-lead, and Mekong team members- were formed to collaboratively develop the four modules. Given the different needs per university, the challenge in many cases of getting approval for new courses, and the role of some universities in teaching non-degree training courses, it was decided that the modules would be developed with flexible formats in terms of length and depth for both degree and non-degree programs. At the maximum each module would be a semester long course.

Summary of Phase 2: Detailed RECCCD and Materials Development

Following the Scoping Trip, the module teams worked together via remote communication (Skype calls, Google Drive, Google Site, DropBox, Email exchange) from October 2012 to August 2013 to develop their modules. A U.S. local coordinator was hired through USFS to coordinate on the U.S. side, and LEAF hired an Adult Learning and Capacity Building Specialist based in Bangkok to coordinate this program on the Asian side.

After the initial team forming that happened during the workshop, teams were finalized through emails and outreach to universities, with the goal of each team having at least one team member per participating countries. Following the finalization of module teams, the main activities of detailed RECCCD and materials development were: 1) setting up communication strategies for collaborative detailed RECCCD based on the outline development in the previous phase, which once developed included the assigning of topics to team members; 2) gathering available relevant materials, including materials from universities, academic resources, websites, regional/international organizations like RECOFTC, Winrock, etc. and posting materials on the commonly shared archives on Google Drive; and 3) developing detailed modules, where team members reviewed key K-S-A, developed lectures based on specific learning objectives, developed learning methods and classroom activities according to their assigned topics; and 4) sharing ideas and materials through incorporated group Skype calls and online resources (Google Drive, Google Site, DropBox) among/across the modules teams. The process was facilitated by the U.S. and LEAF coordinators (see Appendix A3).

LEAF's Regional Climate Change Curriculum Development (RECCCD) Training Workshop Overview

After the Phase 1 Scoping Trip, LEAF and USFS had envisioned that the workshop would be an opportunity to test developed curriculum and to provide a teacher's Training-of-Trainers (TOT) on climate change topics. However, LEAF and USFS readjusted the objectives and the format of the workshop since module materials were not all completed during Phase 2.

The 10-day Climate Change Development Training Workshop consisted of three major sections:

1. Discussions and Trainings on Curriculum Elements and Teaching Strategies
2. Module Team Work Sessions, Teaching Demos and Presentations
3. Action Plans and Next Steps for LEAF & Partner Universities

For Section 1, LEAF Adult Learning and Capacity Building Specialist organized and facilitated several "assignments" on the systems view of training quality, adult learning strategies, training session design, learning domains (K-S-A), and effective teaching. After receiving background information and

instructions, module teams discussed these concepts and presented their results to the plenary group. The purpose was to assist the module teams to revise their module syllabus with SMART learning objectives[1] and to develop more regional- /country-specific examples, interactive class exercises, role plays, case studies, etc.

The majority of the workshop was devoted to Section 2. During these sessions, module teams worked according to their particular gaps and needs. For some modules, this included the finalization of the detailed module syllabus and team member assignment of original material developments. Other modules focused on teaching demos and materials refinement. The four module teams revisited their respective module syllabus: review of relevant KSA, revision of learning objectives, lesson plans, class exercises, case studies and role plays. Module teams presented their progress to the plenary group at the midpoint and conclusion of this section.

Section 3 was implemented during the final two days. Each participating university developed and presented an action plan for the integration of the climate change curriculum modules into their teaching. These action plans also included requests for USAID and/or LEAF support for further support in curriculum development, teacher training, and complementary field-based activities. In the final session of the workshop, LEAF facilitated a plenary discussion on priority areas for the next phase of the curriculum development program.

Gender was a cross-cutting issue of the whole RECCCD efforts, content wise and approach wise. Male and female, senior and young members from 12 universities in the region were engaged in the RECCCD process. Some new and less experienced members from the participating universities were invited to attend the RECCCD training workshop in August. They were committed to continue their engagement in the process. They received close coaching and helpful assistance from the co-leads as well as their peers in order to catch up with the speed of work. They were very active and fully engaged in the training workshop.

The remainder of the report focuses on summarizing the process and outcomes of Section 2 per module team, as well as synthesizing the results of Section 3 for recommendations for next steps.

Module Team Work Sessions: Basic Climate Change
For BCC Module Summary, see Appendix B.1

Introduction of New Team Members
Five new team members were briefed on the BCC module and came up to speed quickly. Two new Malaysian team members, Chan Hoy Yen and Ahmad Makmom Hj Abdullah, contributed to the gaps related to forest management and renewable energy. Sokha Kheam collaborated with his Royal University of Phnom Penh colleague Se Bunleng to develop the "Causes of Climate Change" section. Kalyan Ly of Cambodia's Royal University of Agriculture and Latsamy Boupha of National University of Laos enhanced existing materials related to climate change effects.

Team coherence was excellent and allowed for rapid production and refining of materials (Appendix C.1). The team came to consensus on the final module structure and topics, and drafted much of the remaining material to complete the module during the workshop. A substantial amount of original material and localization was added, enhancing the product. Additional work is still needed to review and polish this material.

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[1] SMART: Specific, Measurable, Achievable, Realistic, Time-bounded.

Outline finalization (learning objectives)

Prior to the workshop, the BCC team had reorganized the original topic list to an outline with the following sections:

1. Causes of Climate Change
2. Effects of Climate Change
3. Responses to Climate Change
4. Tools & Resources

BCC Team chose to keep the outline structure, though the team made significant revisions to the module learning objectives and to the module topic learning outcomes. These revisions were based on the recommendations of the Teaching Strategies section of the workshop (Appendix D.1).

Review of existing session materials

The review of the materials was complicated by their two somewhat distinct purposes: to educate students, and educate and prepare the instructors. The objective of educating students took precedence for BCC development.

Team members divided up the learning topics and each team member took one or two topics for review, augmentation, and localization. Due to limitations on time not all topics were covered, but most of the primary topics were covered. The remaining topics were assigned to particular team members to complete. Focused time and effort was devoted to working on the slide decks for each of these topics.

Development of new materials

A new slide deck was developed for renewable energy solutions. This was seen by the BCC team as an important topic to cover, albeit briefly, in the BCC curriculum. Hoy Yen Chan, from Malaysia, has the expertise and generated this deck during the workshop.

Each slide deck that was worked on was reviewed, enhanced, and localization added. Additional review of the modified material is necessary, as there was not time to do this during the workshop.

Teaching Demos

Each of the team members chose a topic for which to present a teaching demo that would consist of a one-hour lecture. Approximately 5 hours was devoted to preparing this lecture and associated slide deck. The lectures were delivered and critiqued by the rest of the team. The process of doing this revealed strengths and weaknesses in the topical slide decks, and these were either fixed or put into the queue for fixing.

Post-Demos Feedback & Revisions

Overall the teaching demo exercise was highly valuable, giving BCC Team Members important insight into the nature of the curriculum, the utility of the developed materials for use by new lecturers, the depths of topical coverage, and subtopics that are in need of enhancement.

There was agreement that the impact modeling for plants and wildlife needed to be simplified. Also there was agreement that the food security topic is so important to the region that it should be enhanced and go into greater depth and breadth.

Significant findings were made regarding each of the presented topics, and the needed changes were noted. Some revisions were made but most were put into a queue for completing after the workshop.

Module Development Checklist/Plan
(See Appendix E.1)

Course Syllabus and 3/5/10 & academic/training breakdown

An estimate of the lecture time needed for each topic was made (Appendix F.1). Based on this, lecture times, by topic, were derived for two shorter courses: a 5-day (30-hour) and a 3-day (18-hour) version. Team members agreed that it was not necessary to do a highly prescriptive versioning for the shorter

courses, because the topical treatment and time allotted to each would be highly dependent on the specific audience and actual teaching context, which can differ greatly from instance to instance. That is, the potential audiences for shorter courses would be highly variable and would in any case require customization of topics and depth of coverage. It would however be desirable to put more thought and effort into modifying the decks for specific shorter courses, perhaps with a specific audience and prerequisite knowledge level specified. This activity is not identified in the module completion spreadsheet. This would need to be added if this more detailed treatment of the materials is desired.

Participant feedback on workshop

Participant feedback on the workshop was uniformly positive. A tangible sense of purpose was present in the BCC Team, and participants worked hard throughout the workshop. There was a strong sense that the curriculum would be broadly implemented, in the near future.

Several participants were frustrated with spending two days on learning techniques, while others were appreciative of these exercises. There was a broad consensus that active learning was important and would be strongly incorporated into the curriculum.

The best indication of this having been a successful workshop and overall effort was the detailed and specific plans for implementation presented by each of the represented universities the final day.

Module Team Work Sessions: Social and Environmental Soundness
For SES Module Summary, see Appendix B.2

Introduction of new team members

The SES team has experienced considerable dynamism in its membership (Appendix C.2). As a result, a core set of members has formed, consisting of Surin Onprom (co-lead, Kesetsart University), Rejani Kunjappan (RECOTFC), Kalpana Giri (LEAF), Claudia Radel (U.S. co-lead), and Sarah Hines (U.S. co-lead). Several members engaged in the pre-workshop materials development process were not able to attend the workshop: Bui Nguyen Lam Ha (Da Lat University) and Malyne Neang (RUPP). Penporn Janekarnkij (co-lead, Kasetsart University) participated in the very initial phases of the pre-workshop materials development process but had been unable to continue through the process due to other commitments. However, she rejoined the team for several days of the workshop. Two new members joined the team at the start of the workshop, Kaisone Phengspha (National University of Laos) and Chalapan Kaluwin (University of Papua New Guinea). Kaisone Phengspha was only able to attend the first of the two workshop weeks, but during his participation he engaged actively in materials development and review. A final two new members joined the team for the second and final week of the workshop, Sharifah Zakaria (Universiti Kebangsaan Malaysia) and Rusli Yacob (UPM). Both engaged immediately and actively, with Sharifah Zakaria developing new materials for environmental ethics and Rusli Yacob partnering with Penporn Janekarnkij on the economics slide deck materials.

Outline finalization (learning objectives)

At the workshop, SES Team revisited the outline (Appendix D.2) at two separate points. At the start of the module team work time, SES Team discussed the outline for the course and materials and reached consensus. Following a team review (as a group) of first draft slide decks, SES Team then revisited the outline a second time. At this point, the team had a better idea of the logical flow of topics and the linkages among the slide decks. This new perspective led to a reordering of the topics in part 2 of the module.

SES Team also revised its module learning objectives during the second week of the workshop. The team specifically considered the three learning domains (knowledge, skills, and attitudes) and also worked to craft its learning objectives so that students "moved up" Bloom's taxonomy towards higher forms of thinking and understanding.

Review of existing session materials

Apart from team discussion of the outline and of the module learning objectives, SES Team largely divided its time between the development and revision of materials individually and the review of materials as a team. The team collaboratively reviewed first drafts of a significant proportion of the module materials. SES Team reviewed all decks ready in draft form by Wednesday morning of the second week (the last day of module team work).

Development of new materials

Much of the material that was supposed to be developed prior to the workshop was not developed. The only decks developed prior to the workshop were those assigned to Sarah Hines, Claudia Radel, and Malyne Neang. Although all missing decks then were started at the workshop, not all were completed or reviewed.

Teaching demos

SES Team conducted "run-throughs" instead of demos. Each attending team member ran through at least one of the slide decks under their responsibility, with the exception of Rusli Yacob (who joined for the second week). Most deck "run-throughs" lasted somewhere around an hour, depending on the length of the deck. This time included an explanation by the designer of the nature and purpose of the various presentation materials and activities, followed immediately by group feedback with suggestions for revision.

Post-Demos Feedback & Revisions

SES Team Member feedback on the "run-throughs" included questions, ideas, suggestions, and identification of linkages with other decks. The facilitator encouraged each team member in the room to provide feedback in a round-robin fashion. Members worked to provide developmental feedback, with each person first identifying the strengths of the draft and the aspects that they particularly liked before turning to suggestions for changes or improvement. The team then worked to provide individual time for the original designers of each deck to revise the deck, incorporating suggestions and adding all elements of the following proposed structure:

- title slide
- learning objectives for the session(s)
- outline for the session(s), with times required for each element if possible
- methodology employed (e.g. lecture, small group activity, class discussion)
- pre-class student preparation or assignment
- presentation materials (e.g. slides for lecture or for presentation to the learners)
- activities (potentially integrated or interspersed with the presentation materials)
- key points
- references

However, not all planned revisions were possible in the time allowed (Appendix E.2).

Module Development Checklist/Plan

SES Team U.S. co-leads tracked materials development and the status of the module slide decks on the provided checklist spreadsheet (Appendix E.2). In the two weeks following the workshop, several team members hope to tie up loose ends with planned first drafts or revisions (Kalpana Giri, Rejani Kunjappan, Surin Onprom, Claudia Radel, Sarah Hines, Sharifah Zakaria). The willingness of other team members to draft and/or revise their assigned topics is unknown. Rejani Kunjappan and Kalpana Giri are both tasked with participating in the SES module materials development as part of their work assignments under RECOFTC and LEAF, respectively. If they are to do more than simply "tie up loose ends," which is in fact necessary for the completion of their topics, their organizations must provide time within their work schedules to do so.

Course Syllabus and 3/5/10 & academic/training breakdown

U.S. co-leads drafted a proposal for the SES module 3-day and 5-day short course or training scenarios (Appendix F.2). For each time period (3-day and 5-day), there is an academic focus scenario and a practitioner-focus scenario. The practitioner-focus scenarios offer a menu-type approach to part 2 of the materials, with trainers selecting topics based on the particular training needs of the learners. These were then presented to the full SES team and reviewed. No changes were suggested.

Team feedback on workshop

Participant feedback during and at the conclusion of the workshop indicated that it was a positive, productive, and worthwhile experience, despite the fact that it was also quite demanding. Many participants indicated that coming together in a face-to-face workshop proved particularly fruitful because it allowed for in-person, iterative discussions that led to the development of a stronger and more well-synthesized module. Team members felt that this was particularly important for the SES module, which contains a variety of themes that recur and build upon each other; whereas the team had struggled with achieving consensus on, and synthesis and integration of, the module content during Skype calls prior to the workshop, the "same time, same place" interactions at the workshop enabled the team to reach substantially higher levels of productivity and capacity-building.

While the verbal feedback about the workshop was encouraging, the non-verbal feedback was equally telling and also indicated that the workshop was successful in many regards. Most participants were extremely productive during their time at the workshop: several SES team members built or partially built PowerPoint decks (which include comprehensive lesson plans) from scratch; one team member repurposed and refined a deck from another module to meet SES-specific objectives; others were able to strengthen and refine their decks based upon team feedback as well as the lesson planning / teacher training sessions offered during the first two days of the workshop. Many team members voluntarily stayed later each evening and/or worked over the weekend, so as to accomplish their self-imposed goals for content creation or revision. Several team members voluntarily committed to completing final touches on their presentations within the two weeks following the workshop, another sign of team member dedication. The resulting course material that was generated was fairly substantial, as indicated by the fact that by the workshop's conclusion, the SES team had generated complete or almost complete content for each of 41 session hours. In addition, the team had successfully sketched out the entirety of a 45 session-hour course, including options for 12-15 hour (3 day) and 22 hour (5 day) versions tailored to either a practitioner or an academic audience.

Enthusiasm for the syllabus and course material was tangible, as many team members expressed a desire to take and use substantial portions of the content in their teaching in upcoming months. Surin Onprom, Sharifa Zakaria, Rusli Yacob, and Claudia Radel expressed interest in using parts of the material in an academic setting, while Rejani Kunjappan, Kalpana Giri, and Sarah Hines expressed interest in using the material in a practitioner setting.

Module Team Work Sessions: Land Use Planning and Climate Change
For LUPCC Module Summary, see Appendix B.3

Introduction of new team members
The LUPCC Team has changed significantly since the first meeting due to interest, capacity, and need (Appendix C.3). The module team was able to pull the Vietnam case study[2] team onto the LUPCC team with huge success.   The Vietnam team was able to significantly contribute and there was also some significant capacity building in terms of curriculum development and subject matter. Thuy-Anh has implemented some of the material at her university. Attachai from CMU also was instrumental in sending Benz, also from CMU, to join our team with huge success. Benz has already implemented some of the material back in his university. We had a member from a new country join our team, Zaki from Malaysia. Zaki joined the team during the second week of the workshop quickly taking on leadership positions. He contributed to the overview sections, class exercises, laboratory exercises, and section 3. He has committed to taking the material back to his university. There were several new LEAF team members to join our team. This module was described as critical to their other initiatives and programs.

Outline finalization (learning objectives)
The LUPCC team reviewed and finalized the outline during the first week of the workshop (Appendix D.3). Based on this review, the team revised our module learning objectives to take into consideration the three learning domains (knowledge, skills, and attitudes). The team also designed the learning objectives of each module section so that students "moved up" Bloom's taxonomy towards higher forms of thinking and understanding.

Review of existing session materials
There was a significant amount of time devoted early on to the review of existing material. The material that was generated largely was developed from scratch and was practical in application missing the underlying theory and local climate change examples. The team decided to focus its efforts on three things: 1) integrate climate change using local examples into every element of the course, 2) Focus energy on the overview portions of each section, and 3) Add more theory into the introduction sections that would carry through to the sub-sections.

Development of new materials
There was a detailed framework and slide deck for each of the lectures developed by the team before the workshop. The decks were very thin on theory and climate change implications, thus much of the workshop time was focused on developing out the material. Our team found the joint development of materials productive for three reasons; 1) the team was able to integrate each of the sections together in a fashion that was consistent with our framework, 2) it was able to build capacity within our team on both content and style, and 3) it was able to identify common issues within the region to highlight in the module. The team was able to make significant progress, however the effort still needs to be completed.

Teaching demos
The LUPCC module team conducted "run-throughs" instead of demos. Each attending team member ran through their section overview slide decks under their responsibility. Most deck "run-throughs" lasted somewhere approximately 30 minutes, depending on the length of the deck and capacity of the presenter. This time included an explanation by the designer of the nature and purpose of the various presentation materials and activities, followed immediately by group feedback with suggestions for revision.

Post-Demos Feedback & Revisions
The LUPCC team had a "run-through" at the beginning of each working day to check on progress, ensure integration, and to fill gaps. LUPCC member feedback on the "run-throughs" included questions, ideas,

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[2] In May 2013 one of the U.S. curriculum development co-leads, David Saah, and USFS Jim Barber travelled to Lam Dong Province, Vietnam, to conduct a case study with Dalat University and LEAF partners in order to provide a real-world example of land use planning in the region. The resulting case study was used to support the LUPCC module by providing local content for a series of real-world problem solving and learning exercises.

suggestions, and identification of linkages with other elements of the framework. Team leaders encouraged each team member in the room to provide feedback, with each person first identifying the strengths of the draft and the aspects that they particularly liked before turning to suggestions for changes or improvement. Team work time was then dedicated to revising the deck and incorporating suggestions. However, not all planned revisions were possible in the time allowed.

Module Development Checklist/Plan

A rough estimate of progress on the module is that the slide decks are at about 80% complete, not accounting for technical review and editorial and formatting review or the Role Play. Slide decks are in varying stages of completion. In some cases, materials are ready for review; while in other cases, material is still in development. In most cases the role playing elements are thin or missing. In a number of cases, decks are under revision following initial presentation to the team. In a few cases, decks still require substantial work on the core presentation or activity materials

Current progress is indicated in Appendix E.3. Individual commitments are highlighted next to the individual decks. Most of the team members have committed to help with the finalization of this effort.

Course Syllabus and 3/5/10 & academic/training breakdown

The framework that was used by the LUPCC team took into consideration the need for the short courses. The LUPCC team was able to develop the short courses with relative ease due to the structure of the previous two weeks and the joint development effort. The LUPCC team has drafted a proposal for the module 3-day and 5-day short course or training scenarios (Appendix F.3). For each time period (3-day and 5-day), there is an academic focus scenario and a practitioner-focus scenario. The practitioner-focus scenarios offers more of a hands on approach with practical examples and exercises, while the academic short courses focus primarily on the theory and conceptual understandings necessary to make a LUP successful.

Module Team Work Sessions: Carbon Measurement and Monitoring
For CMM Module Summary, see Appendix B.4

Introduction of new team members

CMM Team welcomed two new team members, Lawong Balun from PNG and Ahmad Ainuddin Bin Nuruddin from Malaysia (Appendix C.4). They arrived in the second week; nonetheless, both enthusiastically embraced sections of the module, presented teaching demonstrations based on materials that had been organized by other team members, and revised them based on feedback from the group.

Outline finalization (learning objectives)

CMM syllabus did not change substantially during the workshop, although CMM Team rearranged a few topics (Appendix D.4). Having realized that some topics ended up bigger or smaller than expected, the team adjusted the syllabus accordingly. The team began with excellent material for all five sections (50-90%). Key identified gaps were the inclusion of carbon markets into 1.4 (role of forest carbon in global climate action) and completing 1.5 (challenges of forest-based climate mitigation), completing 2.5 (reference levels), combining and completing 3.6-3.8 (technical and human resource constraints on monitoring), and viewing and revising 4.8 (data management).

Review of existing session materials & development of new materials

CMM team added significantly to all existing materials following demonstrations and feedback. Several team members took on additional sections to present and revise, and CMM Team reviewed all but two topics (4.1, use of Remote Sensing and GIS in carbon monitoring and 4.8).

As a group, CMM Team discussed the possibility of including a capstone project that would span the entire module.

Module Development Checklist/Plan

All participants promised to take two weeks to finalize the slide notes for their presentations, add references, and augment classroom activities (Appendix E.4). Finalizing all sections for the semester long (10 day) course option, including formatting and technical review, would require about 194 hours of dedicated work.

Course Syllabus and 3/5/10 & academic/training breakdown

CMM Team reviewed the module to develop options for 3-day and 5-day training programs (Appendix F.4). The team retained parts of all five sections, but omitted some of each. CMM Team did not spend a lot of time on this process because the team determined that training requirements would likely vary significantly among different agents. Instead, CMM Team decided to provide a framework detailing which topics seemed most important given a limited timeframe.

Team Feedback

CMM Team was strongly influenced by the training in curriculum design delivered by LEAF personnel over the first two days. The team strongly embraced the learner-centered approach. The team revised its learning objectives to emphasize learning outcomes rather than content delivery. The team also incorporated active learning methods into its teaching demonstrations. Over the course of the first week, CMM Team added classroom and laboratory activities, reduced the time devoted to traditional lectures and re-organized the flow of material and exercises during the team's presentations. This critical work of revisiting the learning objectives, revising teaching methods, and re-assessing the module syllabus occurred almost as a happy by-product of the early training on curriculum development. An additional perk was the development of team spirit and commitment.

University Action Plans

During the end of the second-to-last workshop day, Asia-Pacific regional participants had an opportunity to meet in their university-specific teams to discuss implementation strategies. Despite being given relatively little time to discuss (due to a packed agenda), all universities developed plans, most of them extensive, for using module content and/or attempting to formally implement entire modules at their universities. This was likely another indication of the capacity-building that had occurred throughout the course of the workshop: participants were enthused, primed, and ready to discuss implementation and thus did not require abundant preparation time to create implementation plans from scratch.

Common near-term elements in the university plans included having participants share materials and process with key university administrators as well as with colleagues, adopt materials for use into their own existing classes in the immediate future, assess needs to adapt to country-specific or more local contexts, and engage in additional training (for themselves and other university colleagues) on the content. These first three common themes might require little support from LEAF, except for occasional consultation. The fourth theme – additional training – would likely require support from LEAF, in the form of TOT workshops, smaller-scale TOT partnership building (among two or more universities that share common geographic or thematic interests), and/or e-learning offerings.

Several university plans also identified a medium-term goal of implementing one or more entire modules into the university curriculum. This would take 2-3 years' time, and might or might not require support from LEAF in the form of formal agreements with and/or support of the universities.

The Basic Climate Change module was identified for implementation by all of the universities presenting. Some universities explicitly begin with the Basic Climate Change module as a prerequisite for other modules. The Basic Climate Change course was identified in several different parts of existing programs and curricula.

While the BCC content/module was most commonly identified as "low hanging fruit" to be included in university curricula, the SES module was highlighted in many university implementation plans, and was specifically highlighted for its potential to be integrated into forestry science, environmental science, and

agricultural economic & rural development departments. Not surprisingly, participants were most comfortable integrating their own module (BCC, SES, LUPCC, or CMM) into their university implementation plan, re-enforcing the notion that a broader training of the trainer (TOT) offering may help increase lecturer confidence in using and customizing other module content for their own classroom use. Such a TOT offering would help to amplify the SES module offerings substantially; much of the SES content is not technically very challenging, and integrating even a small portion (one to several sessions) of SES content into a wide variety of disciplines could strengthen basic awareness of SES issues.

CMM Module Team was committed to implementing pieces of the CMM curriculum right away, by inserting lectures into their existing classes. They also planned to share information with colleagues and their administration on the curriculum, to pilot short courses based on the material and/or to offer the module as a 'special topic' which requires no permission. Their long term goals included proposing new courses in existing programs and developing full-blown plans for including the module in several curricula. In Cambodia, the curriculum development process is well under way at the Royal University for Agriculture, as one of the participants was principal on a grant to develop climate change curriculum. The only country not represented on the CMM team was Laos, and this absence was evident in the country's university action plan: there was no plan to incorporate CMM into the existing curriculum despite the presence of forestry.

Recommendations for Next Steps of Regional Climate Change Curriculum Development Program

Review and Completion of Module Materials
LEAF and USFS contributors acknowledged that the curricula would never be "finished," since the curricula will continue to be modified and improved over time. Still, each module requires additional work before they are sufficiently complete for public distribution and use, though many professors already expressed their plans to begin using some of the materials in their courses. The required level of effort to complete these modules is relatively small compared to the effort that has already been invested.

The module completion plans indicate the remaining gaps for each module (Appendix E), as evaluated by the module teams. In addition to what is described in the plans, a technical and editorial review should be conducted for each module to ensure accuracy, standard formatting, and appropriate attribution. The modules should also be reviewed for their inclusion of the gender consideration.

All images and text should be checked for any additional need for permissions, or copyright restrictions. Substitutes should be provided for any copyrighted material for which permission cannot be secured.

Translation
The module materials require translation into the LEAF country languages before they can be taught in most of the participating universities. However, it might be prohibitively expensive for LEAF to contract translation services for all the developed materials, and some professors at the workshop thought they could take care of translations themselves. LEAF should confirm translation needs and encourage the workshop participants to request translation for priority materials.

Delivery Mechanism for Modules
Once the materials are finalized, a formal "gateway" for accessing and downloading the curriculum materials needs to be established. This gateway would not limit access to materials, but would require a simple login and authentication so as to both add to the perceived credibility of the teaching materials and provide a better means for tracking and requesting feedback on material usage among universities. This gateway should include a place for comments, a tracking mechanism to inform users of material updates, and could serve as an organization node for a regional network.

In addition, introductory videos about the LEAF's Regional Climate Change Curriculum Development Process and Content/Materials could be created, so as to provide a brief and straightforward introduction and invitation to use, enhance, and apply the content. Introductory videos for each of the four modules could also be created that provide users with a quick overview of course content and potential application.

Training of Trainers Courses

Asian university participants communicated a need for a content-based TOT course that would aim to provide university lecturers with the foundational knowledge of climate change topics necessary to teach the modules. Junior lecturers reported that they are often required to teach courses in which they do not have a strong background. Although the module materials include session outlines and instructor notes, the participants acknowledged that they would need further support to comfortably teach materials that were outside their expertise. LEAF should consider designing and implementing a TOT course (or series of courses) on teaching the four modules.

In addition to content-based TOT courses, LEAF could also consider methods-based TOT courses that would focus on the active learning strategies discussed in the first part of this workshop. Many workshop participants believed that the discussions and exercises on these topics were very valuable and benefited the module material development. Still, the module development plans indicate that more active learning material is needed for each module. The methods-based TOT could aid the improvement of the module materials while assisting the university lecturers in their professional development.

Pilot Short Courses

Once the modules are completed and module team members are proficient, LEAF should consider coordinating or supporting pilot short-courses of the modules in various LEAF countries. The pilot courses would be taught by the regional module teams and potentially U.S. co-leads. Non-university private and public entities could also be engaged in the implantation of these shout course. The courses would be an opportunity for professors to learn more about the topical area, test the developed material, and to practice teaching the curricula. The audience and format of the short courses would be determined by the host site's needs.

Regional Fora for Teaching Climate Change

For continued capacity-building, LEAF could support and develop informal and formal networks. Formal networks might include catalyzing MOUs with universities and holding regular in-person meetings to share feedback and improve content for future application. Informal networks might include an improved website, wiki, and/or social-media component for current and future LEAF Curriculum Development participants and other interested university collaborators.

Development of Additional and Related Resources

Incorporation of Additional Case Studies/Field Experiences

Several teams mentioned that their materials could be strengthened by incorporating and/or developing local case studies and field experiences in to their module materials. For example, in the CMM and SES modules, materials could incorporate more lessons from the field experiences of local REDD+ projects, such as how projects are measuring carbon and addressing safeguard issues, and the challenges and lessons learned that these projects are experiencing in their implementation. In the case of land use planning, given the success of the land use planning case study in Vietnam, additional case studies could be developed in other Mekong countries, localizing the LUPCC materials even more.

Climate Change Glossary Translation

A validated glossary of accepted terminology in various languages is needed to communicate globally about climate change. The specialized terms used in climate change fields can be easily mis-translated, unless the translator is highly knowledgeable in the subject areas, and fluent in both languages.

A Climate Change Glossary has been prepared in English for the USFS Climate Change Resource Center, in coordination with the LEAF's Regional Climate Change Curriculum Development Effort. The Glossary

includes internationally used climate change terms, the definitions of the terms, and the source of the terms and their definitions, as well as a glossary of acronyms associated with the terms. By translating a detailed glossary of climate change and forest carbon-related topics, technical terms could be available in reviewed and reliable translations. This could be thought of as a "Rosetta Stone" that allows inexpensive commodity translation for any climate change-related body of work.

Appendix A – Workshop Agenda and RECCCD Overview

A.1 – Workshop Agenda

**LEAF Training Workshop on
Regional Climate Change Curriculum Development
Bangkok, 5 – 16 August 2013**

BACKGROUND

The Lowering Emissions in Asia's Forests (LEAF) program goal is to strengthen the capacity of targeted countries to achieve meaningful and sustained reductions in greenhouse gas emissions from the forestry-land use sector, and allow these countries to benefit from the emerging international REDD+ framework. One of LEAF's objectives is to build and institutionalize technical capacity for economic valuation of forest ecosystem services and monitoring changes in forest carbon stocks at the project and national levels. In order to meet this objective, LEAF is working with universities in the region on developing curriculum in REDD+ and related climate change fields. The US Forest Service (USFS) works with LEAF to provide strategic technical support by engaging a team of US forestry education specialists and academics to work with Asian universities on developing climate change curricula for degree programs and non-degree training courses.

In October 2012, LEAF and USFS initiated the Climate Change Curriculum Development Program with eight universities in Low Mekong region including Thailand, Cambodia, Laos, Vietnam and LEAF plans to engage more universities from Malaysia and Papua New Guinea (PNG). Through this curriculum development program, teams of US and Asian academics are collaboratively developing university course modules on or related to the topics of sustainable forest management and climate change mitigation. These modules serve to create new curricula related to forestry and climate change or incorporate climate change topics into existing university curricula. The following four detailed modules are developed:

- Module 1: Basic Climate Change (BCC)
- Module 2: Social and Environmental Soundness (SES)
- Module 3: Land Use Planning and Climate Change (LUPCC)
- Module 4: Carbon Measurement and Monitoring (CMM)

Module team members have gathered relevant materials and shared among the module teams via common working platforms (Google Drive, Google Site, Dropbox, LEAF website, Email, Skype Conferences). Necessary teaching materials have been elaborated and still need to be further developed and revised. Trainings on interactive teaching methods will be conducted for optimal use of the developed curriculum and materials. The training workshop in August will bring together academics from American and Asian Universities who have been involved in developing and implementing forestry and sustainable natural resource management curricula. This workshop aims to test and revise the developed LEAF climate change curriculum and teaching materials and to plan for the next steps in the curriculum development (CD) cycle.

WORKSHOP OBJECTIVES

The curriculum development training workshop is designed to achieve the following objectives:
- Test the developed materials of the climate change curriculum among the involved universities;
- Review and revise curriculum based on test results for practical application to the real target groups;
- Develop regional strategies and action plans on how to introduce LEAF climate change curriculum or incorporate the new curriculum covering different aspects of climate change topics into existing curricula and the forestry and NRM training programs;
- Identify better mechanisms and platforms for stronger and closer collaboration among the universities from the region as well as from the US;
- Plan for the next steps in the curriculum development cycle.

Training Workshop Information

Venue:	The training workshop will be held at Marriott Courtyard, 155/1 Soi Mahadlekluang 1, Rajdamri Road, 10330 Bangkok, Thailand. Further look at http://www.marriott.com
Time allocation:	The training workshop starts at 9:00 and ends at 17:30 daily. The very first day starts at 8:30 for participant registration. Coffee breaks will be between 10:30-10:50 in the morning and 15:00-15:20 in the afternoon. One hour is reserved for lunch. We however keep the agenda flexible depending on the daily work progress.
Methods:	The training will utilize a wide variety of learning strategies, methods and techniques. Module members are encouraged to seek solution to training problems that they have encountered and to experiment new ways of teaching.
	Teaching demonstration. Each module member will have at least one opportunity for teaching demonstration based on his/her training session design for about *1 teaching hour (45 minutes)*, including class exercise. Module members are encouraged to contact other members to initiate *co-teaching* session*.* An assignment memo will be sent to each member for their prior preparation to the training workshop. Additional time will be allocated at the training workshop for preparing teaching demonstration.
	Participatory approach. During the training workshop, participatory approach including *plenary discussions* and *series of group work* will be applied to stimulate interaction and exchange among module team members.
	Reflective Journal. Time is reserved at the end of each day for reflective journal. A reflective journal helps participants to self-reflect the training activities and progress in a critical and analytical way and adjust the agenda accordingly.
Materials & facilities:	LCD projector, printer, flipcharts, pin-boards, color cards, color markers,... will be provided at the training workshop. Additional materials and teaching aids can be provided according to participants' request. Participants will bring their own laptops.
Participants:	- Professors and academics from LEAF universities (Thailand, Vietnam, Laos, Cambodia, Malaysia, PNG) and academics from US universities who have been engaged in LEAF CD process - LEAF staff from regional office in Bangkok and LEAF country managers/coordinators
Flight and hotel booking:	LEAF regional office in Bangkok will purchase flight tickets for participants. Those participants that purchase flight tickets on their own will get reimbursed from LEAF office in Bangkok, but LEAF office will have to approve the flight itinerary prior to the purchase. Contact: Ms. Chutamas Phanyapornsuk, Logistics & Operations Specialist Winrock International, Liberty Square, 20th Floor, Suite 2002, 287 Silom Road, Bangkok 10500, Thailand Tel: + 66 (0) 2 6311259 Mobile: + 66 (0) 89 206 1975 E-mail: chutamas@leafasia.org Skype: chutamas2013
Accommodation:	Participants from outside Bangkok and from abroad will stay at Marriott Courtyard. Check-in date is August 4 and check-out date is August 17. Those participants who want come earlier than August 4 and stay longer than August 17 will cover their own expenses.
Per-diem:	Per-diem will be provided to participants from outside Bangkok and from abroad during the period of the training workshop.
Responsibility:	Ms. Phuong Chi Pham (Ms. Chi), Adult Learning and Capacity Building Specialist Winrock International, Liberty Square, 20th Floor, Suite 2002, 287 Silom Road, Bangrak, Bangkok 10500, Thailand Tel: +66 (0)2 631 1259 Mobile: +66 (0)8 70 75 79 74 E-mail: chipham@leafasia.org Skype: pham.phuongchi Mrs. Karen Vandecar, Asia-Pacific Program, US Forest Service – International Programs Email: klv5p@virginia.edu Skype: wingerkv

AGENDA

LEAF Climate Change Curriculum Development Training Workshop
Bangkok – Thailand, 05-16 August 2013

WEEK 1		MON 05.08	TUE 06.08	WED 07.08	THU 08.08	FRI 09.08
9:00 10:30	1	Introduction Objectives and Agenda USAID Opening speech Overview of LEAF Program Introduction to USFS CD Overview &Training Scenario Expectations & Ground Rules *Plenary*	Training Session Design: - Team Preparation - Team Presentation Learning Domains: - Team Preparation - Team Presentation *Team work* *Plenary*	Preparation for teaching demo: - Lesson design - Class assignment *Individual work* *Team work*	*Team Breakout – 4 different rooms for Teaching Demo* Teaching demo 1 Team feedback *Team work*	*Team Breakout – 4 different rooms for Teaching Demo* Teaching demo 5 Team feedback *Team work*
10:30 10:50		Coffee break	Coffee break	Coffee break	Coffee break	Coffee break
10:50 12:20	2	Module team preparation *Team work* Module presentations: M1 BCC - Q&A M2 SES - Q&A M3 LUP&CC - Q&A M4 CMM - Q&A *Plenary*	Effective Teaching: - Team Preparation - Team Presentation *Team work* *Plenary*	Preparation for teaching demo: - Lesson design - Class assignment *Individual work* *Team work*	Teaching demo 2 Team feedback *Individual work* *Team work*	Teaching demo 6 Team feedback *Individual work* *Team work*
12:30 13:30		Lunch	Lunch	Lunch	Lunch	Lunch
13:30 15:00	3	Introduction to online resources *Plenary* Systems View of Training Quality: - Team Preparation - Team Presentation *Team work* *Plenary*	Review of materials *Individual work* *Team work*	Preparation for teaching demo: - Lesson design - Class assignment *Individual work* *Team work*	Teaching demo 3 Team feedback *Individual work* *Team work*	*4 module teams getting back together in the big room* Sharing/Debriefing across modules *Plenary*
15:00 15:20		Coffee break	Coffee break	Coffee break	Coffee break	Coffee break
15:20 16:50	4	Adult Learning Strategies: - Team Preparation - Team Presentation *Team work* *Plenary*	Review of materials *Individual work* *Team work*	Preparation for teaching demo: - Lesson design - Class assignment *Individual work* *Team work*	Teaching demo 4 Team feedback *Individual work* *Team work*	Preparing for week 2 *Individual work* *Team work*
17:00 17:30		Reflective Journal				Weekly evaluation

AGENDA

LEAF Climate Change Curriculum Development Training Workshop
Bangkok – Thailand, 05-16 August 2013

WEEK 2		MON 12.08	TUE 13.08	WED 14.08	THU 15.08	FRI 16.08
9:00 10:30	1	*Team Breakout – 4 different rooms for Materials Development* Teaching demo 7 Team feedback *Individual work Team work*	Sharing/debriefing across modules *Plenary*	*4 module teams breaking up in 4 different rooms for micro teaching* Further materials development - Indiv. Preparation - Sharing in team *Individual work Team work*	Team Preparation: - Revise syllabus: Objectives n Content - Progress of materials development - Volunteering of uncovered topics - Module action plan *Team work*	University Presentation on CD Strategies and Action Plans *Plenary*
10:30 10:50		Coffee break	Coffee break	Coffee break	Coffee break	Coffee break
10:50 12:20	2	Teaching demo 8 Team feedback *Individual work Team work*	*Team Breakout – 4 different rooms for Materials Development* Revising materials - Indiv. Preparation - Sharing in team *Individual work Team work*	Further materials development - Indiv. Preparation - Sharing in team *Individual work Team work*	BCC Module Presentation: - Finalized syllabus - Progress - Action plan SES Module Presentation: - Finalized syllabus - Progress - Action plan *Plenary*	University Presentation on CD Strategies and Action Plans (cont.) *Plenary*
12:30 13:30		Lunch	Lunch	Lunch	Lunch	Lunch
13:30 15:00	3	Teaching demo 9 Team feedback *Individual work Team work*	Revising materials - Indiv. Preparation - Sharing in team *Individual work Team work*	Further materials development - Indiv. Preparation - Sharing in team *Individual work Team work*	LUPCC Module Presentation: - Finalized syllabus - Progress - Action plan CMM Module Presentation: - Finalized syllabus - Progress - Action plan *Plenary*	Focus Group Discussion with evaluation team *Plenary*
15:00 15:20		Coffee break	Coffee break	Coffee break	Coffee break	Coffee break
15:20 16:50	4	Teaching demo 10 Team feedback *Individual work Team work*	Revising materials - Indiv. Preparation - Sharing in team *Individual work Team work*	Further materials development (cont.) *Individual work Team work*	University preparation for CD Strategies and Action Plans : what, when, how, who, how long *Uni/Country team*	Planning for next steps in the CD cycle *Plenary*
17:00 17:30		Reflective Journal				Final Evaluation Closing

9-Stage Process in the
LEAF's Regional Climate Change Curriculum Development

TNA & Target Group Identification

Evaluating & Refining RECCCD

Module Outline Development

Phase 1

Applying/Adapting RECCCD

Detailed RECCCD & Materials Development

Phase 2

TOT Courses: Teaching Methods & Technical Contents

Internal Module Testing & Materials Review

Phase 3

Next Step

Technical Review & Materials Editing

Incorporating RECCCD into existing curricula

We are here!

USAID | ASIA
FROM THE AMERICAN PEOPLE

leaf LOWERING EMISSIONS IN ASIA'S FORESTS
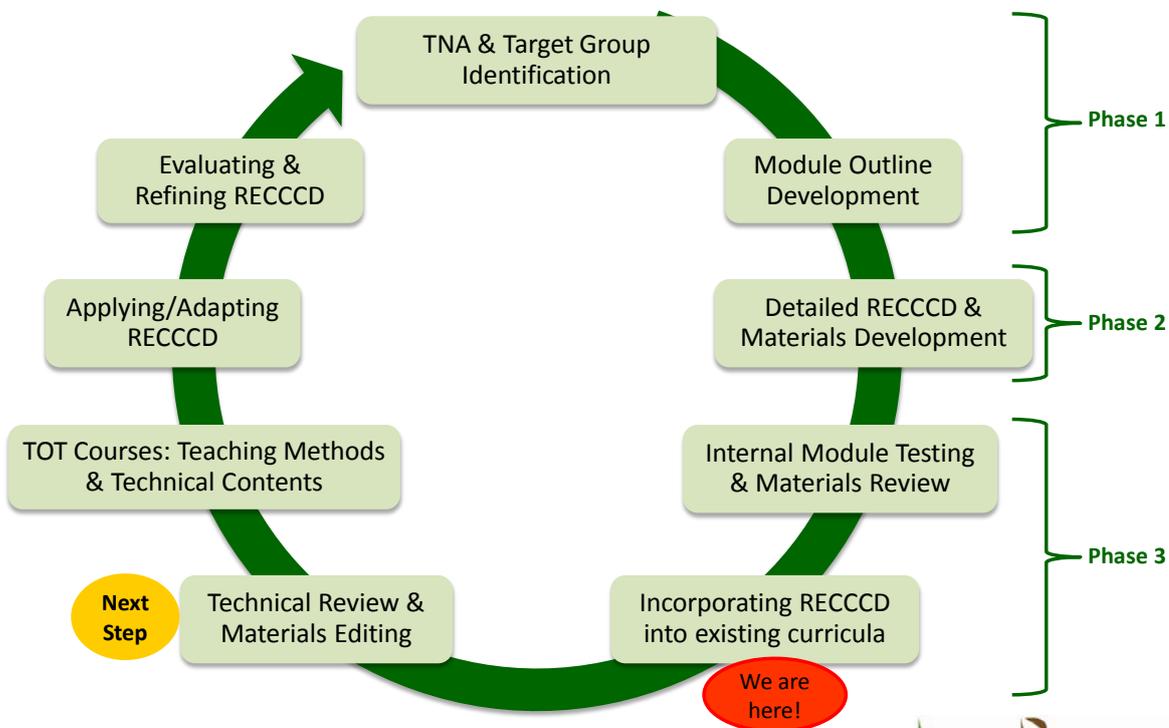
9-Stage Process in the
Regional Climate Change Curriculum Development

	Stage	Aims
1	**Training Needs Assessment (TNA) &Target Group Identification**	• Identify political forces, main reasons for, and purpose of Regional Climate Change Curriculum Development (RECCCD) with different stakeholders (Scoping Trip) • Identify opportunities and challenges and training needs • Prioritize key climate change areas and training needs • Identify key range of Knowledge, Skills and Attitudes (KSA) and target groups for RECCCD • Outline main steps for action
2	**Module Outline Development**	*Module outline development:* • Review existing curriculum based on TNA • Identify major module topics to be developed • Prioritize the most relevant modules for RECCCD • Develop curriculum aims, learning outcomes, main content areas *Forming module teams:* • Form the module teams from the participating universities • Nominate the co-leads for each module team • Identify responsibility by sections by module teams
3	**Detailed RECCCD & Materials Development**	*Communication strategies:* • Set up communication scheme: email system and teleconference meetings, Skype calls among/across the module teams • Create online resources (Google Drive, Google Site, Dropbox) to share among/across the module teams *Gathering resources:* • Gather available and filter these resources whether they are 'must know' or 'nice to know' • Post existing materials on archives on GDrive *Developing materials:* • Review key KSA, relevant tasks and competency • Develop specific learning objectives and learning methods • Develop/write the relevant content for module sections/sub-sections to meet identified learning objectives *Sharing ideas and materials* • Setting up teleconference calls for topical discussions and materials sharing among /across module teams • Maintain regular email exchanges among/across module teams

4	**Internal Module Testing & Materials Review**	• Apply adult learning strategies and reverse planning techniques in curriculum development • Run internal module testing of RECCCD among participating universities and peer review of detailed content • Revisit the module syllabus: review relevant KSA, revise learning objectives, detailed content, lesson plans, class exercises, role plays, case studies • Identify the gaps on materials development and required resources for completion • Develop strategies by participating universities on how to incorporate RECCCD into existing curricula
5	**Incorporating RECCCD into existing curricula**	• Develop immediate action plans to incorporate RECCCD into existing curricula by participating universities • Try out materials of RECCCD in class by participating universities • Develop feedback mechanism on experimental results
6	**Technical Review and Materials Editing**	• Form the technical experts team • Technical review of RECCCD materials by experts • Format and edit the packages of RECCCD materials
7	**TOT Courses: Teaching Methods & Technical Contents**	• Develop capacity building program for professors/trainers on RECCCD in the region • Develop TOT training packages: Learner-centered Teaching Methods (LeTeachMe) and technical contents of RECCCD • Conduct regional TOT courses for participating universities • Apply RECCCD for the degree program
8	**Applying/Adapting RECCCD**	• Apply and adapt RECCCD by to participating universities for different target groups, degree and non-degree programs • Develop evaluation instruments and feedback mechanism on the application of LeTeachMe and the whole RECCCD • Provide coaching/mentoring on RECCCD application/adaptation by participating universities • Organize regional workshops on experience sharing on RECCCD application/adaptation • Create networking of RECCCD for scaling up

9	**Evaluating and Refining RECCCD**	• Review the RECCCD process and products:
		  - Stakeholder participation
		  - RECCCD process and content
		  - Student/Learner performance
		  - Impact of training
		• Refine Monitoring and Evaluation system
		• Maintain RECCCD and provide support as necessary
		
		Teaching > **Learning** > **PERFORMING**

Appendix B – Module Summaries

B.1 – BCC Module Summary
Return to Text

BCC is the one of the four modules of the LEAF's Regional Climate Change Curriculum (RECCC) for the universities and training institutions in the Mekong and Asia-Pacific regions. The process of RECCCD is technically supported by the US Forest Service and the LEAF Asia program funded by the USAID.

The Basic Climate Change syllabus is designed as a "survey course" in climate change, presenting and reviewing a wide range of climate change topics, including causes, effects, and responses, with an emphasis on issues, impacts, and solutions relevant to the region.

This module is designed for flexible application: It may be used and adapted to a variety of teaching contexts, including full semester university courses as well as shorter courses for natural resources professionals and other adult learners. Course materials were prepared with this flexibility firmly in mind. As such the module is not prescriptive, but rather works as a "menu planner" from which particular course implementations may be readily constructed.

The module is elaborated in English will be translated into the national language of the respective countries in LEAF Asia. The module can be tailored to both degree and non-degree programs; as well as for trainings for natural resources professionals and policy-makers. Important training topics can be selected as short course trainings for practitioners and leaders working on climate change.

The module examines a wide variety of topics, so that learners completing the course have a broad knowledge and appreciation for the causes, effects, and solutions to the vulnerabilities, risks, and problems posed by a rapidly warming climate.

Several exercises in active learning were conducted at the start of the workshop. There was broad agreement in the BCC team, and in the other modules teams, that an emphasis on active learning was appropriate and that we would incorporate this in all of the learning materials. Some additional active learning exercises were drafted but more remains to be done to achieve the vision of a curriculum rich in active learning exercises.

By the end of the course, learners will be able to:
- Understand and be able to explain the components, drivers, and interactions of climate, globally and in LEAF countries.
- Understand and be able to explain the causes and effects of climate change, the relationship between human activities and climate; with emphasis on forest ecosystems and conservation.
- Assess the impact of human activities of climate change on ecosystem services and human socio-economic systems.
- Propose effective and practical responses and solutions to climate change issues.
- Collect, interpret and present information and current knowledge on climate change.
- Communicate about strategies to confront and adapt to climate change to a variety of audiences.

The Social and Environmental Soundness (SES) module is oriented towards introducing learners to the social, environmental, and economic issues that arise, or should be considered, in the course of designing, implementing, and evaluating conservation or natural resource management programs and projects. As such the course materials are a broad survey of wide variety of topics, some critical ones of which are delved into at greater depth. REDD+ runs through the module as the context in which these issues are grounded and as a set of programs and projects of particular interest. However, much of the module teaching material can be easily adapted to other policy contexts, including climate change adaptation and conservation/resource management.

The module consists of three parts, with each part consisting of multiple sections. Parts one and three place particular emphasis on the REDD+ program and project context. Part one introduces the REDD+ framework and the concepts of environmental and social soundness, after first having contextualized them in terms of climate change, climate change mitigation, and climate justice. In addition, part one introduces two other frameworks that instructors and learners can use in order to frame and interpret the later course material: sustainable development and environmental ethics. Part two delves into a series of topics to provide learners with a range of knowledge, including concepts/ theories and tools, that can assist them in both understanding and addressing the social, environmental, and economic issues of conservation projects. Significant REDD+ safeguard detail is covered in part three in order to allow learners to apply and synthesize the concepts learned earlier in the course.

The module materials have been designed with active learning in mind, in order to engage learners and achieve the module's learning objectives. Currently, the module learning objectives are as follows:

By the end of the course, learners will be able to:
• Interpret social and environmental "soundness" and explain how it fits into larger contexts of climate change, climate change mitigation, and climate justice debates.
• Analyze conceptual and theoretical frameworks that underlie social and environmental soundness.
• Describe, explain the purpose, and apply a variety of relevant tools for addressing soundness.
• Appraise how gender issues relate to REDD+ and cut across various other concepts.
• Explain how safeguard mechanisms and approaches are being used in practice.
• Evaluate social, environmental, and economic costs and benefits, risks and opportunities associated with REDD+ and with other PES or conservation programs and projects.
• Synthesize a range of social, economic, and environmental considerations for application in REDD+ projects and safeguard mechanisms and assess real-world REDD+ and safeguard design and implementation.

Materials have also been designed to cross all three learning domains: knowledge, skills, and attitudes. In the knowledge domain, the materials cover key information, concepts, and conceptual/theoretical frameworks with accompanying student activities to solidify understanding and application. In the skills domain, the knowledge and accompanying learner

tasks are framed to foment and encourage the development of critical thinking and analytic skills. Additional skill development emphasized includes communication through written and oral means and collaborative teamwork. Finally, a number of specific tools relevant to the topics are introduced, with information on both purpose and application. The materials address the attitude domain particularly through beliefs and values, with the emphasis on critical thinking asking learners to question their own potential assumptions.

All materials are consolidated into a series of slide decks. These slide decks include a structure for class delivery, including active learning activities. Decks also include more specific learning objectives and a short topical list of references. Some slide decks have accompanying files for classroom handouts. The following section outlines the structure of the course and notes the associated slide decks. Sessions refer to 45-minute blocks of instruction, including time for "in-class" activities, exercises, and discussions. Slide decks vary in terms of how many sessions they cover. When a single topic requires multiple sessions for delivery and the flow of materials suggests a logic of keeping the materials together, a slide deck covers multiple sessions. In only one case is a topic broken into two different slide decks (topic 1.4: one deck is a single session to introduce the concepts of social and environmental soundness, while another deck introduces the historical policy context of social and environmental safeguards more specifically).

The Land Use Planning and Climate Change (LUPCC) module was designed to introduce learners (both academic and technical) to an adaptive management land use planning framework geared to deal with climate change. The course was designed based on abstraction of many US agencies and INGO's land use planning cycles that a core team thought was applicable for a South East Asian Regional effort. The curriculum development itself is a combination of several complementary USFS IP programs including the Vietnam Land Use Planning Case Study, The Land Use Planning Guidelines Project, and the Land Use Planning Curriculum Development effort. The Case Study provided a real world example of how practical it would be to implement an adaptive land use planning cycle at multiple levels within the Vietnam resource management structure. It also was a great opportunity to work with local team members to develop an approach on how to make the framework locally specific. The Guideline Project provided the general Adaptive Management Land Use Planning Framework along with the reasoning for each section and a description on the interconnections between sections. The Curriculum Development effort allowed us to integrate climate change as a major stressor both in the Case Study and the Guideline Project. The cumulative materials have been all merged into one set on information products with the hope that it becomes a living document to be used by our collaborators in their regional learning network.

The teaching material was created in a general fashion with regional examples so that it can be easily adapted to a local setting. The material has been designed to cross all three learning domains: knowledge, skills, and attitudes. In the knowledge domain, the materials cover key information, concepts, and conceptual/theoretical frameworks with accompanying student activities to solidify understanding and application. In the skills domain, the knowledge and accompanying learner tasks are framed to foment and encourage the development of critical thinking and analytic skills. Additional skill development emphasized includes communication through written and oral means and collaborative teamwork. Finally, a number of specific tools relevant to the topics are introduced, with information on both purpose and application. The materials address the attitude domain particularly through beliefs and values, with the emphasis on critical thinking asking learners to question their own potential assumptions. There are five sections of teaching materials within the module that can each be expanded or minimized based on the learner's interest, backgrounds, and needs. Below is a brief description of each section in the module:

1: **Institutional Framework***:* This section describes what is needed to create an enabling environment for a successful Land Use Planning Effort. Through this section, the learners understand the land use planning context, including: The political and regulatory frameworks that influence the land use planning; Stakeholders, their roles, responsibilities and participation. Land use planning should be the participatory making-decision; and an understanding of how to set Goals and achieve objectives within the LUP process.

2: Assessment of Current Conditions: This section teaches learners how to identify drivers of change that have the largest impacts on land use /land cover and can be influenced by management or policy actions. In the module learners understanding how to develop information products that quantify historic trends and current conditions based on those drivers of change. Learners also learn how to identify gap in knowledge necessary for a successful land use planning effort.

3: Analysis of Options: This section teaches learners how to deal with the uncertainty of climate change when dealing with land use planning scenario development. Learners will understand and apply the concept of modeling an environment including climate change. Learners will develop a baseline assessment with the BAU scenario environment including climate change. They will also learn how to identify a series of future potential scenario and analyze their impacts (socio-economic, environmental).

4: Negotiate and Prioritize an Implementation Plan: This section exposes learners to the elements necessary to negotiate a successful land use planning program. Learners will be exposed to a variety of methods to identify ad engage with stakeholder and learn about how their priorities differ. Learners will also be exposed to the practical application of a plan such as identification, prioritization, and sequencing of activities and their implementation needs.

5: Monitoring and Evaluation: This section exposes learners to the concept of and practical application of adaptive management. Learners will learn what is necessary in establishing a monitoring and evaluation framework, what to measure, and the importance of reporting and modifying the land use plan. Learners will also learn why this process is more important with a changing climate.

The module materials have been designed with active learning in mind, in order to engage learners and achieve the module's learning objectives. Currently, the module learning objectives are as follows:

By the end of the course, learners will be able to:

- Develop an adaptive management framework for land use planning under uncertain climate patterns and policy regimes
- Develop approaches for quantifying drivers of historic land use patterns in a changing climate
- Develop scenario planning and cost-benefit analysis that takes into consideration Climate adaptation and mitigation strategies (environmental, social and economic)
- Describe a process that leads to a negotiated agreement.
- Construct a Monitoring and Evaluation framework for land use planning that is tailored to a changing climate
- Integrate information from multiple disciplines

The Carbon Measurement and Monitoring (CMM) module is built around five themes: i) linking forest and terrestrial carbon with global climate change, ii) defining carbon stocks, drivers of change and approaches to measurement, iii) designing systems to monitor carbon stocks and emissions, iv) theoretical and practical constraints on measuring forest carbon, and v) integrating methods to estimate emissions on a national scale. The module starts by outlining the environmental, social and political basis for incorporating forest carbon into global climate mitigation strategies. This section links well with the BCC module. REDD+ is introduced in this section, and because REDD+ is fundamentally dependent on land use planning, this section also links with LUP-CC. In the UN negotiations, REDD+ has become a catalyst for dealing with issues of co-benefits and unintended circumstances—both for the environment and for local communities. Thus, this introduction touches on themes from the SES module.

In the second section, learners explore and analyze variation in terrestrial carbon pools as a function of natural and human drivers with a specific focus on forests. Critical links are made between carbon stocks and the land use maps that define them and the development of emission factors, activity data, and reference levels, primary components of the IPCC approach. This section is linked to the LUP-CC module, and would benefit from specific references to those materials.

The third section steps back to address how to monitor forest carbon depending on goals, drivers of emissions, and constraints imposed by resources and human capacity. There may be some potential linkages to LUP-CC here as well.

The fourth section is rich blend of theory and application, with many hands-on activities in the lab and/or in the field to illustrate the principles of rigorous forest carbon measurement. From sampling design and statistics to field measurements, scaling factors and calculations, learners engage with all aspects of forest carbon data generation. Although not yet complete, the data management section will include the topic of community forest monitoring, which could be linked with either LUP-CC or SES through the concept of stakeholder engagement.

The last section integrates information from the discussions of monitoring and measurement in the previous three sections. Learners discover how to scale up emissions from specific drivers of forest change into a national assessment of emissions from land use, land use change and forestry. Because this topic is dealt with in a case study (Cambodia), it would be possible to link with SES here as well.

The module is designed to enhance learning by encouraging a learner-centered experience. In addition to the theory surrounding the connection between forests and climate, the conceptual framework of forest monitoring design, and key concepts in forest carbon measurement (critical knowledge), the module will develop essential skills and attitudes for success in the course, on the job market and in the world. In particular, the module emphasizes analytical and critical thinking, research and study, cooperation, communication, problem solving and practical skills in the field and the laboratory. At the end of the course, learners should feel an increase in confidence, accomplishment, enthusiasm, integrity, open-mindedness, commitment, and self-direction.

The module is designed for flexibility and may be implemented at the undergraduate or graduate level. While it would best serve an advanced undergraduate (or graduate student) who has had some related courses in forest ecology, climate change science, statistics or geographic information systems (GIS), the module has no prerequisites and is designed to stand alone. In its entirety, the module could be taught as a course that would cover an entire semester, with options for two credits (30 hours) or three credits (45 hours). In addition, the complete module can be taught in an intensive short course of 10 days. Abbreviated versions of the module (3 day or 5 day) could also be offered to fulfill specific training goals.

The CMM module stands alone as an excellent introduction to the socio-economic, political, and environmental importance of forest carbon in mitigating climate change. The focus of this module, however, is to explore the science underpinning variation in forest carbon stocks, change, measurement and monitoring. Ideally, learners would encounter this material in the broader context of the other three modules related to forest-based climate mitigation: Basic Climate Change, Land Use Planning, and Social and Environmental Soundness.

At the end of the course module, learners will be able to:

- Identify the roles of forests in climate change and that of international efforts to mitigate climate change
- Explain forest carbon stocks, the geographic and climatic constraints on forest carbon, and the drivers of change in forest carbon
- Apply the theoretical issues of and practical methods for measuring and monitoring forest carbon, including statistical approaches, sampling design, and operational protocols.
- Integrate map and field-based measures to generate forest carbon stocks and emissions at plot to national scales using an IPCC framework

Appendix C – Module Team Rosters

C.1 – BCC Module Team
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C.2 – SES Module Team

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C.3 – LUPCC Module Team
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C.4 – CMM Module Team
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Appendix D – RECCCD Information

D.1 – BCC Syllabus
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Module Information

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Module	**Basic Climate Change (BCC)**
Rationale	To provide learners/students necessary KSA (Knowledge, Skills and Attitude) on the broad topic of climate change, covering causes and effects, mitigation and adaptation, application of tools and technology and communications regarding climate change.
Structure	BCC is the one of the four modules of the Regional Climate Change Training Curriculum for the universities and training institutions in South East Asia and the Pacific.
	The process of Curriculum Development is technically supported by the US Forest Service and the LEAF Program funded by USAID.
	This is a "survey course" in climate change, that presents and reviews a wide range of climate change topics, including causes, effects, and responses.
	The module is elaborated in English and will be translated into the national language of the LEAF participating countries.
	The module can be tailored to both degree and non-degree programs; as well as for trainings for natural resources professionals and policy-makers. Important training topics can be selected as short course trainings for practitioners and leaders working on climate change.
Target groups	Undergraduate and postgraduate students
	NGO practitioners and natural resources professionals
	Governmental managers, planners, policy makers at different levels
Prerequisite	Consent of the teachers/trainers/professors/academic department.
Learning Outcomes	At the completion of the module, learners/students will be able to: • Explain the causes and effects of climate change • Explain the relationship between human activities and climate change: causes and effects. • Assess the impact of human activities of climate change on ecosystem services, humans, and other values • Propose effective and practical solutions to climate change issues. • Collect, interpret and present information on climate change. • Communicate about strategies to confront climate change to a variety of audiences, including other students and the local community.
Methodology	In class, computer lab, field visits, field work in forests.
Certification	Respective university will award a certificate/degree to those learners/students who successfully complete the module.

Module Content
Module 1: Basic Climate Change (BCC)

The following section contains the specific content of the curricula organized according to the following format:

Knowledge, Skill or Concept: What is to be done or learned.

Expected performance: A written statement describing what the learners/students will be able to do at the end of each training session.

TOPICS	EXPECTED PERFORMANCE	CREDIT HOURS
I. CAUSES OF CLIMATE CHANGE		
Basic Climate Science - Introduction to Climate Change Causes of Climate Change Atmospheric Structure The Greenhouse Effect Climate Intensification Climate Modeling	• Explain the basic physics of the Earth's climate system. • Explain why and how global climate is changing, and the source and fate of the primary drivers of anthropogenic climate change • Explain the basis for projections of climate intensification (larger floods, droughts, windstorms). Understand the main implications. • Use primary literature to stay informed and current in fast-paced field of climate change science. • Improve skills in oral and written communication related to climate change.	The Training Unit is responsible for defining the way in which the credit hours are calculated for the Degree and/or Non-Degree program
II. EFFECTS OF CLIMATE CHANGE		
Climate Change and Sea Level Rise Climate Change and Water: Effects Climate Change and Food Security Effects of Climate Change on Human Health Climate Impact Modeling for Vegetation and Wildlife	• Explain how climate change is affecting human societies and land use in urban and wildland settings. • Explain basic mechanisms of impacts to human and ecological systems • Describe current trends and future predictions with respect to climate change and its impacts. • Use primary literature to stay informed and current in fast-paced field of climate change science. • Employ your skills in critical thinking. • Employ improved skills in oral and written communication.	

III. RESPONSES TO CLIMATE CHANGE

Climate Change and Forests: Mitigation and Adaptation	• Give detailed suggestions for adapting to climate change.
Approaches to Dealing with Uncertainty in Land Management	• Give detailed recommendations for managing landscapes to mitigate climate change by sequestering carbon. Also see Module CMM
Introduction to Ecosystem Services	• Use primary literature to stay informed and current in fast-paced field of climate change science.
Principles and Practice of Climate Vulnerability Assessment	• Employ your skills in critical thinking.
	• Employ improved skills in oral and written communication.
Communications and Engagement	

IV. TOOLS AND TECHNOLOGY

Tools Videos Literature Exercises	• Apply practical tools, instruments, methods related to climate change issues.

Module Information

Module	**Social and Environmental Soundness (SES)**
Purpose/Goal	To provide learners/students necessary KSA (Knowledge, Skills and Attitude) on social and environmental issues potentially associated with REDD+ projects and the safeguard tools for assessing these issues.
Structure	SES is the one of the four modules of the Regional Climate Change Training Curriculum for the universities and training institutions in South East Asia and the Pacific.
	The process of Curriculum Development is technically supported by the US Forest Service and the LEAF Program funded by USAID.
	SES module is elaborated in English and will be translated into the national language of the LEAF participating countries.
	BCC module is elaborated in English and will be translated into the national language of the LEAF participating countries.
	The module can be tailored to both degree and non-degree programs; as well as for trainings for natural resources professionals and policy-makers. Important training topics can be selected as short course trainings for practitioners and leaders working on climate change.
Target groups	Undergraduate and postgraduate students
	NGO practitioners and natural resources professionals
	Governmental managers, planners, policy makers at different levels
Prerequisite	Consent of the teachers/trainers/professors/academic department
Objectives	At the end of the module, learners/students will be able to: • Interpret social and environmental "soundness" and explain how it fits into larger contexts of climate change, climate change mitigation, and climate justice debates. • Analyze conceptual and theoretical frameworks that underlie social and environmental soundness. • Describe, explain the purpose, and apply a variety of relevant tools for addressing soundness. • Appraise how gender issues relate to REDD+ and cut across various other concepts. • Explain how safeguard mechanisms and approaches are being used in practice. • Evaluate social, environmental, and economic costs and benefits, risks and opportunities associated with REDD+ and with other PES or conservation programs and projects. • Synthesize a range of social, economic, and environmental considerations for application in REDD+ projects and safeguard mechanisms and assess real-world REDD+ and safeguard design and implementation.
Methodology	In class, activities, exercises and discussions, reading, writing
Certification	Respective university will award a certificate/degree to those learners/students who successfully complete the module.

Module Content

Module 2: Social and Environmental Soundness (SES)

The following section contains the specific content of the curricula organized according to the following format:

Knowledge, Skill or Concept: What is to be done or learned.

Expected performance: A written statement describing what the learners/students will be able to do at the end of each training session.

KNOWLEDGE/SKILLS/CONCEPTS	EXPECTED PERFORMANCE	CREDIT HOURS
I. What is Social and Environmental Soundness and its Larger Climate Change Context? INTRODUCTION AND BACKGROUND		
1.1 Introduction to climate change 1.2 Climate change mitigation & adaptation context 1.3 Sustainable development and ethical frameworks 1.4 Intro to social and environmental soundness (SES)	• [waiting for the two week period for designers to finalize section learning objectives, which can then be pasted in here from the slide decks]	The Training Unit is responsible for defining the way in which the credit hours are calculated for the Degree and/or Non-Degree program
II. What Social and Environmental Issues Exist? **STRENGTHENING DESIGN & IMPLEMENTATION OF REDD+ PROJECTS**		
Environmental Soundness 2.1. Environmental benefits and co-benefits 2.1.1. Carbon monitoring and MRV *Social and Political Soundness* 2.2. Governance 2.2.1. Regulatory frameworks, forest tenure, and carbon rights 2.3. Stakeholder participation 2.3.1. FPIC 2.4. Social co-benefits 2.5. Gender equity and women's empowerment 2.5.1. Gender analysis 2.5.2. Women's Empowerment in Agriculture Index 2.6. Indigenous empowerment *Economic Soundness* 2.7. Local livelihoods 2.7.1. Integrated agrarian system analysis and ecosystem services 2.7.2. Livelihoods Impact Case Study: April Salumei, Papua New Guinea	•	

2.8. REDD+ benefit sharing

2.9. Economic/financial viability and sustainability

| III. STATE OF THE ART IN ACTION: BRINGING THE PIECES TOGETHER IN REDD+ |

3.1. REDD+ safeguard mechanisms and streamlining •

3.2. National safeguard approach options and country-specific overviews

3.3. Guest seminars: REDD+ practitioners or community leaders invited to classroom to share experience with REDD+ and SES.

3.4. Capstone Project: Class Debate "To implement or not to implement REDD+; and if so, how?"

Grading System

Each university has its own grading system and will apply its existing practice. This proposed grading system is based on the belief that knowledge, skills and attitudes are all important in becoming a good actor on climate change. Hence, the assessment criteria are:

Criteria	Grading (points)
Knowledge Necessary knowledge on SES Final exam (summative-objective)	50
Skills Completion of activities and out-of-class assignments (written assignments and debate)	40
Attitude • Attendance • Punctuality • Group participation • Quality of assistance to others • Contribution to the overall learning effort • Perceived effort • Preparation for class	10
Total	**100**

Criteria for Marks and Certificate/Degree

Percentage	Module Points Required	Marks Awarded	Performance Description	Certificate/Degree Awarded
90 - 100	90 100	**A**	Excellent	Yes
80 - 89	80 - 89	**B**	Good	Yes
70 - 79	70 - 79	**C**	Satisfactory	Yes
0 - 69	0 - 69	**D**	Unsatisfactory	Letter of attendance

Module Information

Module	**Land Use Planning and Climate Change (LUPCC)**
Rationale	To provide learners/students necessary KSA (Knowledge, Skills and Attitude) on the integration of low carbon trajectories into land use planning and appropriate decision support tools for implementation in the LEAF participating countries.
Structure	LUPCC is the one of the four modules of the Regional Climate Change Training Curriculum for the universities and training institutions in South East Asia and the Pacific.
	The process of Curriculum Development is technically supported by the US Forest Service and the LEAF Program funded by USAID.
	The module is elaborated in English and will be translated into the national language of the LEAF participating countries.
	The module can be tailored to both degree and non-degree programs; as well as for trainings for natural resources professionals and policy-makers. Important training topics can be selected as short course trainings for practitioners and leaders working on climate change.
Target groups	Undergraduate and postgraduate students
	NGO practitioners and natural resources professionals
	Governmental managers, planners, policy makers at different levels
Prerequisite	Consent of the teachers/trainers/professors/academic department
Learning Outcomes	At the end of the module, learners/students will be able to:

At the end of the module, learners/students will be able to:

- Develop an adaptive management framework for land use planning under uncertain climate patterns and policy regimes
- Develop approaches for quantifying drivers of historic land use patterns in a changing climate
- Develop scenario planning and cost-benefit analysis that takes into consideration Climate adaptation and mitigation strategies (environmental, social and economic)
- Describe a process that leads to a negotiated agreement.
- Construct a Monitoring and Evaluation framework for land use planning that is tailored to a changing climate
- Integrate information from multiple disciplines

Methodology	Lecture, Class Exercises, Field Work, Computer Laboratory

Module Content

Module 3: Land Use Planning and Climate Change (LUPCC)

The following section contains the specific content of the curricula organized according to the following format:

Knowledge, Skill or Concept:	What is to be done or learned.
Expected performance:	A written statement describing what the learners/students will be able to do at the end of each training session.

KNOWLEDGE/SKILLS/CONCEPTS	EXPECTED PERFORMANCE	CREDIT HOURS
I. Institutional Framework: Low Emission Land Use Planning Frameworks – National level scale down to community initiatives.		
1.1. Enabling Environment 1.2. Stakeholders Engagement 1.3. Development of Roles, responsibilities, objectives and vision	The learner/student will be able to design and/or describe multi-scaled framework for integrating green growth strategies and low emission development strategies into land use planning using examples.	The Training Unit is responsible for defining the way in which the credit hours are calculated for the Degree and/or Non-Degree program
II. Assessment of Current Condition (Defining the Drivers)		
2.1. Historic Data and Methods Compilation 2.2. Information Production Development (Status and Trend) 2.3. Gap Audit (Assess Information Gaps)	The learner/student will be able to understand the major drivers of land use change and analyze viable low carbon development pathways.	The Training Unit is responsible for defining the way in which the credit hours are calculated for the Degree and/or Non-Degree program
III. Analysis of Options		
3.1. Data and Methods Needs for Scenario Analysis 3.2. Baseline Assessment: Historical and BAU emissions 3.3 Scenario Assessment: Understanding the Pro's and Con's of Low Emission Pathways	The learner/student will be able to identify the major regulatory environment for land use planning and analyze the impact of climate change on existing regulatory systems.	The Training Unit is responsible for defining the way in which the credit hours are calculated for the Degree and/or Non-Degree program

Module Information

Module	**Carbon Measurement and Monitoring (CMM)**
Purpose/Goal	To provide learners/students necessary KSA (Knowledge, Skills and Attitude) on climate change, carbon stocks, carbon measurement methods and monitoring.
Structure	CMM is the one of the four modules of the Regional Climate Change Training Curriculum for the universities and training institutions in South East Asia and the Pacific.
	The process of Curriculum Development is technically supported by the US Forest Service and the LEAF Program funded by USAID.
	The module is elaborated in English and will be translated into the national language of the LEAF participating countries.
	The module can be tailored to both degree and non-degree programs; as well as for trainings for natural resources professionals and policy-makers. Important training topics can be selected as short course trainings for practitioners and leaders working on climate change.
Target groups	Undergraduate and postgraduate students
	NGO practitioners and natural resources professionals
	Governmental managers, planners, policy makers at different levels
Prerequisite	Consent of the teachers/trainers/professors/academic department
Goals	At the end of the course module, learners will be able to:

At the end of the course module, learners will be able to:

- Identify the roles of forests in climate change and that of international efforts to mitigate climate change
- Explain forest carbon stocks, the geographic and climatic constraints on forest carbon, and the drivers of change in forest carbon
- Apply the theoretical issues of and practical methods for measuring and monitoring forest carbon, including statistical approaches, sampling design, and operational protocols.
- Integrate map and field-based measures to generate forest carbon stocks and emissions at plot to national scales using an IPCC framework

Methodology

In class

Computer Lab

Field work in forests

Module Content

Module 4: Carbon Measurement and Monitoring (CMM)

The following section contains the specific content of the curricula organized according to the following format:

Knowledge, Skill or Concept: What is to be done or learned.

Expected performance: A written statement describing what the learners/students will be able to do at the end of each training session.

KNOWLEDGE/SKILLS/CONCEPTS	EXPECTED PERFORMANCE	CREDIT HOURS
I. OVERVIEW OF CLIMATE CHANGE AND TERRESTRIAL CARBON		
1.1. Climate system and climate change	Explain how the climate system works, the role of the carbon cycle and especially the how forest change has contributed to climate change in both recent and historic periods.	The Training Unit is responsible for defining the way in which the credit hours are calculated for the Degree and/or Non-Degree program
1.2. Tropical forests, the global carbon cycle and climate change		
1.2.1. Broad overview		
1.2.2. Contribution of land use change, historic and current		
1.3. The role of forest carbon in global climate action		
1.3.1 Brief History of UNFCCC		
1.3.2 Mitigation potential of tropical forests		
1.4 Context, constraints and challenges of forest-based climate mitigation.		
1.4.1. Complete GHG inventories to improve climate science		
1.4.2. NAMAs and developing country commitments		
1.4.3. Concept of offsetting – overview		
1.4.4. Overview of REDD+		
1.4.5 Theoretical and practical challenges for forest-based climate mitigation		
1.4.5.1. Leakage		
1.4.5.2. Permanence		
1.4.5.3. Governance		
1.4.5.4. Equity		

II. TERRESTRIAL CARBON STOCKS AND CHANGE		
2.1. Overview of terrestrial carbon pools	• Explain the LULUCF offsets potential and barriers to realizing LULUCF and related issues	
2.1.1. Stand-level pools: living biomass above and belowground, dead biomass, soil		
2.1.2. Variation across space: effects of moisture, temperature and soil nutrients at landscape scale		
2.1.3. Variation across space: biome level		
2.2. Land use, land use change, and forestry (LULUCF) and CO_2 emissions and sequestration		
2.2.1. Discussion on drivers of emissions, impact of drivers on various pools		
2.2.1.1. Change in forest area (deforestation)		
2.2.1.2. Change in forest C stocks within an area (degradation)		
2.3. IPCC Approach: activity data and emissions data		
2.3.1. Activity data (area change data): total area change, change by category, or spatially explicit change		
2.3.2 Generation of land use maps		
2.4.1. Emissions data (emission 'factors'): change in C stocks for given change in land use category using different 'tiers'		
2.4.2 Generation of carbon density associated with each land use		
2.5. Monitoring against a baseline (forest area, forest emissions)		
2.5.1. Forest area (Reference level, RL)		
2.5.2. Forest emissions (Reference emission level, REL)		
2.6 Case study of Cambodia		
III. CARBON MEASUREMENT AND MONITORING DESIGN		
3.1. Goal (national reporting vs project-level)	• Apply the theoretical issues of and practical methods for measuring and monitoring forest carbon, including statistical approaches, sampling design, and operational protocols.	
3.2. Precision requirements (relate to markets)		
3.3. What drivers to monitor? Key category analysis (mapping land use change)		
3.4. Which pools to measure, approach to use		
3.5. Which pools to measure, approach to use (IPCC tier 1, 2, 3)	• Integrate map and field-based measures to generate forest carbon stocks and emissions at plot to national scales using an IPCC	
3.6. Constraints on monitoring design		
3.6.1 Role of existing data (optional: part of methods, in section 4)		

3.6.2 Resources, human and technical	framework
3.6.3 Identifying capacity building needs	

IV. CARBON STOCK MEASUREMENT METHODS

4.1. Options to monitor forest carbon (RS+field, field-based national forest inventory (NFI), models to integrate RS+NFI, or models to predict C based on environment)	• Apply the theoretical issues of and practical methods for measuring and monitoring forest carbon, including statistical approaches, sampling design, and operational protocols.	
4.2. Design field sampling framework		
4.2.1. Value of sampling (extrapolation, inference)		
4.2.2. Use of statistics	• Integrate map and field-based measures to generate forest carbon stocks and emissions at plot to national scales using an IPCC framework	
4.2.3. Target area boundaries (geographic area/spatial extent of monitored area)		
4.3. Stratification, using:		
4.3.1. Remotely sensed data on C density		
4.3.2. Land use/land cover maps		
4.3.3. Topography		
4.3.4. Deforestation/degradation 'risk'		
4.4. Understanding the effects of plot design		
4.4.1. Shape and size of plots		
4.4.2. Distribution and number of plots		
4.5. Terrestrial carbon field measurement methods		
4.5.1. Overview of SOP for carbon pools		
4.5.2. Overview of SOPs for selective logging (discuss different approaches, option for explicit discussion of methods)		
4.5.3. QA/QC (option: insert later in the pool calculations section)		
4.6. Use of GIS to determine area change and to generate emission factors		
4.6.1. Overview of SOPs for GIS		
4.7. Carbon stock calculations – LEAF Carbon Calculator, etc. (excellent for hands-on/laboratory practicum)		
4.7.1 Standard methods for each pool (revisit QA/QC for pool each here)		
4.7.2 Units, scaling factors, slope corrections		
4.7.3 Statistical analysis (mean and confidence intervals)		

Appendix E – Module Completion Plans

E.1 – BCC Module Completion Plan
Return to Text

Session Completion Checklist

Session	Person Responsible	Lecture Notes	Activities	Concept Slies (content)	Objectives	Key Points	References	Gender Integration	Copyright & Permissions	Technical Review	Formatting / Editing	Total
Column1	Column2	Column3	Column4	Column4	Column5	Column6	Column7	Column7	Column7	Column8	Column9	Column
Introduction	Bunleng/Sokha		4				4		1			9
Causes	Bunleng		4						1			5
Intensification	Furniss/Chun	16	4	16			4		1			41
Modeling	Michael								1			1
Sea Level Rise	Michael							2	1			3
Water	Michael/Jiriwan							2	1			3
Food Security	Latsamy/Jiriwan	5	4				8	2	1			20
Human Health	Kalyan/Sokha			16			10		1			33
Vegetation and Wildlife	Naroon	16					4		1			21
Forest Management	Hoyyen/Ahmad	4	4				6	2	1			17
Uncertainty	Hoyyen	16	8	4		4	8	1	1			42
Ecosystem Services	Vinh	4	4	4	1	1	2	2	1			19
Vulnerability Assessment	Vinh	6					4	8	1			19
Communications	Chun/Nicole/Michael	16	4	16	1	1	8	6	1			53
Tools: Tools	Michael			8			8	2	1	2		21
Tools: Video and animations	Michael/Karen			8			8	2	1	2		21
Tools: References and Literature	Michael/Karen			8			8	2	1	2		21
Tools: Exercises and Simulations	Michael/Karen			8			8	2	1	2		21
Tools: Glossary	Michael							2	1			11
Totals		83	36	88	2	6	104	35	19	8	0	**381**
		Completion color legend										**9.5**

E.2 – SES Module Completion Plan

Session Completion Checklist

Session	Session Length	Person who designed	Presentation Material	Presentation Notes	Learning Objective	Outline (w/ time)	Pre-Class Reading	Activities	Methodology	Key Points	References &	Technical Review	Formatting/ Editing	Total additional time investment needed, including technical
1.1. Intro to Climate Change	1	Kaisone	2	2	0.25	0.5	0.25	0.25	0.25	0.25	0.25	2	2	10
1.2. The Climate Change Mitigation & Adaptation Context	3	Sarah				0.5						6	6	12.5
1.3. The Sustainable Development and Ethical Frameworks	1	Sharifa		1								2	2	5
1.4. Intro to Social and Environmental Soundness (SES)	4	Kalpana & Surin	6	3					1		1	1.25	8	8	28.25
2.1 Environmental benefits and co-benefits	3	Sarah				0.5	0.25					6	6	12.75
2.1.1 Carbon monitoring & MRV	2	Sarah	1	2	0.25	0.5	0.1	0.5	0.1	0.5	1	4	4	13.95
2.2. Governance	3	Rejani	4	2	0.5	0.25 ?	?	?	?	?	?	6	6	18.75
2.2.1. Regulatory Frameworks, Forest Tenure, and Carbon Rights	2	Surin	1	2	0.5					0.5 ?		4	4	12
2.3. Participation and stakeholder engagement	2	Rejani		??	??	??	??	??	??	??	??	4	4	8
2.3.1. FPIC	2	Rejani	??	??	??	??	??	??	??	??	??	4	4	8
2.4. Social benefits and co-benefits	1	Claudia										2	2	4
2.5. Gender equity and women's empowerment	2	Claudia	6	2					1			4	4	17
2.5.1. Gender analysis tools	1	Kalpana	3	1	?	?	?	?	?	?	?	2	2	8
2.5.2. WEAI	1	Claudia										2	2	4
2.6. Indigenous empowerment	1	Claudia	1	1							0.5	2	2	6.5
2.7. Local livelihoods	1	Chalapan & Claudia	4	2								2	2	10
2.7.1 Integrated agrarian systems analysis and ES	1	Malyne		2	0.5	0.25	0.5	1	0.25	0.5	0.5	2	2	9.5
2.7.2 PNG Case Study	1	Chalapan	3	2	0.5	0.25	0.5	1	0.25	0.5	0.25	2	2	12.25
2.8. REDD+ benefit sharing	2	Claudia		1								4	4	9
2.9. Economic/financial viability and sustainability	3	Penporn & Rusli	??	??	??	??	??	??	??	??	??	6	6	12
3.1. REDD+ Safeguard Mechanisms and Streamlining	3	Kalpana	3	2	??	??	??	??	??	??	??	6	6	17
3.2. National Safeguard Approach Options and country-specific overviews	3	Kalpana	3	2	??	??	??	??	??	??	??	6	6	17
3.3. Guest seminars	2	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	0
3.4. Capstone Project	2	TBD	4									1	1	6
Other Items to be completed														
Glossary terms														16
annotatated references														
fix all numbering throughout for consistency														
video toolbox														
review of all material for further integration of gender		Kalpana & Claudia										**Total additional time (person hours) needed**		261.45

Completion color legend	
white/blank	in progress
red	not yet started
green	completed

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E.3 – LUPCC Module Completion Plan

Session Completion Checklist

Type	Session	Title	Person Responsible	Primer	Integrated	Objectives	Lecture Notes	Class Engagement	Exercise	Key Points	References	Technical Review	Formatting/ Editing	Total Credit Units
Lecture	Intro	Introduction to Adaptive Land Use Planning and Climate Change	David		2	2	2	2	2	2		0		3
Lecture	1.0	Institutional Framework	Tuan		2	2	2	2	2	2		0		2
Lecture	1.1	Enabling Environment	Peter		2	2		2			0	0		2
Lecture	1.2	Stakeholders Engagement	Tuan		2	2		2			0	0		2
Lecture	1.3	Development of Roles, responsibilities, objectives and vision	Tuan		2	2		2			0	0		2
Lecture	2.0	(Dfining the Drivers)	Benz		2	2	2	2	2	2	2	0		2
Lecture	2.1	Data and Methods Compilation	Benz		2	2		2				0		3
Lecture	2.2	Information Production	Benz		2	2		2				0		3
Lecture	2.3	Gap Audit	Benz		2	2						0		2
Lecture	3.0	Analysis of Options	Thuy-Ahn / Zaki		2	2	2	2	2	2	2	0		2
Lecture	3.1	Baseline Assessment: Historical and BAU emissions	Thuy-Ahn / Zaki		2	2		2	2		2	0		1
Lecture	3.2	Scenario Assessment: Low emission pathways	Thuy-Ahn / Zaki		2	2		2				0		1
Lecture	3.3	Additionally Assessment (economic, social, and environmental)	Thuy-Ahn / Zaki		2	2		2				0		4
Lecture	4.0	Negotiate and Prioritize Implementation Plan	Phu		2	2	2	2	2	2	2	0		2
Lecture	4.1	Negotiation of options (including financing, economics, environmental, social, and political costs) including existing or needed policy to be able to implement those scenario(s)	Phu		2	2		2	2		2	0		2
Lecture	4.2	Prioritizing and sequencing activities (must include policy to make it happen)	Phu		2	2		2	2		2	0		1
Lecture	4.3	Implementation needs (technology, education, capacity building, etc needs) including roles and responsibilities	Phu		2	2			2		2	0		1
Lecture	5.0	Monitor and Evaluation	Tom / Nam		2	2	2	2		2	2	0		2
Lecture	5.1	Establishing M&E Framework (Process of Defining Targets (Thresholds for indicators))	Tom / Nam		2	2		2				0		2
Lecture	5.2	Measure	Tom / Nam		2	2		2				0		2
Lecture	5.3	Adaptive Management (Report / Modify)	Tom / Nam		2	2	0	0	0			0		1
Role Play	1.0	Institutional Framework	Peter / David	2								0	0	1
Role Play	1.1	Enabling Environment	Peter / David	2								0	0	1
Role Play	1.2	Stakeholders Engagement	Peter / David	2								0	0	1
Role Play	1.3	Development of Roles,	Peter / David	2								0	0	1
Role Play	2.0	Assessment of Current Condition	Peter / David	2								0	0	1
Role Play	2.1	Data and Methods Compilation	Peter / David	2								0	0	0
Role Play	2.2	Information Production	Peter / David	2								0	0	1
Role Play	2.3	Gap Audit	Peter / David	2								0	0	1
Role Play	3.0	Analysis of Options	Peter / David	2								0	0	1
Role Play	3.1	Baseline Assessment: Historical	Peter / David	2	0	0	0	0		0	0	0	0	1
Role Play	3.2	Scenario Assessment: Low	Peter / David	2	0	0	0	0		0	0	0	0	1
Role Play	3.3	Additionally Assessment	Peter / David	2	0	0	0	0		0	0	0	0	1
Role Play	4.0	Negotiate and Prioritize	Peter / David	2	0	0	0	0		0	0	0	0	1
Role Play	4.1	Negotiation of options (including	Peter / David	2	0	0	0	0		0	0	0	0	1
Role Play	4.2	Prioritizing and sequencing	Peter / David	2	0	0	0	0		0	0	0	0	1
Role Play	4.3	Implementation needs	Peter / David	2	0	0	0	0		0	0	0	0	1
Role Play	5.0	Monitor and Evaluation	Peter / David	2	0	0	0	0		0	0	0	0	1
Role Play	5.1	Establishing M&E Framework	Peter / David	2	0	0	0	0		0	0	0	0	1
Role Play	5.2	Measure	Peter / David	2	0	0	0	0		0	0	0	0	1
Role Play	5.3	Adaptive Management (Report /	Peter / David	2	0	0	0	0		0	0	0	0	2

Color		Status
0		not started
1		in progress
2		completed

E.4 – CMM Module Completion Plan

Session Completion Checklist

#	Session	Person Responsible	Lecture Notes	Activities	Objectives	Key Points	References	Technical Review	Formatting/ Editing	Credit hours (45 min
1	Climate system and climate change	Lawrence	not started					TBD - Leaf	TBD - Leaf	1
1	Tropical forests, the global carbon cycle and climate change	Lawrence	not started					TBD - Leaf	TBD - Leaf	1
1	The role of forest carbon in global climate negotiations	Lawrence	not				8/14/2013	TBD - Leaf	TBD - Leaf	2
1	Context, constraints and challenges of forest-based mitigation	Lawrence	not started	not started			8/14/2013	TBD - Leaf	TBD - Leaf	1
2	(now included in 1.4)									
II	**Terrestrial Carbon stocks and change**									
2	Overview of terrestrial carbon pools (stocks)	Diloksumpun	In progress					TBD - Leaf	TBD - Leaf	1
2	Land use, land use change, and forestry (LULUCF) and CO2 emissions and sequestration (change)	Diloksumpun	Not started					TBD - Leaf	TBD - Leaf	1
2	How does carbon stock measurement contribute to development of activity data and emission factors?	Diloksumpun	Not started				In progress	TBD - Leaf	TBD - Leaf	1
2	IPCC approach: activity data and emissions data	Diloksumpun	Not started				In progress	TBD - Leaf	TBD - Leaf	1
3	Reference levels and baselines	not yet identified						TBD - Leaf	TBD - Leaf	1
3	Case study	Kim Soben	In progress					TBD - Leaf	TBD - Leaf	1
III	**Carbon measurement and monitoring design**									
3	Goal (national reporting vs. project-level)	Prasit	started					TBD - Leaf	TBD - Leaf	0.5
3	Precision requirements (relate to markets)	Prasit	started					TBD - Leaf	TBD - Leaf	0.5
3	What drivers to monitor? Key category analysis (mapping land use change)	Prasit	started					TBD - Leaf	TBD - Leaf	1
3	Which pools to measure, approach to use (IPCC tier 1, 2, 3)	Prasit	started					TBD - Leaf	TBD - Leaf	0.5
4	Frequency of monitoring (as it related to the goal)	Prasit	started					TBD - Leaf	TBD - Leaf	0.5
4	Role of existing data (this might be part of methods, below)	Prasit						TBD - Leaf	TBD - Leaf	0.33
4	Resources, human, technical, and financial	Prasit						TBD - Leaf	TBD - Leaf	0.33
4	Identifying capacity building needs	Prasit						TBD - Leaf	TBD - Leaf	0.33
	note 3.6-3.8 combined into one; 3.1-3.5 a total of 3 hours									
IV	**Carbon stock measurement methods**									
4	Forest Carbon Monitoring (4.1)	Erin & Sarah & KIM Soben	not started					TBD - Leaf	TBD - Leaf	1
4	Design of field sampling framework (4.2-4.3)	Erin, Sarah and Toai	about finish					TBD - Leaf	TBD - Leaf	1.5
4	Plot Design for Carbon Stock Inventory (4.3-4.4)	Erin, Sarah and Toai	about finish	########				TBD - Leaf	TBD - Leaf	1.5
4	Terrestrial Carbon Field Measurement Methods (4.5)	Ahmad Ainuddin Nuruddin						TBD - Leaf	TBD - Leaf	1+6-9 field
5	Carbon Stock Calculations and Available Tools (4.7)	Bui The Doi & Nguyen The Dz	Some	########	14-08-2013		14-08-2013	TBD - Leaf	TBD - Leaf	1+4-6 lab
5	Creating Activity Data and Emission Factors (4.6)	Lawong Balun						TBD - Leaf	TBD - Leaf	1
5	Methods for Selective Logging Analysis (4.7.3)	Erin & Sarah & Nguyen The Dzung	Some		14-08-2013		14-08-2013	TBD - Leaf	TBD - Leaf	1
5	Monitoring non-CO2 GHGs (4.8)	Erin & Sarah & Bui The Doi	Some	########	8/14/2013		14-08-2013	TBD - Leaf	TBD - Leaf	1
	Original 4.8 Design of field data collection not yet demo	Erin & Sarah						TBD - Leaf	TBD - Leaf	1
V	**Monitoring Emission**									
5	Goals	Sokline	Done							1
5	Measurement methods to monitor	Sokline	Done							
5	Monitoring specific drivers	Sokline	Done							
5	Generating national emissions from land use		No	pink	pink	pink	pink			
										36 - 41 hours

white/blank	in progress
pink	not started
green	completed

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Appendix F – Time Allocation for Module Formats

F.1 – BCC Module Formats
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BCC Teaching Unit Topic	Hours 10-day (60)	Hours 5-day (30)	Hours 3-day (18)
Introduction to CC	1	1	0.3
Causes of CC	4	2	1.2
Climate Modeling	2	1	0.6
Climate Intensification	3	2	0.9
Sea Level Rise	6	3	1.8
Climate Change and Water	5	3	1.5
Food Security	4	2	1.2
Human Health	4	2	1.2
Intro to Ecosystem Services	1	1	0.3
Forest Management	5	3	1.5
Impact Modeling Vegetation	3	2	0.9
Uncertainty	2	1	0.6
Vulnerability Assessment	6	3	1.8
Communication	3	2	0.9
Tools	2	1	0.6
Subtotal	*51*	*26*	*15.3*
Assessment & Testing	4	2	1.2
Field Visits	2	1	0.6
Total Hours	**57**	**28.5**	**17**

F.2 – SES Module Formats

3/5/10 Day Detailed Training Plan

Session	(12-15 training hours) Academic Focus	(12-15 training hours) Practitioner Focus	(22 training hours) Academic Focus	(22 training hours) Practitioner Focus	10 day (45 training hours)
	number of hours are suggested below, but instructors may want to choose differently according to their classroom				
1. Introduction and Background: What is Social and Environmental Soundness (SES) and its Larger Climate Change Context?					
1.1. Intro to Climate Change	0	0	1	0	1
1.2. The Climate Change Mitigation & Adaptation Context	2	1	3	2	3
1.3. The Sustainable Development and Ethical Frameworks	1	0	1	1	1
1.4. Intro to Social and Environmental Soundness (SES)	3	3	3	3	4
2. What Social and Environmental Issues Exist: Strengthening Design and Implementation of REDD+		*Choose 5 out of 15*		*Choose 10 out of 15*	
2.1 Environmental benefits and co-benefits	1	0-1	2	0-1	3
2.1.1 Carbon monitoring & MRV	0	0-1	1	0-1	2
2.2. Governance	1	0-1	2	0-1	3
2.2.1. Regulatory Frameworks, Forest Tenure, and Carbon Rights	0	0-1	0	0-1	2
2.3. Participation and stakeholder engagement	1	0-1	1	0-1	2
2.3.1. FPIC	0	0-2	0	0-2	2
2.4. Social benefits and co-benefits	1	0-1	1	0-1	1
2.5. Gender equity and women's empowerment	1	0-1	1	0-1	2
2.5.1. Gender analysis tools	0	0-1	0	0-1	1
2.5.2. WEAI	0	0-1	0	0-1	1
2.6. Indigenous empowerment	1	0-1	1	0-1	1
2.7. Local livelihoods	1	0-1	1	0-1	1
2.8. REDD+ benefit sharing	1	0-1	1	0-1	2
2.9. Economic/financial viability and sustainability	1	0-1	2	0-1	3
3. State of the Art in Action: Bringing the Pieces Together					
3.1. REDD+ Safeguard Mechanisms and Streamlining	0	2	0	2	3
3.2. National Safeguard Approach Options and country-specific overviews	0	3	1	3	3
3.3. Guest seminars	0	1	0	1	3
3.4. Capstone Project	0	0	0	0	2
Total Module Length (Number of Hours)	**15**	**15**	**22**	**22**	**45**

F.3 – LUPCC Module Formats

Type	Session	Title	Total Credit Units	Academic			Technical		
				3D T:18L 15 RP:3	5D T:30L 30 RP:0	10D T:60L 40 RP:20	3D T:18L 10 RP:8	5D T:30L 12 RP:18	10D T:60L 40 RP:20
Lecture	Intro	Introduction to Adaptive Land Use Planning and Climate Change	3	3	3	3	3	3	3
Lecture	1.0	Institutional Framework	2	2	2	2	1	1	2
Lecture	1.1	Enabling Environment	2	■	2	2	■	■	2
Lecture	1.2	Stakeholders Engagement	2	■	2	2	■	■	2
Lecture	1.3	Development of Roles, Responsibilities, Objectives and Vision	2	■	2	2	■	■	2
Lecture	2.0	Assessment of Current Condition (Defining the Drivers)	2	2	2	2	1	1	2
Lecture	2.1	Historic Data and Methods Compilation	3	■	2	3	■	■	3
Lecture	2.2	Information Production Development (Status and Trend)	3	■	2	3	■	■	3
Lecture	2.3	Gap Audit (Assess Information Gaps)	2	■	1	2	■	■	2
Lecture	3.0	Analysis of Options	2	2	1	2	1	1	2
Lecture	3.1	Data and Methods Needs for Scenario Analysis	1	■	1	1	■	■	1
Lecture	3.2	Baseline Assessment: Historical and BAU emissions	1	■	1	1	■	1	1
Lecture	3.3	Scenario Assessment: Understanding the Pro's and Con's of Low Emission Pathways	4	■	1	3	■	■	3
Lecture	4.0	Negotiate and Prioritize Implementation Plan	2	2	1	2	1	2	2
Lecture	4.1	Negotiation of options (including financing, economics, environmental, social, and political costs) including existing or needed policy to be able to implement those scenario(s)	2	1	1	2	1	1	2
Lecture	4.2	Prioritizing and sequencing activities (must include policy to make it happen)	1	■	1	1	■	■	1
Lecture	4.3	Implementation needs (technology, education, capacity building, etc needs) including roles and responsibilities	1	■	1	1	■	■	1
Lecture	5.0	Monitor and Evaluation	2	2	1	2	1	1	2
Lecture	5.1	Establishing M&E Framework (Process of Defining Targets (Thresholds for indicators))	2	■	1	1	■	■	1
Lecture	5.2	Measure	2	■	1	2	■	■	2
Lecture	5.3	Adaptive Management (Report / Modify)	1	1	1	1	1	1	1
Role Play	1.0	Institutional Framework	1			1	1	1	1
Role Play	1.1	Enabling Environment	1			1	■	1	1
Role Play	1.2	Stakeholders Engagement	1	1	■	1	■	1	1
Role Play	1.3	Development of Roles, Responsibilities, Objectives and Vision	1	■	■	1	1	1	1
Role Play	2.0	Assessment of Current Condition (Defining the Drivers)	1	■	■	1	1	1	1
Role Play	2.1	Historic Data and Methods Compilation	0	■	■	■	■	■	■
Role Play	2.2	Information Production Development (Status and Trend)	1	■	■	1	■	1	1
Role Play	2.3	Gap Audit (Assess Information Gaps)	1	■	■	1	■	1	1
Role Play	3.0	Analysis of Options	1	1	■	1	1	1	1
Role Play	3.1	Data and Methods Needs for Scenario Analysis	1	■	■	1	■	1	1
Role Play	3.2	Baseline Assessment: Historical and BAU emissions	1	■	■	1	■	1	1
Role Play	3.3	Scenario Assessment: Understanding the Pro's and Con's of Low Emission Pathways	1	■	■	1	■	1	1
Role Play	4.0	Negotiate and Prioritize Implementation Plan	1	■	■	1	1	1	1
Role Play	4.1	Negotiation of options (including financing, economics, environmental, social, and political costs) including existing or needed policy to be able to implement those scenario(s)	1	1	■	1	1	1	1
Role Play	4.2	happen)	1	■	■	1	■	1	1
Role Play	4.3	Implementation needs (technology, education, capacity building, etc needs) including roles and responsibilities	1	■	■	1	■	1	1
Role Play	5.0	Monitor and Evaluation	1	■	■	1	1	1	1
Role Play	5.1	Establishing M&E Framework (Process of Defining Targets (Thresholds for indicators))	1	■	■	1	■	1	1
Role Play	5.2	Measure	1	■	■	1	■	1	1
Role Play	5.3	Adaptive Management (Report / Modify)	2	■	■	2	1	1	2

F.4 – CMM Module Formats
Return to Text

#	Session	3 Days training	5 Days training			
I	*Overview of Climate Change and Terrestrial Carbon*					
1.1	Climate Change in the past 150 years	x	x			
1.2	Global carbon cycle	x	x			
1.3	Brief history of UNFCCC					
1.4	Role of terrestrial carbon and forests in climate change mitigation	1/2	1/2			
1.5	Theoretical and practial challenges for forest-based climate mitigation			**3&5 Days Training Colors**		
				white/blank	not included	
II	**Terrestrial Carbon stocks and change**			1/2 (green)	1/2 included	
2.1	Overview of terrestrial carbon pools (stocks)	x	x	x (red)	fully included	
2.2	Land use, land use change, and forestry (LULUCF) and CO2 emissions and sequestration (change)					
2.3	How does carbon stock measurement contribute to development of activity data and emission factors?					
2.4	IPCC approach: activity data and emissions data		1/2			
III	**Carbon measurement and monitoring design**					
3.1	Goal (national reporting vs. project-level)					
3.2	Precision requirements (relate to markets)					
3.3	What drivers to monitor? Key category analysis (mapping land use change)	1/2	x			
3.4	Which pools to measure, approach to use (IPCC tier 1, 2, 3)	1/2	x			
3.5	Frequency of monitoring (as it related to the goal)					
3.6	Role of existing data (this might be part of methods, below)					

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Appendix G – Final Evaluation by Participants

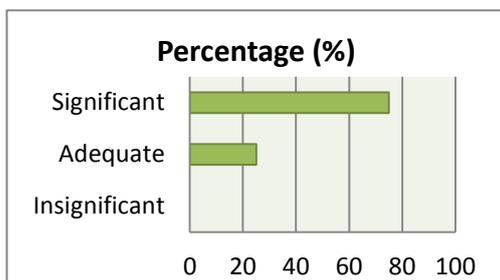## G.1 – Training Workshop Assessment (rating the training workshop)

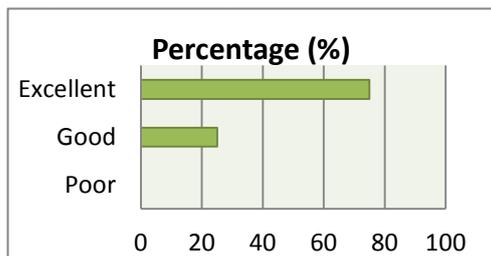1. *Were the stated training workshop objectives accomplished?*

Percentage (%)

Response	
Yes	~65
Partially	~35
No	0
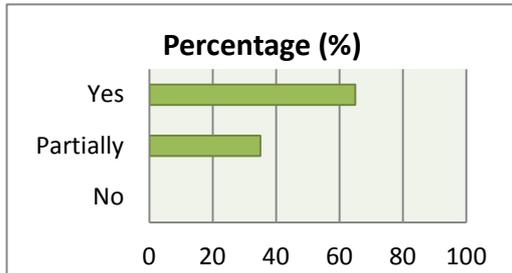
2. *Did the training workshop meet your expectation?*

Percentage (%)

Response	
Yes	~75
Partially	~25
No	0
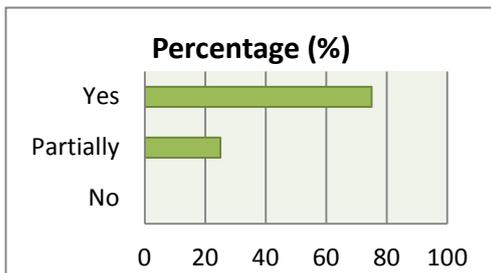
3. *How applicable is the training workshop content to your job?*

Percentage (%)

Response	
Significant	~75
Adequate	~25
Insignificant	0

4. *How effective was the facilitator(s)?*

Percentage (%)

Response	
Excellent	~75
Good	~25
Poor	0

5. *How suitable were the resources and materials provided and shared (on GDrive, GSite)?*

Percentage (%)

Response	
Excellent	~60
Good	~40
Poor	0
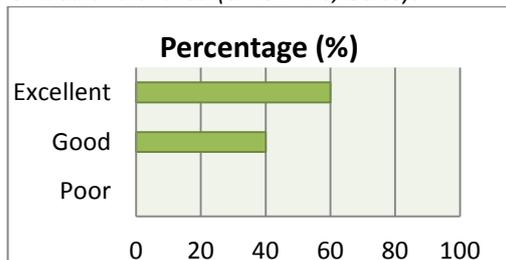
6. *What was the level of difficulty?*

Percentage (%)

Response	
Appropriate	~95
Too advanced	~5
Too elementary	0
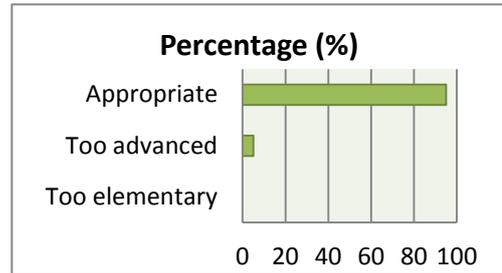
7. *Was the length of the training workshop appropriate?*

Percentage (%)

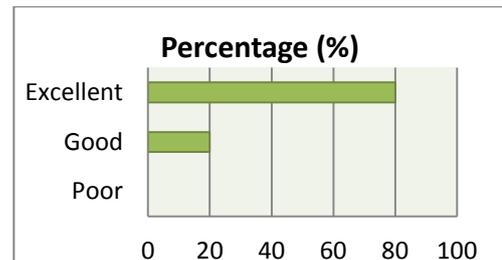| Response	
Appropriate	~60
Too long	~30
Too short	~10
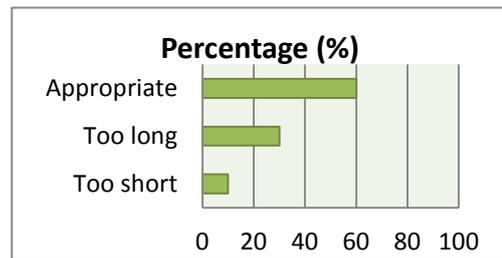
8. *How was the training workshop organization (e.g. smoothness of the training plan, training activities, problem-solving of the organizer)?*

Percentage (%)

Response	
Excellent	~95
Good	~5
Poor	0
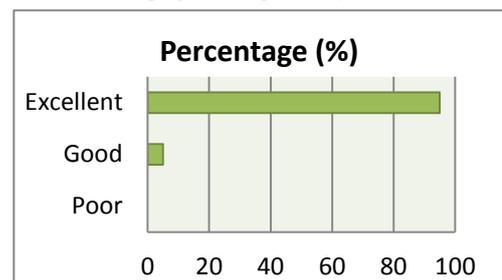
9. *Was the training workshop location convenient?*

Percentage (%)

Response	
Excellent	~80
Good	~20
Poor	0
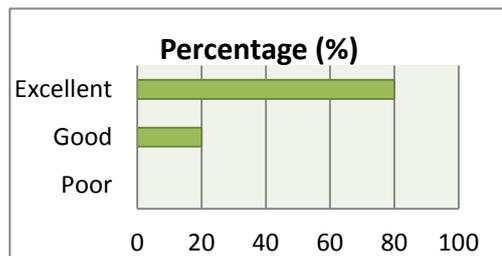
10. *How were the training workshop facilities?*

Percentage (%)

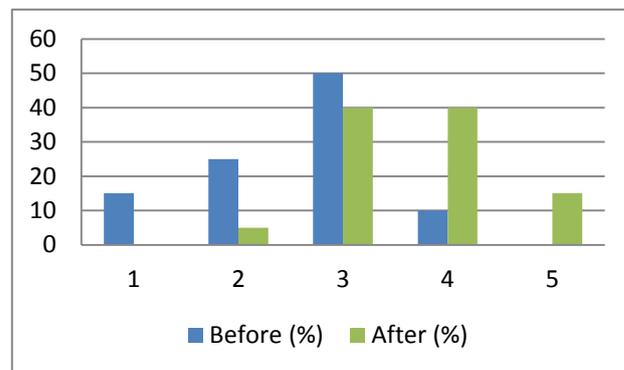| Response	
Excellent	~80
Good	~20
Poor	0

G.2 – Pre and post Training Workshop Self-evaluation (1=low; 5=high)

1. *Application of adult learning strategies in curriculum development*

Before (%) — **After (%)**
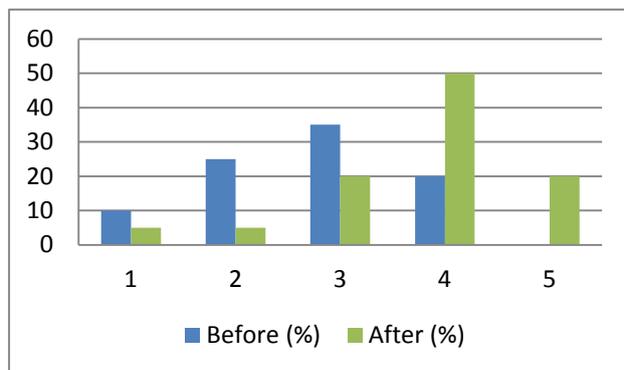
2. *Reverse planning on training design and effective teaching to engage students in teaching-learning process*

Before (%) — **After (%)**

3. *Methods and participatory approaches in regional climate change curriculum development*

Before (%) — **After (%)**
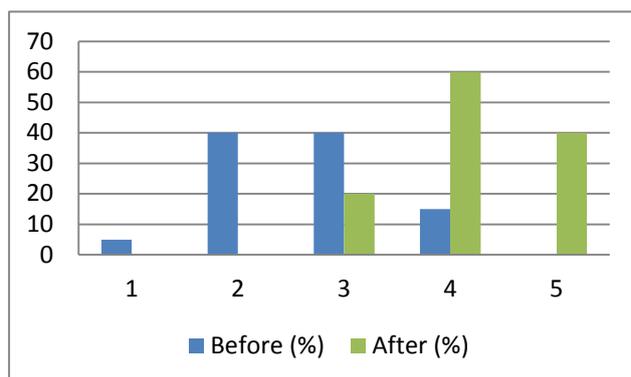
4. *Materials development on regional climate change curriculum and testing the developed materials*

Before (%) — **After (%)**
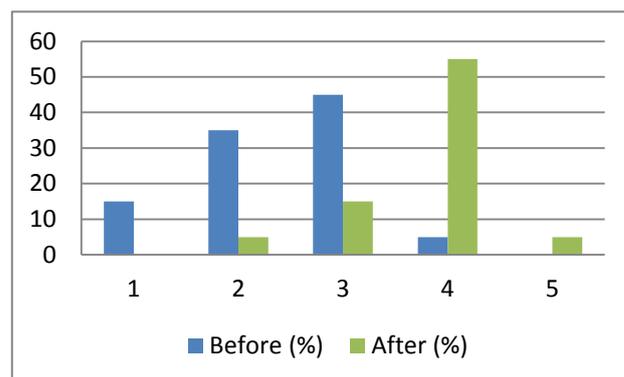
5. *Participatory approaches and mechanisms for close collaboration among the universities and other stakeholders across the region*

Before (%) — **After (%)**
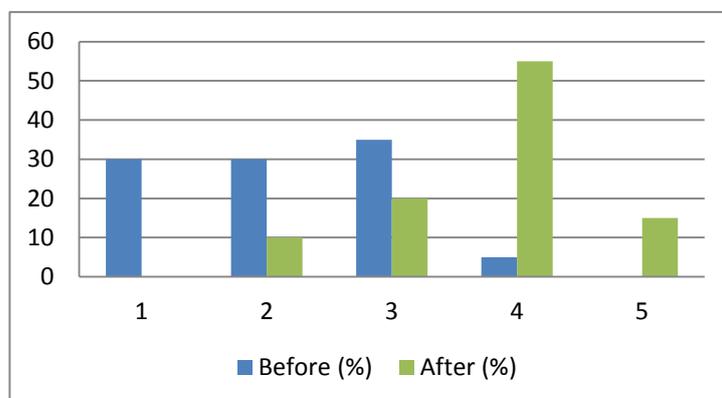
G.3 – Comments and Suggestions

1. *What were the strongest points of the training workshop on Regional Climate Change Curriculum Development?*

   - Dedicated time to work on products.
   - Very good progress.
   - Establish networks, knowledge gain on climate change.
   - Interactions with participants from the region.
   - Some materials provided by the Winrock International.
   - Climate change teaching materials of different modules.
   - Different experts from different principles worked together.
   - Team building!
   - Collaboration with regional universities and US Forest and US universities.
   - The most important for the training workshop is sharing information and documents.
   - Mobilize people working together.
   - The workshop provided participants necessary skills and knowledge.
   - Strategies on training and teaching.
   - Methods in regional curriculum development.
   - Skills on working in collaborative way.
   - Facilitators' jobs; workshop organization, materials.
   - Well organized!
   - Lots of learning and reflecting own lesson planning and teaching style during the first 2 days.
   - Participation and collaboration among team members.
   - Sharing information, uni-connected, team-work.
   - Well organized with very capable leaders.
   - Regional and global sharing of experience and working together.

2. *What would you like LEAF program to improve for the future training workshop?*

   - Continue support for local (country) and region training workshop.
   - Establish protocols for members of different groups can communicate with each other.
   - More plenary.
   - Making it shorter and more concise.
   - Reduce number of tasks so that it can fit the time of a training workshop.
   - Right and suitable participants.
   - Needed a fieldtrip during a workshop.
   - I did not see any improvement for the next training.
   - More time in country.
   - Chance to join another module.
   - Example of trial exercise with existing teaching system.
   - Delivery methods and tools using the internet for online learning.
   - Shorten duration, clearer instruction and objectives prior to the workshop.
   - Organize more events for better mutual understanding among the team members and better interaction with other teams as well as universities in the region.

3. *What would you like improve yourself for attending the future training workshop?*
   - Practice more on application of adult training techniques.
   - Improving my communication skill.
   - Making myself free thru-out the workshop.
   - Presentation, talking and discussion.
   - Allocate time to attend training and work more before attending!
   - What I would like to improve myself for attending the future training workshop is to get trained on GIS and Remote Sensing and more techniques skills on Climate Change.
   - More prep time.
   - Detail methods of adult learning.
   - Knowledge.
   - Assessment methods using online learning tools.
   - Background knowledge on the topics I will be in charge of.
   - Better preparation.
   - Need to prepare myself better before the workshop.
   - TOT.

4. *Please give some examples of how you will use what you learned in your work?*

   - Clear objectives lead a well content.
   - Applying the curriculum development approach.
   - Improving my team spirit.
   - Building up my knowledge on land uses and climate change.
   - Adopt partially teaching demo into my course.
   - The way to start a section or a lecture (more concise).
   - How to organize a meeting.
   - Apply reverse training on my lecture/course.
   - Apply learned approach to the revision of the university current curriculum in the near future.
   - Methods gained from workshop will be applied in my teaching.
   - Materials will be selected to teach for students in my university.
   - Presentations making and giving lectures.
   - Apply skills in teaching
   - I will use PPT presentations of BCC for my teaching.
   - Some websites that can access for students to conduct their researches.
   - In bachelor courses, problem-based learning and as lecture notes.
   - Some of the materials and approaches will be used in my lecture.
   - Select relevant topics for my lectures.
   - Teaching undergrad and grad students.
   - Apply the developed materials in real class.

5. *What additional training topics would be suitable for you and your work?*

- Training on the methods and techniques of adults teaching.
- Effective presentations.
- Active learning techniques (for those who need this).
- Detail method and implementation of learner-centered teaching/learning.
- Going through some of the spreadsheet models using field data.
- Practice adult teaching.
- How to do role play in class.
- I think it should be included more specific topic of Hydrology and Oceanography.
- PES.
- Teaching demos – Exercise
- Media development

6. *What other specific comments or suggestions do you have?*

- Overall, this training workshop gets an A+ Outstanding!
- Include social activities such as field visit in between if it is a long workshop.
- Field visits would be more helpful.
- Objective and scope should be very cleared.
- Level of learner targeted should be identified and focus.
- I suggest to train on GIS and Remote Sensing and each module for other module because it could be useful when they want to apply these module to their university.
- Should have a fieldtrip during the workshop and/or practices demo in a real class attended with students.
- Support partner universities to organize a workshop at their own location.
- There should be more interactions among modules.
- Allow participants to participate and vote on the workshop agenda so that our contributions could be more efficient.
- Reservation in a very luxury hotel is not really necessary.