



Asia-Pacific Network for Sustainable Forest Management and Rehabilitation

**Innovative Sustainable Forest Management
Education in the Asia-Pacific Region
(Phase II)**

PROJECT DOCUMENT

Prepared by

University of British Columbia, Canada

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Project title	Phase II of Innovative Sustainable Forest Management Education in the Asia-Pacific Region	
Supervision department	University of British Columbia	
Executive agency	Executive Office, Asia Pacific Forest Education Coordination Mechanism (AP-FECM)	
Project period	1 st January, 2018- 31 st December, 2020, 36 months	
Project location: Asia Pacific region		
Total budget(US\$) 794,600	APFNet(US\$) 563,000	Counterpart Contribution (US\$) 231,600

Outline of the Project:

Building upon a successful online course project, the *Innovative Sustainable Forest Management(SFM) Education Program*, which has attracted more than 3300 users from 91 economies, the second phase of the project will give priority to develop new online courses on tropical forests and complete the unfinished course *Sustainable Use of Forest Ecosystem Services*, meanwhile put immediate action on upgrading and promoting the courses developed in Phase I, then ultimately establish a systematic SFM online learning program to benefit the Asia Pacific region and worldwide. Lessons learned and recommendations from Phase I's evaluation will be incorporated into the new course development. A team-based approach will be used to ensure quality and stability of the project development. An advanced Learning Management System will be embedded to better understand diverse learner's needs and learning behaviors. A more holistic course structure will be considered to integrate basic SFM knowledge modules with case studies or practical experience in specific regional contexts. In addition, new educational technology such as lab simulation, Virtual Reality/Augmented Reality (VR/AR), Artificial Intelligence (AI) will be applied to bring visualized practical experience for global learners. As a key unit to operate the project, the Executive Office of Asia Pacific Forest Education Coordination Mechanism (AP-FECM) will take responsible to continuously encourage global utilization and increase international recognition of the project.

In phase II, with new courses developed, global learners will be able to freely access to more high quality SFM educational resources without constraints on geographic location, time and health condition. It will be a great effort on increasing equity in forest education around the world, which will largely enhance the reputation of APFNet and AP-FECM. Also, the

development of the courses will narrow the gaps among universities in the Asia Pacific Region, as many universities have entirely or partially used the materials in their teaching curricula. More importantly, the project has set a baseline and an excellent example for future course articulation and mutual recognition regionally, which will further promote student mobility and faculty exchange, as well as collaboration in forest education at national, regional and global levels.

Project Goal:

The overall goal of the project is to generate long-term improvements in forest education and sustainable forest management capacity in the Asia Pacific region and worldwide.

To maximize the utilization of this project, its goals in the second phase is to develop a comprehensive systematic SFM online learning program to benefit a wider range of global learners.

Project Objectives:

- Adopt the world leading online course platform (edX Edge) to develop new online courses with an emphasis on tropical forests, covering from forest measurement, planning, climate adaptation, carbon management to community forest and livelihoods;
- Enhance the quality of forest education in the region by integrating the world-leading edX online course platform (UBC edX Edge) with MOOC standards for all developed courses;
- Provide a foundation for regional universities to further develop an online SFM Master's degree program that will help filling the gaps in forest education across the region; and
- Make efforts on increasing equity in forest education by providing more open educational resources and credential programs (Certificate and Master's degree) to global learners.

Project Outputs:**Output 1: Establishment of the AP-FECM SFM Certificate Program**

The AP-FECM SFM Certificate Program will package with a series of online courses, instructor-facilitated learning activities and student assessment. On completion of the program, students will be able to gain a SFM Certificate issued by AP-FECM.

Output 2: Migration to edX platform and upgrade to MOOCs version

All developed courses will be migrated to the world's leading online course platform (edX) and upgraded to MOOC version. On the edX platform, more functions such as user tracking, learner survey, learning analytics and discussion forum will be available to support student engagement and learning management. Additionally, in order to meet the needs of global learners, the unfinished course *Sustainable Use of Forest Ecosystem Services* will need to be completed and

moved to edX platform following MOOC standard.

Output 3: Development of new online courses on sustainable management of tropical forests

The development of new courses on tropical forest management will broaden the range of topics on SFM. Along with the developed courses in phase I, this project will provide a systematic knowledge and skill set for learners to understand sustainable forest management in a global context. New courses will also be available on UBC edX platform following MOOC standard. In addition, new educational technology like lab simulation, VR/AR, AI will be incorporated to course content and student assessment for improving learning experience and effectiveness of evaluation.

Output 4: Promotion and management of *Innovative Sustainable Forest Management Education in the Asia-Pacific Region*

The Executive Office of AP-FECM will be responsible for managing daily operations and administration of this online course program and organizing promotional activities. In order to further increase the global recognition, the project will run continuously as open educational resources, meanwhile creating credential programs (Certificate, Master's degree) to attract a wider range of learners. An enrichment function will be added to the course design to allow updates from instructors of regional universities to share their latest experiences and knowledge on SFM. All of these outputs will generate a long-term impact on forest education in the region and will contribute greatly to capacity building in SFM.

Project Proponent:

Main contact: Guangyu Wang, Associate Dean and Director of AP-FECM

Agency/organization/entity: AP-FECM and UBC Faculty of Forestry

Email: Guangyu.wang@ubc.ca Tel: 1 604 822 2681 Fax: 1 604 822 8645

Backup contact: Michelle Zeng Email: michelle.zeng@ubc.ca Tel: 1 604 822 5432

Reviewed and Nominated by:

Prepared and Submitted by:

Dr. Guangyu Wang

Director, Executive Office of AP-FECM

Project Proponent Signature on behalf of EA

Date

Dr. John Innes

Chair, Asia Pacific Forest education

Coordination Mechanism

Date

Abbreviations and acronym

Acronym and Abbreviation	Full Name
APEC	Asia–Pacific Economic Cooperation
APFNet	Asia–Pacific Network for Sustainable Forest Management and Rehabilitation
AP–FECM	Asia Pacific Forest education Coordination Mechanism
BFU	Beijing Forestry University, China
CAF	Chinese Academy of Forestry
CIFOR	Center for International Forestry Research
CTLT	The Centre for Teaching, Learning and Technology, UBC
GFOI	Global Forest Observations Initiative Office, FAO
IPB	Bogor Agricultural University
HKU	University of Hong Kong
KU	Kasetsart University, Thailand
NTU	National Taiwan University
RECOFTC	The Center for People and Forests
SFM	Sustainable Forest Management
UBC	University of British Columbia, Canada
UCSD	University of California, San Diego, USA

UG	University of Georgia, USA
UM	University of Melbourne, Australia
UN-REDD	The United Nations – Reducing Emissions from Deforestation and forest Degradation
UPLB	University of Philippines–Los Banos, Philippines
UPM	University Putra Malaysia, Malaysia
VNUF	Vietnam National University of Forestry

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1 Background

AP economies lack a systematic training system to promote SFM. This, in turn, limits their capacity to undertake SFM in the field. Therefore, there is a need for the development of a holistic and comprehensive academic program to improve capacity building. Given the size of the region, and the difficulties of moving between countries for extended periods of time, online course delivery mechanisms provide an ideal solution to capacity building challenges in the region. In 2013, the *Innovative Sustainable Forest Management Education in the Asia-Pacific Region* program was launched with an overall goal of improving the capacity for SFM in the Asia-Pacific region. It uses an innovative pedagogical approach to convey knowledge on SFM and related issues to various forestry stakeholders through a combination of online learning, short-term onsite training, and community sharing of results and experiences. Five universities, including the University of British Columbia (UBC), Beijing Forestry University (BFU), University of Melbourne (UM), University Putra Malaysia (UPM) and University of the Philippines Los Baños (UPLB), have worked together to develop the first six online SFM courses. In 2015, five core courses featuring self-directed learning were developed as open education resources for the AP region. The existing five SFM online courses include:

- Sustainable Forest Management in a Changing World (UBC)
- Forest Governance, Public Relations, & Community Development (UPLB)
- International Dialogue on Forestry Issues (UBC)
- Restoration of Degraded Forest Ecosystems & Forest Plantation Development (UM)
- Forest Resource Management and Protection (BFU)

The results of an in-house quality enhancement review done by experts of online course development showed that each course met online quality instructional design standards. A workshop was very helpful in orientating course leading professors in best practices in the rapidly-evolving field for online course design. Results of the project survey conducted by students indicated that the courses employed the fundamental principles of sound instructional design, including easy navigation, embedding of resources and the use of attractive and intellectually stimulating images; these all contributed to the courses being

considered very user friendly. Additionally, this project also won a Canadian National Award “Excellence and Innovation in the Integration of Technology in Educational Practices/Collaboration”. It demonstrated the benefit of the collaboration in the integration of resources and information to build learning experiences that are engaging and sustainable.

2. Necessity and Significance

2.1 Significance

During the evaluations for completion and implementation, this project was considered as largely successful in developing a collaborative online platform and delivering accessible knowledge to enhance sustainable forest management on a global scale. Since 2016, the project has attracted over 3,300 users and 37,000 views from 91 countries, representing over 47% of countries worldwide. Free access to high quality SFM educational resources without constraints on geographic location, time and physical condition is the biggest advantage of the project provided to global learners. It has launched a great step on promoting equity in forest education around the world.

In the second phase, this project will further generate long-term impacts to benefit the entire forestry sector in the Asia Pacific region and worldwide.

- 1) The new proposed courses along with the developed courses will cover a wide range of important topics of sustainable forest management across the region. These courses will lead to the improved management of plantation forests and forest resources, which is essential to the long-term well-being of regional and global environment, communities and economy;
- 2) Workshops provided in this project will introduce new technologies and pedagogy to various regional institutions to advance their long-term teaching quality;
- 3) The project will create a collaboration platform for schools and research organizations that will promote student mobility, faculty exchange, course articulation and recognition, and joint educational and research cooperation in the future.

2.2 Necessity

The second phase will put a focus on tropical forest. Tropical forest resources in the AP region are diminishing in response to climate change where local communities are highly reliant on forest ecosystems for food, fuel, and other natural resources. To tackle these challenges, there is a clear need to prepare high quality education and training for human resources to promote and practice sustainable management in tropical forests. During the Steering Committee meetings held in South Africa and the Philippines, and later this year in Freiberg Germany, members of AP-FECM have urged that a wider range of SFM courses focusing on tropical forests should be undertaken in timely fashion. New proposed courses should provide a systematic knowledge and skill set for forestry professionals to understand plantation forests planning and decision making for tropical forests management and utilization, geospatial technologies in environmental management, climate modelling tools for forestry applications, REDD+ forest measurement and reporting, as well as contextual factors that influence conservation and livelihood outcomes in tropical forest areas.

While developing the first core courses as a self-directed and open source online program in Phase I, inquiries regarding credential and student engagement arose. A major incentive for many serious learners to pursue academic programs is the opportunity for them to upgrade and get verified for their qualifications. To support meaningful learning, students may also require an online course setting that includes greater interaction with peers and instructors, as well as graded assessments. An online program that provides a qualification such as a certificate, diploma or Master's degree would meet these requirements. The six existing core courses (or parts of them) can be re-purposed and incorporated into current or future courses and degree programs. These courses support flipped, blended, and online teaching approaches, and provide a potential foundation for a new SFM Certificate or future Master's Program(s). In addition to the traditional online courses, all developed and proposed online courses will be upgraded to meet the requirements of Massive Open Online Courses (MOOCs) and Master's degree programs to enable participating universities to establish a self-sustaining SFM web-based program regionally.

3. Goal and Objectives

The overall goal of the project is to generate long-term improvements in forest education and

sustainable forest management capacity in the Asia Pacific region and worldwide.

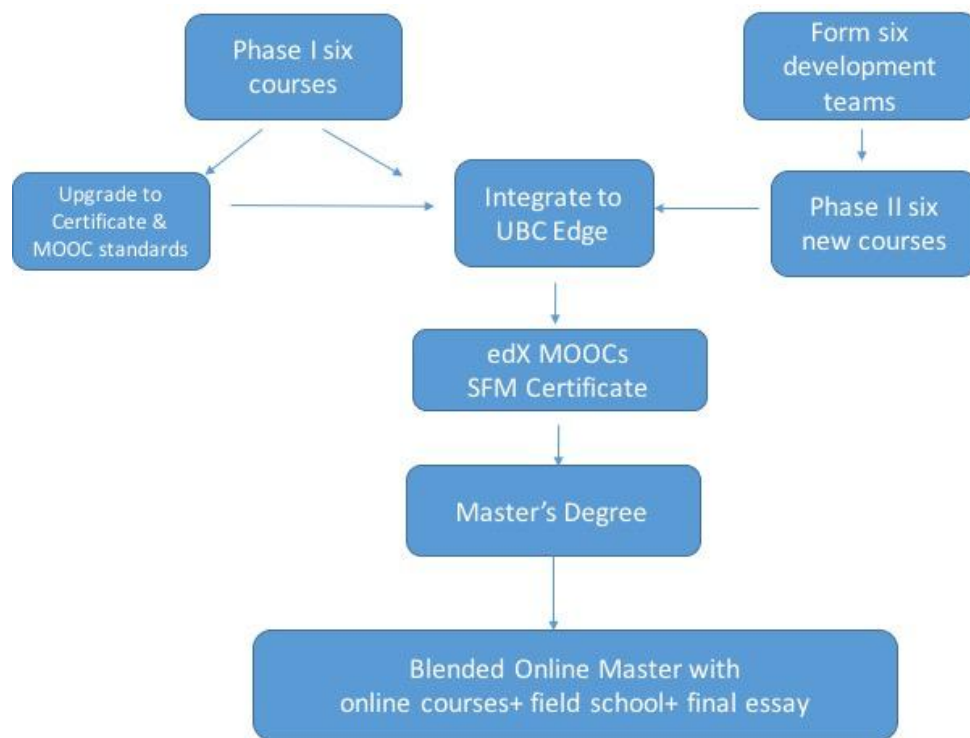
To maximize the utilization of this project, its goals in the second phase is to develop a comprehensive systematic SFM online learning program to benefit a wider range of global learners.

Project Objectives:

- Adopt the world leading online course platform (edX Edge) to develop new online courses with an emphasis on tropical forests, covering from forest measurement, planning, climate adaptation, carbon management to community forest and livelihoods;
- Enhance the quality of forest education in the region by integrating the world-leading edX online course platform (UBC edX Edge) with MOOC standards for all developed courses;
- Provide a foundation for regional universities to further develop an online SFM Master's degree program that will help filling the gaps in forest education across the region; and
- Make efforts on increasing equity in forest education by providing more open educational resources and credential programs (Certificate and Master's degree) to global learners.

4. Outputs and Main Activities

Based on the lessons that we learned from phase I and program implementation, and bearing in mind the rapid technological developments associated with MOOCs, in the second phase we will put immediate actions on the upgrading and promotion of the courses that were developed in Phase I. While developing the six new courses, an improved methodology will be applied to produce a systemic SFM program that will meet users' needs. The flowchart illustrates the key steps in Phase II.



Flowchart for Phase II

4.1 Expected Outputs

The project will generate the following outputs:

Output 1: Establishment of the AP-FECM SFM Certificate Program

The AP-FECM SFM Certificate Program will be built on a more advanced learning management platform, integrating instructor-facilitated active learning activities and authentic student assessment strategies. Completion of the Certificate Program will be recognized with an AP-FECM SFM Certificate issued by the Executive Office of AP-FECM.

Output 2: Migration to the world's leading online program platform (edX Edge) and upgrade to MOOCs version

EdX is a non-profit open online course provider created by the Massachusetts Institute of Technology and Harvard University, offering high-quality MOOC courses from the world's best universities and institutions to learners worldwide on open-source platform. With an edX platform, educators and technologists can use learning tools and new features integrated into the platform to create innovative online learning solutions to benefit all stakeholders in the

region. The UBC version of edX Edge will be specifically used for hosting and running the AP-FECM SFM Certificate Program. Meanwhile, MOOCs are a recent and widely researched development in distance education. They were first introduced in 2008 and have emerged as a popular mode of learning. While the budget is an order of magnitude less than it would be required to meet MOOC standards, the SFM online courses will adopt as many of the MOOC characteristics as possible to ensure that they attract students and serve their purpose.

In addition, unfinished course *Sustainable Use of Forest Ecosystem Services* has exhibited the most diverse audience engagement, with viewers and learners from 75 different countries around the world. We will need to develop the video lectures and other course content based on the completed structure. This course will also need to migrate to edX platform and follow the MOOC standard.

Output 3: Development of new online courses on sustainable management of tropical forests.

The development of new courses on tropical forest management will broaden the range of topics on SFM knowledge. Along with the developed courses in phase I, this project will provide a systematic knowledge and skill set for learners to understand sustainable forest management in a global context. New courses will also be available on UBC edX platform following MOOC standard. New courses will be structured to combine modules of basic knowledge and case studies in specific regional contexts. In addition, new technologies such as social media, virtual field trips, (visual/augmented reality) VR/AR, will be incorporated into the courses to promote social interaction, student engagement while providing visualized practical experiences to online learners. Student assessment strategies using Artificial Intelligent (AI) technology will be applied to evaluate and ensure teaching and learning outcomes.

Output 4: Promotion and management of *Innovative Sustainable Forest Management Education in the Asia-Pacific Region*.

The Executive Office of AP-FECM will be responsible for managing daily operations

and administration of this online course program and organizing promotional activities. In order to further increase the global recognition, the project will run continuously as open educational resources, meanwhile creating credential programs (Certificate, Master's degree) to attract a wider range of learners. An enrichment function will be added to courses to allow updates from instructors of regional universities to share their latest experiences and knowledge on SFM.

Beneficiaries:

The project intends to engage a wide range of forestry stakeholders with careers focused on environment, conservation and sustainability, particularly senior level students, young faculty, and mid-career professionals, including government officials, forest industry managers. In addition, educational institutions and research organizations working in the fields of forestry and natural resources will benefit from the project.

The target participants can be broadly divided into five categories:

- Formal participants registered in courses for self-directed learning to improve their knowledge of SFM;
- Formal participants who are pursuing higher academic qualifications in SFM;
- Informal participants who will integrate or partially integrate the online course material into their formal teaching;
- Educators and course technologists who want to enhance their teaching and course design skills.

4.2 Expected Outcomes

- 1) Within this project's 3-year term, more than 5000 learners from over 90 economies are expected to join the courses and utilize them to supplement their learning and teaching.
- 2) The project will set a unique example for regional universities in developing a joint Master's degree program to narrow the gap of forest education among different institutions and regions.

4.3 Main Activities

Activities that contribute to output 1

A1.1. Development of assessment strategies for the SFM Certificate program

A variety of student assessment strategies and learning activities will be designed and integrated into the existing courses in order to meet the requirements of a Certificate Program. Leading professors or experts from the five participating universities will be responsible for the development of course assessments and assignments.

Person in Charge: leading professors & Dr. Chris Crowley, UBC

Leading Institutes: UBC, UPLB, UM, BFU, UPM

Methods: Student assessment in formats of essays, portfolios, tests, presentations, design proposals, and more.

Potential Location: UBC, UPLB, UM, BFU, UPM

A1.2. Quality review and evaluation for the Certificate program

In order to ensure quality and standardize the development of the SFM Certificate program, UBC CTLT will provide standards of a certificate program to support leading professors in developing the student assessment strategies. Then CTLT will prepare and implement a quality review and evaluation for the program.

Person in Charge: Dr. Chris Crowley, UBC

Leading Institutes: UBC CTLT

Methods: Design evaluation plan and conduct quality review for each course

Potential Location: UBC

A1.3. Teaching and learning support for the Certificate Program

UBC will lead the effort to provide teaching and learning support for all courses in the AP-FECM SFM Certificate Program. Instructor and Teaching administrator (TAs) will be employed for all courses to lead discussions, answer questions, conduct reviews, grade assessments and provide feedback on exams and assignments on the Certificate platform. TAs will also be responsible for running the forum and facilitate information exchange on the open course blogsites.

Person in Charge: Dr. Guangyu Wang, UBC

Leading Institutes: UBC, AP-FECM

Method: Assign teaching assistant for courses

Location: UBC

A1.4 Certification of the program

Students will have the opportunity to gain a completion certificate for each course. To receive the AP-FECM SFM program certificate, students will be required to complete all required courses, and pass the final assessment for each course. The Executive Office of AP-FECM at UBC will be responsible for issuing the certificate, tracking student records and encouraging learner engagement.

Person in Charge: Michelle Zeng, AP-FECM

Leading Institutes: Executive office of AP-FECM at UBC

Potential participants: UPLB, UM, BFU, UMP

Location: Varied

Activities that contribute to output 2

A2.1 EdX Edge platform development

EdX Edge is a leading online learning management platform that enables the building and offering of innovative high-quality online course experiences to learners around the world. The certificate version of the existing and new proposed SFM online courses with comprehensive assessment strategies will be built on the edX Edge platform and made available on the server to allow for 24-hour access worldwide. Students will have the option to take the open source courses on the course blog sites first, and then upgrade to take the Certificate Program on edX Edge according to their availability and needs. When upgrading to the Certificate Program, students will need to register in the enrollment system, and a monitoring system will be put in place to supervise course operation.

Person in Charge: Chris Crowley, UBC

Leading Institutes: UBC CTLT

Location: UBC

A2.2 Testing of courses and website

The completed certificate package will be delivered to all participating universities and will undergo assessment and testing by UBC CTLT after they are built on the edX Edge platform. Leading professors will also be invited to test the website before opening it for student registration. Any necessary modifications of content or correction of technical issues will be undertaken based on the feedback received. Internal reviews will be organized by the UBC Faculty of Forestry to evaluate course quality.

Person in Charge: Chris Crowley, UBC

Leading Institutes: UBC CTLT

Potential participants: UPLB, UM, BFU, UPM, IPB, VNUF and more

Method: Review and testing

Location: Varied

A2.3 Upgrade of existing SFM online courses to MOOC versions

An upgrade will be made to the existing courses to restructure them in accordance with the standards of MOOC on the edX platform. All lecture materials of the existing courses will be edited based on the requirements of MOOCs. A quality review of all course content will be arranged to ensure in compliance with MOOC standards. The unfinished course *Sustainable Use of Forest Ecosystem Services* will need to be completed and moved to edX platform following MOOC standard.

Person in Charge: Dr. Guangyu Wang & Chris Crowley, UBC

Leading Institutes: UBC, UPLB, UM, BFU, UPM,

Methods: Upgrade video lectures to MOOCs standards

Location: UBC

Activities that contribute to output 3

A3.1. Development of tropical SFM curricula for the AP region

New courses focused on tropical forests will be developed by regional institutions. Leading professors or experts from participating institutions will be responsible for course

curricula development in consultation with experts from the participating institutions.

Leading Institutes: UBC

Participants: UM, UPLNB, BFU, CSIRO, CIFOR, RECOFTC, UN REDD, IPB, VNUF, NTU, KU, CAF

Methods: Innovative pedagogy

Potential Location: Varied

A3.2. Development of MOOCs template

In order to normalize and standardize the development of all course content and material for the proposed new courses to be in line with MOOCs on edX Edge, the UBC Faculty of Forestry and UBC CTLT will be responsible for providing content development templates to support the new leading professors and subject matter experts in developing new courses.

Person in Charge: Dr. Guangyu Wang & Chris Crowley, UBC

Instructional Designer/Project Manager: UBC, CTLT

Methods: Integration of video lectures, course materials, student assessment into the courses based on MOOCs standards

Location: UBC, CTLT

A3.3. Workshop on new online course design

UBC CTLT will provide central support to develop the new online courses by providing standardized course development templates. BFU, CSIRO, CIFOR, GFOI RECOFTC, CAF, UN REDD, NTU, KU, UM, are participants of the new online courses. Experts from these institutions will attend a workshop on online course development at UBC. In the workshop, the content and format for each course will be thoroughly discussed to ensure that all are built following the same requirements for quality and style. During the workshop, each leading professor will present his/her course development outline. The three main focuses of curriculum development, evaluation and cooperation will be: 1) avoid overlap among courses, 2) agreement over the depth and breadth of each course, and 3) ensure interconnection of each course. Copyright compliance issues will also be emphasized during the workshop.

Person in charge: Dr. Guangyu Wang, UBC

Lead Institute: UBC, CTLT

Participants: BFU, CSIRO, CIFOR, GFOI RECOFTC, CAF, UN REDD, NTU, KU, UM, UBC

Methods: Two-day extensive training and one-day course mapping

Location: Vancouver, Canada

A3.4. Development of new online courses focusing on tropical forest and completion of Course *Sustainable Use of Forest Ecosystem Services*.

The new courses currently under consideration for phase II are:

1) Plantation Design and Management

Course Coordinator/Lead Institute: Dr. Youqing Luo (BFU),

Participants: expert team from BFU, Dr. Damrong Pipatwattanakul from KU

2) Geomatics in Forestry (Data Collection and Measurement)

Course Coordinator/Lead Institute: Dr. Nicholas Coops /UBC

Participants: Dr. Li Yong Pang, Chinese Academy of Forestry, Dr. Cao Lin, Nanjing Forestry University

3) Climate Modelling and Forest Application

Course Coordinator/Lead Institute: Dr. John Innes, Dr. Tongli Wang, UBC

Participants: Dr. Guangyu Wang, Dr. Brad Seely, Dr. Stephen Sheppard

/ UBC. Case studies will be provided by UPM, National Taiwan University, and Forestry Research Institute of Myanmar

4) REDD+ Forest Measurement and Reporting

Course Coordinator/Lead Institute: Dr Chris Weston and Dr Luba Volkova / UM

Participants: Julian Fox / UN-REDD, Tom Harvey / GFOI, Dr. John Niles, University of California, San Diego.

5) Forest Resources Decision Making

Course Coordinator/Lead Institute: Dr. Jack Putz / University of Florida

Participants: Pete Bettinger/ University of Georgia, Dennis Dykstra/ Blue Ox Consulting,

6) Forests, Livelihoods and Community Forestry at SE Asia

Course Coordinator/Lead Institute: Dr. Naya Sharma Paudel/Forest action Nepal, Dr. Joleen Timko/UBC

Participants: Tropical Resources Institute at Yale University, RECOFTC, and UBC

7) *Sustainable Use of Forest Ecosystem Services*

Development will be based on the structure completed in phase I.

Course Coordinator/Lead Institute: Professor Juan M. Pulhin, UPLB

Participants: Dr. Gary Bull, UBC

Given the lesson learned in phase I, additional courses will be considered as a back-up plan to ensure course development in phase II.

8) Conservation in Asia

Course Participants/Lead Institute: Dr. Guangyu Wang/UBC

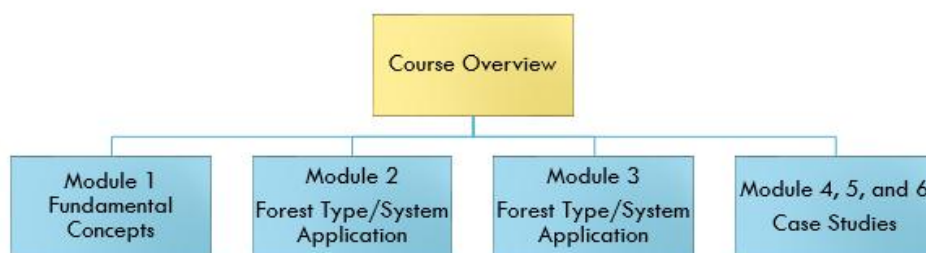
Participants: Dr. K. Ramesh/Wildlife Institute of India, Dehradun, Dr. Jinming Hu, Yunnan University, China

9) Urban Forestry

Course Participants/Lead Institute: Dr. Cecil Konijnendijk and Dr. Stephen Shepard/UBC

Participants: Dr. Cheng Wang / China Academy of Forestry, Dr. Wendy. Y. Chen/HKU

Methods: In order to empower the course development team and ensure effectiveness, during the second phase a team-based module approach will be applied to the development process. One leading institution will be designated to take responsibility for developing each course. The leading institutions will be encouraged to invite other contributors from regional institutions to join the course development teams. The leading institutions will work with their development teams to decide on the overall structure of the course, course content, course materials, learning activities, and assessment strategies. A major advantage of this approach will be to increase the diversity of presenters within each course.



All courses will be developed following the same general principles and a consistent format. The general principles include: courses can be tailored to reflect each particular national context; they can be integrated into current curriculum planning; duplication of course content is minimal; and benefits accrued by participating institutions are equitable. Typically, each course (3 credits) will contain minimum 4 modules and each module will contain at least 3 topics. Each topic will require approximately 9-12 hours of work for a person intimately familiar with the topic. Extra time will be required if the instructor needs to update knowledge on a particular topic (which is inevitable). New technologies such as social media, virtual field trips, VR/AR, will be incorporated into the courses to promote student engagement as well as peer to peer and student-instructor interactions while providing visualized practical experiences to online learners. Student assessment strategies with AI will be applied to evaluate teaching and learning outcomes.

For the self-directed version of a course, each topic will typically consist of background information, online video lectures, supplemental readings, and self-directed activities in the form of self-tests, self-directed reflection questions, and/or self-directed forum discussions. For the certificate version of a course, instructor-facilitated active learning activities will be added to each topic and graded assessments will be added to the course. Post production of the new courses will be conducted by UBC CTLT to ensure quality of the course package and cross-platform usability. AP-FECM will coordinate with the leading institutions to monitor the development process.

A3.5. Integration of UBC edX Edge platform

The proposed new online courses on tropical forests will be designed and added to UBC edX Edge for the Certificate Program in line with MOOC quality requirements. All courses in MOOC format will attract more attention from various learners through the edX platform.

UBC CTLT will assist with technical operations.

Person in Charge: Chris Crowley, UBC

Instructional Designer/Project Manager: UBC, CTLT

Location: UBC, CTLT

A3.6 Assessment and testing of new courses and website

The completed course package, including both the self and certificate versions of the new courses, will be delivered to all participating universities by UBC CTLT to undergo assessment and testing after they are built on the edX Edge platform. Reviews will be organized by the UBC Faculty of Forestry and external experts to evaluate course quality.

Person in charge/ Lead Institute: Dr. Guangyu Wang & Dr. Chris Crowley/UBC

Participants: CIFOR, RECOFTC, BFU, UM, UPLB, UPM, UK, IPB, VFU, NTU, CAF

Location: Varied

An external evaluation will be organized and conducted by APFNet for project completion. The Executive Office will prepare required documents and materials, as well as provide necessary supports for the evaluation.

Person in charge/ Lead Institute: Dr. Guangyu Wang & the Executive Office of AP-FECM

Participants: CIFOR, RECOFTC, BFU, UM, UPLB, UPM, UK, IPB, VFU, NTU, CAF, etc.

Location: Varied

Activities that contribute to output 4

A4.1 Promotion of the *Innovative Sustainable Forest Management Education Program*.

Aimed at increasing enrolment and promoting the reputation of APFNet and AP-FECM, the project will run continuously as open educational resources, meanwhile creating credential programs (Certificate, Master's degree) to attract a wider range of learners. To cover the costs and maintain a sustainable operation, program fees (to ensure cost-recovery) will be charged once enrollment rates becomes stable.

Promotional activities will be organized through internal cooperation of AP-FECM members, attendance of international and regional events, visiting universities and forestry-related organizations in the region, preparing e-news, social media publications, etc.

Person in Charge: Dr. Guangyu Wang, UBC

Leading Institutes: Executive office of AP-FECM at UBC

Methods: Participate events and visit partnering universities

Location: Varied

A4.2 Management of the *Innovative Sustainable Forest Management Education* program.

The Executive Office of AP-FECM will be responsible for operation and management of the *Innovative Sustainable Forest Management Education* program. Student enrolment, TA supervision, certification, etc. will be monitored by the Executive Office.

A4.2.1 Website operation

Daily operation and maintenance of the open resources blogs and Edge platform will be conducted by an IT manager assigned by the Executive Office of AP-FECM and UBC CTLT. The manager will also respond to requests from course leading professors and users regarding technical problems. With a Learning Management System developed, user statistics will be tracked, and all interactions and feedback will be kept and analyzed later.

Person in Charge: Dr. Guangyu Wang & Chris Crowley, UBC

Leading Institutes: Executive office of AP-FECM at UBC, UBC CTLT

Methods: Assign IT manager to support daily operation of the websites

Location: UBC

A4.2.2 Enrichment of the online SFM course content

In order to provide the most current SFM knowledge and information to stakeholders in the region, all course content will be renewed and integrated with regional case studies and data. Therefore, an advanced function for course update and enrichment will be made available to instructors who use the open resources blogs for their teaching. New content updated by instructors will be approved by course leading professors and added to the Certificate Program if applicable.

Workshops will be provided to faculty members and instructors from AP-FECM's member universities on how to use the open resources platform and integrate it into their current course teaching, as well as to encourage input from instructors.

Person in Charge: Dr. Guangyu Wang & Chris Crowley, UBC

Leading Institutes: Executive office of AP-FECM at UBC, UBC CTLT

Methods: Develop course enrichment function on the website and provide workshop for instructors to update the course content

Location: Varied

A4.3 Development of self-sustained web-based Master's degree program

The goal of this initiative is to build a high quality education program for forestry institutions in the region to narrow the gap of forest education, provide a cost-efficient distant learning program for students to pursue higher academic qualification, and most importantly to generate income for participating universities to cover the cost of running a graduate program sustainably.

A4.3.1 Improvement of all SFM online courses to meet Master's degree requirements

UBC will take the lead to modify course content and structure of all twelve courses to meet the course crediting policy of graduate level programs (3 credits for each course). The suggested blended master's degree program will require the completion of 30 credits, 18 being required web-based courses, 6 being field courses/schools and 6 being a graduating paper. The 18 credits of course work can be generated from any six of the twelve available courses.

Participating universities, which are willing to use the developed courses in their own programs, will be encouraged to upgrade these online courses to meet their national graduate program level and establish their own SFM Master's program. The Executive Office of AP-FECM at UBC will provide support to participating universities for program development if needed. Participating universities will need to obtain all relevant approvals (university, government) to host an online Master's program in their regions.

Person in charge/ Lead Institute: Dr. Guangyu Wang /UBC

Potential participants: BFU, UM, UPLB, UPM, IPB, VFU, NTU,

Location: Varied

5. Project financial management

Since participating institutions are highly accredited universities and organizations in the AP region, each should have a well-established financial management and internal auditing system to deal with a large amount of the research and education funding. For UBC, the funding will strictly follow the financial management procedure as outlined in the UBC Policy #87 – Research, Section 3: Administration of Trust Funds, and Policy #90 – Over-Expenditure on Research and Specific Purpose Trust Project/Grants. Grant and contract funds are held in trust by the University, and are not the property of any individual. Expenditures that do not conform to contract budgets may not be accepted when the account is audited following termination of the contract. Grantees may then be held responsible.

As technology is changing online learning rapidly, all courses developed are needed to keep up with the development of MOOCs and VR/AR, AI to provide a more advanced learning experience for global learners, which will require an increase of course development cost in the second phase.

The total counterpart funding has already exceeded 30% of the primary funding. The operation cost and administrative staff cost of the Executive Office of AP-FECM are excluded in this project budget. For more detail about the budget allocation, please see the Annex C and D.

6. Project reporting, monitoring and evaluation

The project quality assurance system will be rigorously followed based on the management structure: APFNet <-> AP-FECM <-> Executive Office of AP-FECM <-> Project Implementing bodies. The project performance will be monitored and measured regularly to identify variances from the program plans. Executive Office of AP-FECM and hired financial experts will monitor the progress and outcome of the project, the expenditure, quality, communication, staffing, and risks of the project.

Three on-site monitoring events will be carried out during the course of the project. An initial monitoring event will be performed approximately six months after the beginning of

the project. The monitoring will be conducted by the Executive Office of AP-FECM and the financial management specialist. The participants will be required to spend at least 30% of the budget and produce at least 20% of the expected outputs.

An intermediate monitoring event will be performed approximately one and half-year after the beginning of the project. It will be carried out by the Executive Office of AP-FECM and the financial management specialist. The participants will be required to spend a minimum of 60% of the budget and produce no less than 50% of the expected output.

The final monitoring event will be performed approximately one month in advance of the completion of the project. The monitoring will be conducted by the project management board and the financial management specialist. At this stage, all participants will be required to fully execute the budget and achieve all targeted outputs.

The lead institute, UBC will be subject to all three on-site monitoring events. Other participating institutes will be subject to the initial monitoring and the final monitoring. If any significant problems arise during the course of the project, additional monitoring will be performed with the approval of the project management board.

All participants are also required to produce quarterly progress reports and provide prompt answers to the inquiries from the Executive Office of AP-FECM and APFNet.

An external evaluation will be organized and conducted by APFNet for project completion. The Executive Office will prepare all required documents and materials, as well as provide necessary supports for the evaluation.

7. Project publicity and dissemination

Potential beneficiaries of the project are forestry students, faculty members, practitioners and policy makers in the Asia-Pacific region. Since 2016, the developed courses have been promoted through the Asia Pacific Forest education Coordination Mechanism to a global audience. Currently, the online courses have attracted over 3,300 users and 37,000 views from more than 90 countries. In the second phase, the Executive Office of AP-FECM will continue to host instructor-led sessions for global learners, encourage applications in member universities, and raise global recognition of the program through a variety of international events.

The publicity and dissemination of the results of the project will be handled by the Executive Office of AP-FECM, and the participating institutions. The major activities include organization of instructor-led sessions and maintenance of the project websites, production of dissemination materials, and contact with press, and dissemination events in regional and international channels.

The outputs of the project will be presented on AP-FECM's website, with links to the UBC edX platform. AP-FECM's website will also contain news and progress updates for the project. The project will also produce brochures, project fact sheets, short videos, and press articles throughout the implementation of project. These materials will be delivered at forestry and education related conferences, relevant newspapers, and new media channels such as YouTube, and other social media. The Executive Office of AP-FECM also plans to arrange promotional activities to publicize the project to global audiences.

8 Guarantee System

8.1 Project organizational and management structure

The project will follow a hierarchical management format as in Phase I. The project steering committee will consist of the 10 Steering Committee members of AP-FECM and a liaison from APFNet. The responsibility of the Steering Committee is to monitor the project management and report to APFNet.

The Executive Office of AP-FECM is responsible for implementation of the project, and handling the communication with APFNet. The Executive Office of AP-FECM will directly communicate with the leading institutions who will coordinate with participating contributors. The Executive Office of AP-FECM will make administrative and financial arrangements with leading institutions and participating contributors, and all participating institutions are responsible for the successful implementation of the project. The Executive Office of AP-FECM will also need to prepare and submit annual project plans, progress reports and completion reports to APFNet. As for financial report, at least one auditing will be conducted by an independent auditing company in consultation with APFNet.

In developing the six new courses, a team-based approach will be adopted to involve specific content experts from regional institutions and also to ensure stability of the course

development team. UBC CTLT will take responsible to provide technical support in course development, organization of workshop, platform development and maintenance.

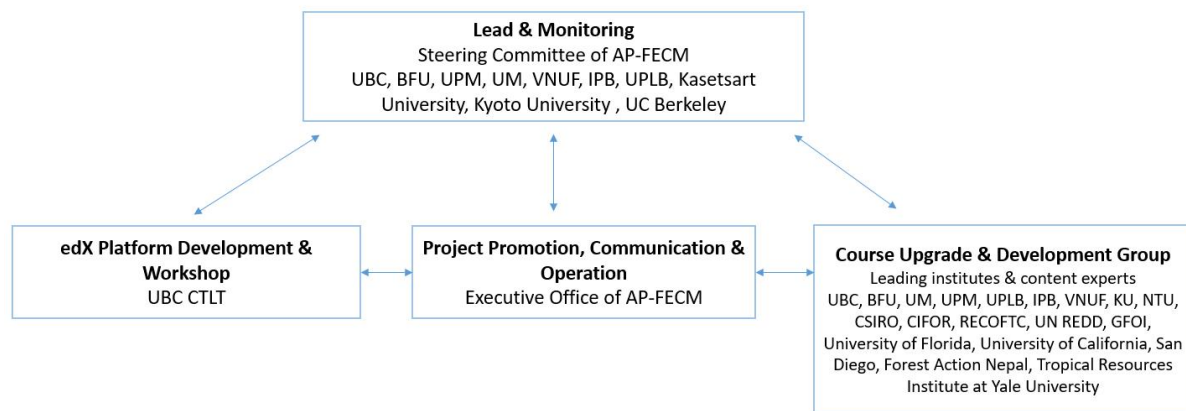


Fig.1 Project Management Structure

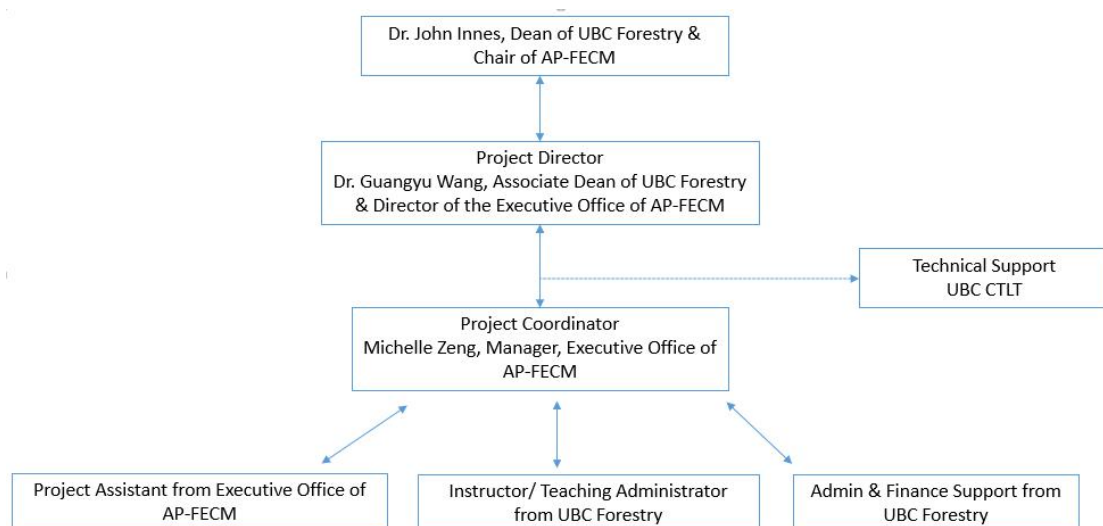


Fig.2 Project Organizational Structure

8.2 Organization ability

Project executive agency AP-FECM, as an international consortium of forestry universities, was established in 2011 with its mission to promote forest education through strengthening cooperation and taking collaborative actions that contribute to furthering sustainable forest management (SFM). It has 10 Steering Committee members, 58 member institutions, and an Executive Office to support its daily operations and projects management.

8.3 Material resource

Purchases of equipment and supplies for this project must be made through the UBC University Purchasing Office. None may obligate the University for the purchase of goods or services. All equipment so purchased is the property of the University. The servers and IT systems for hosting the AP-FECM website, online courses and UBC edX platform are located at UBC. It provides high efficiency and accessibility for the Executive Office to manage and maintenance the project outputs. The course development packages will be delivered to APFNet once they are finished.

9. Project sustainability and risk analysis

SFM is widely recognized as an effective means for forests to adapt to climate change, and to achieve a dynamic balance between environmental, economic, and social aspects. It is therefore the common goal for forestry stakeholders worldwide. However, given the rapidly changing and increasing expectations of goods and services from forests, it is extremely difficult for forestry managers to keep up with the evolution of the core values of forest management. This project aims to create a better understanding amongst managers and others of SFM and newly emergent forestry related issues of concern. The project addresses the sectoral strategy as specified in the goal of APFNet: "enhancing capacity building and strengthen information sharing on sustainable forest management in the forestry sector". In 2012, APEC leaders in their joint declaration clearly stated the support for "...efforts to enhance the mobility of students, researchers, and education providers within APEC through the development of higher education cooperation". The proposed project will benefit from this strong political support and in turn, contribute significantly to realizing that goal. Moreover, the proposed project activities were discussed and agreed to by all Steering Committee members of AP-FECM during the Steering Committee meeting in World Forestry Congress 2015 and the 4th AP-FECM conference in Asia Pacific Forestry Week 2016. Strong supports will be provided by Steering Committee members and other members of AP-FECM to ensure the development and implementation of this project.

Major outputs of the project will be the SFM certificate program, six new core courses for SFM education, and a future web-based SFM Master's degree program. All these outputs

will be kept open to the general public after the completion of the project. AP-FECM, with the support of APFNet, will maintain the online materials. All participating institutions will also make all or parts of the open online course packages available through their websites. The open online courses will be structured by modules, which will enable each university to integrate the course material into their current teaching, or customize it with local materials into their education curricula. Also, the proposed SFM Certificate and future web-based SFM Master's program are good ways to attract enrolment and generate income to cover the on-going costs. As such, the project will be sustainable over time, and continue to enrich and contribute to the education provided at participating universities. We believe the project will bring a huge positive impact on sustainable forest education and forest practices in the region and

The main uncertainties that might impede the achievements of the project's objectives are that 1) unexpected job change of leading professor will impact the implementation of course development such as the case of Dr. Awang Noor from UPM; 2) edX MOOC standards are highly influenced by technology innovation, therefore, budgets for achieving MOOC standards might keep changing and more resources may be required in the coming three-year term. To address these issues, several measures have been taken. The project enrolled the best forestry universities and organizations in the region to form six team-based course development groups with more than two members in each group. The setting will limit the influence from unexpected job changes of individual member. Also, the Executive Office will continually monitor the progress and prepare backup plan for any unexpected issues happened. Finally, the SFM online courses will adopt as many of the MOOC characteristics and new educational technology as possible to ensure that they attract students and serve their purpose, even though it highly depends on final costs of achieving edX MOOC standards and incorporating new technology.

Annex B: Project logical framework

Items	Intervention logic	Objectively verifiable indicators of achievement	Sources of information and means of verification	Assumptions
Goal	The overall goal of the project is to generate long-term improvements in forest education and sustainable forest management capacity in the Asia Pacific region and worldwide.	<ul style="list-style-type: none"> 1. The developed courses to deliver high quality educational resources in forestry and SFM; 2. New pedagogy and technology to improve forestry education worldwide; 3. Personnel with enhanced capacity for SFM; 4. A collaborative platform to advance globalization in forestry education. 	<ul style="list-style-type: none"> 1. Course materials will be delivered to APFNet at the end of the project; 2. Advanced teaching methods and online education model will be documented; 3. Reports and publications will be submitted to APFNet. 	Based on experiences obtained from phase I (over 3,300 users and 37,000 views from 91 countries, representing over 47% of countries worldwide), the phase II will be expected to attract more than 6,000 users around the world. But it may be beyond the project's direct control.
Objectives	<ul style="list-style-type: none"> 1. Adopt the world leading online course platform (edX Edge) to develop new online courses with an emphasis on tropical forests; 2. Enhance the quality of forest education in the region by integrating the world-leading edX online course platform (UBC edX Edge) with MOOC standards; 3. Provide a foundation for 	<ul style="list-style-type: none"> 1. A systematic SFM knowledge with existing courses and new courses in tropical forest; 2. A forestry MOOC program on the edX Edge platform; 3. An accessible OER in forestry and SFM; 4. Online credential programs in forestry and SFM. 	<ul style="list-style-type: none"> 1. All developed courses will be delivered to APFNet at the end of the project; 2. The courses will be uploaded and accessible on the edX Edge platform; 3. The OER platform will be available at sfmcourses.com; 4. The project will be demonstrated and promoted through various 	The same as above.

	regional universities to further develop an online SFM Master's degree program; and 4. Make efforts on increasing equity in forest education by providing more open educational resources (OER) and credential programs (Certificate and Master's degree) to global learners.		international events and AP-FECM's network; 5. Reports and publications will be submitted to APFNet	
Output 1	Establishment of the AP-FECM SFM Certificate Program	Establishment of the AP-FECM SFM Certificate Program	The Certificate course package to be delivered.	N/A
Activity 1.1 Activity 1.2 Activity 1.3 Activity 1.4	<ul style="list-style-type: none"> • Development of assessment strategies for the SFM Certificate program • Quality review and evaluation for the Certificate program • Teaching and learning support for the Certificate Program • Certification of the program 	<ul style="list-style-type: none"> • Student assessment strategies and learning activities will be designed and integrated into the existing courses for the Certificate Program • Instructor and Teaching administrator (TAs) will be employed to facilitate the courses • Learners will obtain a completion certificate once they complete all required courses, and pass 	<ul style="list-style-type: none"> • Course materials • Learner data and performance report • Certificate records • Semi-annual and annual reports • Learning management system 	N/A

		the final assessment		
Output 2	Migration to the world's leading online program platform (edX Edge) and upgrade to MOOCs version	Migration to the world's leading online program platform (edX Edge) and upgrade to MOOCs version	All developed courses will be uploaded on the edX Edge platform, which will be accessible online.	N/A
Activity 2.1 Activity 2.2 Activity 2.3	<ul style="list-style-type: none"> • EdX Edge platform development • Testing of courses and website • Upgrade to MOOC versions 	<ul style="list-style-type: none"> • The certificate program will be built on the edX Edge platform and available on the server for 24-hour access worldwide • All courses on edX Edge platform will be tested by participated universities and partners • All existing lecture materials will be modified and upgraded to MOOC standards 	<ul style="list-style-type: none"> • Courses will be opened to global learners on the edX Edge platform • Semi-annual and annual reports 	The project will try to meet the requirements of edX and MOOC, but as technology is changing rapidly, the outcomes may be beyond the project's direct control.
Output 3	Development of new online courses on sustainable management of tropical forests	Over 15 leading professors and content experts will be invited to join the development of new online	7-9 new online courses will be developed	N/A

		courses		
Activity 3.1 Activity 3.2 Activity 3.3 Activity 3.4 Activity 3.5 Activity 3.6	<ul style="list-style-type: none"> • Development of tropical SFM curricula • Development of MOOCs template • Workshop on new online course design • Development of new online courses on tropical forest and completion of Course <i>Sustainable Use of Forest Ecosystem Services</i> • Integration of UBC edX Edge platform • Assessment and testing of new courses and website 	<ul style="list-style-type: none"> • New curricula for tropical courses • MOOC course template for new courses • A workshop for course development • New courses to be uploaded on edX Edge platform • New courses on edX Edge platform will be tested by participated universities and partners 	<ul style="list-style-type: none"> • Course materials • Workshop materials • New courses will be opened on the edX Edge platform and at sfmcourses.com • Semi-annual and annual reports 	<p>The project will try to meet the requirements of edX and MOOC, but As technology is changing rapidly, the outcomes may beyond the project's direct control.</p>
Output 4	Promotion and management of the project in the Asia Pacific region and worldwide	To attract over 6000 global users	Verifiable through user data and performance report	N/A
Activity 4.1 Activity 4.2 Activity 4.3	<ul style="list-style-type: none"> • Promotional activities • Project management & operation • A potential web-based Master's degree program 	<ul style="list-style-type: none"> • The project will be run as OER, meanwhile creating credential programs (Certificate, Master's degree) to attract a wider range of learners. • Two instructor-led 	<ul style="list-style-type: none"> • Course websites • Event reports, proceedings and publications • Semi-annual and annual reports • Promotional materials (brochures, e-news, video, 	N/A

		<p>sessions will be organized</p> <ul style="list-style-type: none"> • Intensive promotion will be conducted through various international events and AP-FECM's network • Workshop will be provided to faculty members and instructors from AP-FECM's network to encourage utilization of course materials • Courses and web-platforms will be operated and maintained on a daily basis • Networking platform will be enhanced to increase the influence of APFNet and AP-FECM 	<p>etc.)</p> <ul style="list-style-type: none"> • Learning management system 	
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Annex

Annex A Basic information of project sites

Annex B Project work plan

Annex C Project budget by activity

Annex D Project budget by category

Annex E List of projects executing agency and potential partnership organizations

Annex F Steering Committee members of AP-FECM

Annex G Draft Course Outline

Annex H Project implementation report for phase I

Annex I Communication strategy