Lao People's Democratic Republic
The Capacity Development Project for Establishing National Forest Information System for Sustainable Forest Management and REDD+ (Phase Ⅱ)

Completion Report

Annex

Lao People's Democratic Republic

The Capacity Development Project for Establishing National Forest Information System for Sustainable Forest Management and REDD+ (Phase Ⅱ)

Completion Report

Annex1-1 : Minutes of 1st JCC

MINUTES OF THE MEETING

THE 1ST JOINT COORDINATING COMMITTEE MEETING OF
THE CAPACITY DEVELOPMENT PROJECT FORESTABLISHING
NATIONAL FOREST INFORMATION SYSTEM FOR SUSTAINABLE FOREST MANAGEMENT AND
REDD+ IN LAO PDR

Pursuant to the Record of Discussions signed between Japan International Cooperation Agency (hereinafter referred to as "JICA") and the Department of Forestry, Ministry of Agriculture and Forestry of Lao PDR (hereinafter referred to as "DOF, MAF"), dated 20 May 2013, the first meeting of the Joint Coordinating Committee (hereinafter referred to as "JCC") of the Capacity Development Project For Establishing National Forest Information System for Sustainable Forest Management and REDD+ in Lao PDR (hereinafter referred to as "NFIS") was convened on 23October 2013 at the Meeting Room, Department of Forestry, Vientiane.

The JCC in principle approved the drafts of Inception Report and Work Plan for the 1st Phase from Sep 2013 to Mar 2014, and the outline of Kick-Off Workshop on NFIS as attached herewith. Other main matters related to the JCC meeting are also in Annexes attached.

Vientiane, 23 October 2013

JAPAN INTERNATIONAL COOPERATION AGENCY JICA LAOS

For

Boualy PHAMEUANG

Mr. Koichi TAKEI
Chief Representative
JICA Laos Office
Japan International Cooperation Agency
Japan

Dr. Silavanh SAWATHVONG
Director General
Department of Forestry
Ministry of Agriculture and Forestry
Lao People's Democratic Republic

Annex 1: Agenda of the JCC Meeting

Annex 2: Summary of the Meeting

Annex 3: List of Participants

Annex 4: Draft Inception Report

Annex 5: Draft Work Plan for the 1st Phase from Sep 2013 to Mar 2014

Annex 6: Draft outline of the Kick-Off Workshop

Annex 1

The 1st Joint Coordinating Committee Meeting of
Capacity Development Project for Establishment of National Forest Information System
for Sustainable Forest Management and REDD+ (NFIS Project)

1. Date and venue

Date: Afternoon, 23rd (Wed) October 2013

Venue: Conference Room, DOF

2. Objectives of the meeting

1) To present and approve the Inception Report of the Project

2) To present and approve the Work Plan from October 2013 to March 2014

3) To present and approve an outline of the Kick-off Workshop on NFISP

3. Chairpersons

Chairperson: Dr. Silavanh SAWATHVONG, DG, DOF

Co-chairperson: Mr. Koichi TAKEI, Chief Representative, JICA Laos Office

4. Agenda

Time	**Items**
13:00-13:30	Registration
13:30-13:40	Introduction and welcome *(Mr. Linthong, Project Director, NFISP)*
13:40-13:50	Opening speech by Department of Forestry, MAF *(Dr. Silavanh SAWATHVONG, Director General of DOF)*
13:50-14:00	Speech by Japan International Cooperation Agency *(Mr. Takei, Chief Representative, JICA Laos Office)*
14:00-14:30	Presentation of draft Inception Report *(Mr.Soukanh, Project Manager, NFISP)*
14:30-14:50	Discussion on draft Inception Report
14:50-15:00	*Coffee break*
15:00-15:20	Presentation of Work Plan until March 2014 *(Mr.Soukanh, Project Manager, NFISP)*
15:20-15:35	Discussion on Work Plan until March 2014 *(Chairperson)*
15:35-15:50	Presentation of Outline of Kick-off Workshop on NFIS *(Mr. Soukanh, Project Manager, NFISP)*
15:50-16:00	Discussion *(Chairperson)*
16:00-16:30	Conclusion and closing *(Chairperson and Co-chairperson)*

Annex 2

Summary of Meeting

5.1 Opening

Chairperson welcomed all the participants who are invited to this meeting about the Forestry Information System Project.

He summarized the process of past forest resource information development in Lao PDR that the survey of forest resources such as the assessment of forest cover and changing of forest land use had been carried out since 1982 with 10 year interval i.e. 1982, 1992, 2002 and 2010 and the 1st national forest inventory called NFI had been conducted from 1991 to 1999 covering all Provinces. Further, he noted that in the past there had been only information/data of growths and volume of trees but no survey system for assessment of forest biomass and forest carbon. He also mentioned that the past NFI was supported by Sida and now JICA was here to work with us.

He referred to the pilot work on estimate of forest biomass and carbon stock by an Expert from Finland using previous NFI data during the period from 1991 to 99, but the results were not enough especially for REDD+. He raised the support provided by Japan's Forest Information Management Program (FIM), which provided necessary facilities, equipment and technical capacity development of Lao staff, and continued that the Lao Government and JICA had agreed to have a follow-up project to complete the FIM maps and inventory data and develop them into carbon estimate with database in scope. He expressed a gratitude that the national forest information project had been formulated and the project was to commence today by the Lao side with technical assistance from Kokusai Kogyo and Air Asia Survey companies.

He stated that the meeting today was for discussion to introduce this project and for better design of the project activities in the first phase until Mar 2014. He stressed the need to have more ideas and comments to be added to the planned activities because the products/output of this project would be the National data that Lao PDR have never used before and they would have details about the forest and carbon stock for sustainable forest management as well as for REDD+.

He further stressed that the emission from land use changes esp. forest loss and degradation was largest in Lao PDR occupying about 80% of all emissions and the necessity to address this issue together with the Ministry of Natural Resources and Environment for developing the forest data system to carry on the establishment of REDD+ through sharing same database around country, and there was a pressing need to have coordination between the land sector, forest resources management sector and other sectors involved in REDD+ development. He also stated that the implementation of this project was very timely when the Government was preparing an institutional arrangement for REDD+.

Finally, he stressed again the importance of ideas and comments from participants so that the project design and activities would be improved so as to be more in line with the current domestic and international situation concerning forest mapping and carbon estimate under REDD+.

Co-chairperson delivered his opening speech as follows;

"It is my great pleasure to say a few words today on behalf of the Japan International Cooperation Agency (JICA), at the first Joint Coordinating Committee Meeting of the Capacity Development Project for Establishment of National Forest Information System for Sustainable Forest Management and REDD+ today.

First of all, I would like to express my appreciation to all participants for your cooperation and assistance to Japan's projects, thus far. Your continuing support will be very important for the outcome of our projects.

The Lao government has formulated a plan to restore its forestation rate to 70% by 2020. To achieve this target, it has been establishing and revising forest-related laws and rules. It has also been defining Reducing Emissions from Deforestation and Forest Degradation (REDD) as a measure against climate change; and as a useful means to raise the livelihood of farmers who rely on forest conservation and forests.

To achieve this purpose, the government of Japan has committed itself to providing various forms of Official Development Assistance in the Forestry sector of the Lao PDR. This support includes;

(1) the FSCAP project – capacity development for implementation the Forestry Strategy 2020 and other forestry related issues including REDD+;
(2) the PAREDD project – a field-level project that aims to reduce deforestation at the local level;
(3) And the Forest Preservation Program.

I would also like to highlight that this project is important. The project will implement for only 2 years with the aim at Establishment of National Forest Information System by compiling information on forest carbon dynamics at national level, designing a prototype of national forest information database, designing of national forest inventory, and compiling relevant information required by REDD+. Since this project aims at capacity building, this is very good opportunity for the government officers to obtain the techniques and the basic practical knowledge and skills for data collection methodology, especially the sample surveys based on measurement from Japanese experts and other resources personnel.

Today, we will listen to the plan of operation of the project Therefore, I expect all JCC members attending today's meeting will actively involve in providing the comment and suggestion for the improvement of project planning and operation to ensure the project has a good plan.

In order to ensure the effectiveness and sustainability of our cooperation, Ministry of Agriculture and Forestry will not only need to actively participate in, but also expected to assume the ownership in project implementation.

In this connection, I would like to ask the government of Lao to make continuous effort to allocate necessary qualified and appropriate number of staff to work in this project and bearing necessary cost for project implementation. I would also like to emphasise that Lao counterparts must also work hard in order to sustain the project activities.

Before closing my speech, I would like to express my heartfelt thanks to all of those who have been involved in the process of project formulation and organize the first Joint Coordinating Committee Meeting of the Project. I also do hope that our cooperation will continue to foster a close working relationship between Japan and the Lao PDR."

5.2 Presentation and Discussion on the draft Inception Report

Mr. Soukanh BOUNTHABANDID, NFIS Project Manager, Presented an outline of NFIS.

Mr. Linthong Khamdy, Director, FIPD, requested clarification of the following;:

1. Concept of National Forest Information System
2. Development of National Forest Type and Carbon Maps with respect to the 3 forest categories, village forest and plantation forest

Mr. Kitamura, Chief Adviser, NFIS, responded as follows;

1. Concept of National Forest Information System

The chart of Concept of National Forest Information System shows the main component and functions of the system with the national forest monitoring system playing the central functional roles and providing the necessary output for REDD+ and sustainable forest management such as REL/RL, forest carbon change, forest maps for management planning. But, this is only a concept and it is not clear at this stage yet how these components and functions are defined and linked as a system.

2. Maps and forest categories, village forest and forest plantation

The forest maps show location and distribution of various forest types, which meet the physical definition of forest and each forest type. The 3 forest categories and village forest are administratively defined forest for forest management, therefore their boundaries will be overlaid on forest maps after map finalization, then we will see how much forest remain in each Conservation Forest and so on.

Dr. Kinnalone Phommasack, REDD+ Office, DOF, asked two questions as follows;

1) We knew that the REDD+ components included the establishment of REDD's strategy, REL/RL, MRV and Safeguards. How and which component would this project contribute to?
2) UNFCCC required REDD+ countries to report the results of REDD+ implementation every 4 year in their National Communications. But, the project seemed proposing a national forest inventory every 5 year. How did this duration meet the REDD+ reporting requirement? Moreover, this project would last only 2

years and how the system and data/information established or collected would be maintained and used after the project completion in two years?

Mr. Kitamura answered that as for the 1st question this project would provide carbon stock estimate for the 3 time points i.e. 2000, 05 and 2010 and the carbon changes between these points i.e. 2 periods and they would be used for construction of REL/RL as historical data. Concerning the inventory cycle he replied that the 5 year cycle of forest inventory would match the development planning of Government but doesn't meet the UNFCCC's requirement of every 4 years and this was an issue which the Government had to decide.

5.3 Presentation of Work Plan and Discussion

Mr. Soukanh presented an outline of the 1st Phase Work Plan until March 2014.

Dr. Silavanh SAWATHNVONG, Director General of DOF, after summarizing the contents of the work plan, stated that DOF needed to report the project budget to the Government, no figure was provided in either the Inception Report or 1st Phase Work Plan.

Mr. Koichi Takei, Chief Representative, JICA Laos Office replied that the JICA Office would provide DOF with the information regarding the budget.

Mr. Hideaki Takai, Chief Adviser, FSCAP, provided information for the 2nd question made by Dr. Kinnalone that the project had some components only for designing such as national forest information database and next national forest inventory and this was because of its short implementation period, but last year and this year, too, the Lao Government submitted to Japanese Government a proposal for an integrated forestry project which also incorporated this forestry information system as one of its components. He continued that if Japanese Government accepted the proposal by Government of Laos this year, the integrated project would follow activities of NFIS project after its completion in 2015 maybe for another 4 year period.

He stated regarding Output 2 Database Design that this database component was closely related to the existing database of SUFORD and also preparation is now underway for the establishment of databases for Protection forest and Conservation forest under FPP TA2. He then questioned how the overall database design under NFIS project was consistent with the progress of the FPP TA2, which will finish soon.

Mr. Haraguchi, database expert, NFIS, explained the slide of the presentation "Design of Prototype of NFIDB" as follows; FPP was developing the protection forest and conservation forest management databases. The design of these databases was almost completed and prototype databases were currently developed. So, this NFIS project itself would not work on these databases themselves. But even though FPP protection forest and conservation forest management database frame was going to be developed, the information and contents to be used in the databases were not sufficient enough. The contents should be developed from the information developed by FIM and this NFIP Project namely national level geo-spatial information including forest base map and forest inventory survey data. Those data were stored in other databases but need to be

further processed and linked with the databases for Protection Forest and Conservation Forest for better management planning and reporting of these forest categories. So under NFIS project, the system component of the FPP would be one part of the big structure of NFIDB design.

5.3 Presentation of Proposal on Kick-Off Workshop and Discussion

Mr. Kitamura proposed an outline of the Kick-Off Workshop planned on 30th (wed) Oct 2013 by stressing importance of coordination and cooperation with other projects and agencies engaged in forest mapping and carbon estimate. He also requested confirmation of the date of workshop because of limited time for preparation and needs for commencement of actual map accuracy assessment and carbon stratification works as soon as possible.

Dr. Silavanh confirmed the time and venue of the workshop as proposed.

5.4 Closing

Co-chairperson thanked all participants and for the presentations for NFIS project and stated that this project was highly technical and the Japanese experts and the Lao side Officials needed to closely work together and also that this was a development project, so at the end of 2 years the knowledge and techniques for map improvement, designing the database, and carbon stock estimate, etc. should be fully transferred to the Lao side, so that the Lao side would be able to manage the database etc.

He also noted that this project was very focusing on data itself but the significance of data was that the data was used effectively. He stressed that in addition to the expected use of the forest data and information including reporting to national and international organizations, the data and information showing the forest situation and past changes in Laos should be used for formulation of policy and measures for improvement of forest management and urged the relevant departments of Government to explore the possibility of making best use of the data and information for the coming 2 years.

Chairperson stated that today's meeting was successful and hopefully all participants understood the contents of the project activities and the work plan and hoped the implementation of the Phase 1 would led to successful planning and implementation of the Phase 2 for the development of data and information, and the database of forest resources. He also stated that further comments and requests for clarification on the drafts of Inception Report and 1st Phase Work Plan would be accepted until 30th Oct 2013 and after the deadline, if no comment for revision, they would be considered approved.

He also thanked all participants for attending this meeting, which was very interesting, and hoped that the technical issues would be discussed in detail and become clearer at the kick off workshop next week and DOF would cooperate and coordinate all the works together to make the data and information produced by this project the national ones. At the end he wished all the participants healthy and the project to be carried out efficiently.

Annex 3

Participants

Chairperson

Dr. Silavanh SAWATHVONG, Director General, DOF, MAF (Project Director)

Co- chairperson

Mr. Koichi TAKEI, Chief Representative, JICA Laos Office

Members

Lao Side

Mr. Somchay SANONTRY, Deputy DG, Mr. Bounsuane, Planning Division, Mr. Sawanh CHATHAKHUMMANH, REDD+ Office

Mr. Linthong KHAMDY, Director, FIPD

Mr. Oukham Phiathep, Deputy DG, Department of Planning, MAF

Mr. Saysamone Phothisat, Deputy DG, DFRM

Mr. Soukanh BOUNTHABANDID, Head of FRIC, FIPD

Mr. Sombath PANYASAK, Deputy Head, FRIC

Mr Souvanna CHANTHALUESY, FRIC

Mr Siamphone SIBOUN, FRIC

Japan Side

Mr. Akira MIZUNO, JICA Laos Office

Mr. Hideaki TAKAI, Chief Adviser, Forestry Sector Capacity Development Project (FSCAP)

Mr. Takayuki NAMURA, REDD+, FSCAP

Mr. Kenji NAKAJIMA, Coordinator/Forest Management, FSCAP

Mr. Makoto DAIMON, Chief Adviser, Participatory Land and Forest Management Project for Reducing Deforestation (PAREDD)

Mr. Noriyoshi KITAMURA, Chief Adviser, NFIS

Mr. Masamichi HARAGUCHI, Deputy Chief Adviser/Database, NFIS

Dr. Ryota KAJIWARA, R/S, NFIS

Mr. Toru FURUYA, Database, NFIS

Observers

Lao Side

Ms. Thongsouk XAYAPHANTHONG, Planning Division, DOF

Dr. Kinnalone PHOMMASACK, REDD+ Office, DOF

Japan Side

Mr. Seiichi YOKOI, Agriculture Policy Adviser, JICA/MAF

Annex 4: Draft Inception Report

Annex 5: Draft Work Plan for the 1st Phase from Sep 2013 to Mar 2014

Annex 6

The Kick-Off/Technical Workshop on the Capacity Development Project for Establishment of National Forest Information System for Sustainable Forest Management and REDD+ (NFISP)

(Draft)

1. Date and venue

Date: Afternoon, 30th (Wed) October 2013 (TBD)

Venue: Conference Room, Department of Forestry, VTE

2. Objectives of the workshop

1) To present an outline of NFISP and get feed-back from other related projects/donors for coordination and cooperation

2) To present options for methods and processes for map accuracy assessment/correction, carbon stratification and designing of national forest information database and get feed-back from concerned projects/donors for coordination and cooperation

3. Chairperson

Chairperson: Dr. Silavanh SAWATHVONG, DG, DOF

4. Participants

Lao Side

MAF: NAFRI(Forest Research Center), any other department or divisions?

DOF: Mr. Somchay SANONTRY, Deputy DG, Mr. Sawanh CHANTHAKHUMMANH, Director, REDD+ Office

DFRM: Climate Change Office, Land Information Center (?), Remote Sensing Center, REDD+ Office?

National University of Laos; Faculty of Forestry (Dr. Sithong)

Other Donors/Projects

World Bank (FCPF), CliPAD, LEAF, FSCAP, PAREDD, SUFORD III, WWF, WCS, i-REDD, New Chip Xeng, etc.

NFIS Project

Mr. Linthong KHAMDY, Project Director, Mr. Soukanh BOUNTHABANDID, Project Manager, Mr. Sombath PANYASAK, Deputy Head, FRIC, Mr. Mr. Khamkhong INTHAVONG, Mr Souvanna CHANTHALUESY, Mr Siamphone SIBOUN

NFIS Project experts

4. Agenda

Time	**Items**

13:00-13:30	Registration
13:30-13:40	Introduction and welcome *(Mr. Linthong, Project Director, NFISP)*
13:40-13:50	Opening speech by Department of Forestry, MAF *(Dr. Silavanh SAWATHVONG, Director General of DOF)*
13:50-14:20	Presentation of NFISP Outline *(Mr.Soukanh, Project Manager, NFISP)*
14:20-14:40	Q&A for NFISP Outline
14:40-15:00	Coffee break
15:00-15:15	Presentation on Options for Map Accuracy Assessment and Correction (*Dr. Kajiwara, R/S expert, NFISP*)
15:15-15:30	Discussion on Options for Map Accuracy Assessment and Correction
15:30-15:45	Presentation on Options for Carbon Stratification *(Dr. Kajiwara, R/S expert, NFISP)*
15:45-16:00	Discussion on Options for Carbon Stratification
16:00-16:10	Presentation on initial idea for designing of National Forest Information Database *(Mr. Haraguchi, Database expert, NFISP)*
16:10-16:20	Discussion on designing of National Forest Information Database
16:20-16:30	Conclusion and closing *(Chairperson)*

Lao People's Democratic Republic
The Capacity Development Project for Establishing National Forest Information System for Sustainable Forest Management and REDD+ (Phase Ⅱ)

Completion Report

Annex1-2 : Minutes of 2nd JCC

MINUTES OF THE MEETING

THE 2ND JOINT COORDINATING COMMITTEE MEETING OF
THE CAPACITY DEVELOPMENT PROJECT FOR ESTABLISHING
NATIONAL FOREST INFORMATION SYSTEM FOR SUSTAINABLE
FOREST MANAGEMENT AND REDD+ IN LAO PDR

Pursuant to the Record of Discussions signed between Japan International Cooperation Agency (hereinafter referred to as "JICA") and the Department of Forestry, Ministry of Agriculture and Forestry of Lao PDR (hereinafter referred to as "DOF, MAF"), dated 20 May 2013, the second meeting of the Joint Coordinating Committee (hereinafter referred to as "JCC") of the Capacity Development Project For Establishing National Forest Information System for Sustainable Forest Management and REDD+ in Lao PDR (hereinafter referred to as "NFIS") was convened on 26 May 2014 at the Meeting Room, Forest Inventory and Planning Division, Department of Forestry, Vientiane.

The JCC approved the Work Plan for the 2nd Phase from Apr 2014 to Sep 2015, and an idea of a technical workshop on forest mapping and carbon assessment to be jointly organized by DOF, NFIS and CliPAD as attached herewith. Other salient matters related to the JCC meeting are also in Annexes attached.

Vientiane, 26 May 2014

Mr. Koichi TAKEI
Chief Representative
JICA Laos Office
Japan International Cooperation Agency
Japan

Mr. Somchay SANONTRY
Deputy Director General
Department of Forestry
Ministry of Agriculture and Forestry
Lao People's Democratic Republic

The 2nd Joint Coordinating Committee Meeting of
Capacity Development Project for Establishment of National Forest Information System
for Sustainable Forest Management and REDD+ (NFIS Project)

1. Date and venue

Date: Afternoon, 26th (Mon) May 2014
Venue: Meeting Room, FIPD/DOF

2. Objectives of the meeting

1) To report the results of 1st Phase (Sep 2013 – March 2014)
2) To present and approve the Work Plan for the 2nd Phase (April 2014 to Sep 2015)
3) To introduce and discuss an initial idea of a Technical Workshop on Mapping and Carbon Assessment (Provisional) by NFISP/CliPAD

3. Chairpersons

Chairperson: Mr. Somchay SANONTRY, Deputy Director General, DOF
Co-chairperson: Mr. Koichi TAKEI, Chief Representative, JICA Laos Office

4. Agenda

Time	Items
13:00-13:30	Registration
13:30-13:40	Introduction and welcome *(Mr. Linthong, Project Director, NFISP)*
13:40-13:50	Opening speech by Department of Forestry, MAF *(Mr. Somchay SANONTRY, DDG, DOF)*
13:50-14:00	Speech by Japan International Cooperation Agency *(Mr. Takei, Chief Representative, JICA Laos Office)*
14:00-14:30	Presentation of the 1st Phase results *(Dr. Kajiwara, NFISP)*
14:30-14:50	Discussion on The 1st Phase Results
14:50-15:00	*Coffee break*
15:00-15:20	Presentation of Work Plan for the 2nd Phase *(Mr.Soukanh, Project Manager, NFISP)*
15:20-15:35	Discussion on the 2nd Phase Work Plan *(Chairperson)*
15:35-15:50	Presentation on an initial idea of Technical Workshop on Mapping and Carbon Assessment by NFIS/CliPAD *(Mr. Noriyoshi Kitamura, CTA, NFISP)*
15:50-16:00	Discussion *(Chairperson)*
16:00-16:30	Conclusion and closing *(Chairperson and Co-chairperson)*

The Capacity Development Project for

Establishing National Forest Information System for

Sustainable Forest Management and REDD+

Work Plan for 2nd Phase
(Apr 2014 to Sep 2015)

April, 2014

Department of Forestry

and

Joint Venture

KOKUSAI KOGYO CO., LTD.

ASIA AIR SURVEY CO., LTD.

Contents

Chapter 1 Activities at Project Level

a. Work in Lao PDR

a.0 Common Items for All Output

a0.1 Explanation of First Year Work Results / Discussions

The first year work results will be explained to the counterpart agency and JICA at the JCC, at which time discussions will be held for revision or improvement in implementation.

a0.2 Preparation of Second Year Work Plan / Technology Transfer Plan

The second year work plan and technology transfer plan will be prepared together with the C/P organization.

a0.3 Report on Second Year Work Results / Holding of Technology Dissemination Seminar

A report meeting / technology dissemination seminar to the counterpart agency and other donors, etc. will be held when the second year ends, based on the results (outputs) of the second year activities.

The activities for each output are described below. Furthermore, technology transfer will be implemented as necessary by means of the respective activities.

b. Work in Japan

b.0 Common Items for All Output

b0.1 Report to JICA on Second Field Survey Progress

A report will be made to JICA on the status of progress of the second field survey.

b0.2 Preparation of Action Plan Concerning Formulation of National Forest Monitoring System / Work Completion Report (Final) (Draft)

An action plan related to formulation of a national forest monitoring system implemented by the Lao PDR will be prepared, taking the overall evaluation of activities up to the second phase into consideration, and will be compiled as a Work Completion Report (final) (draft).

b0.3 Explanation/Discussion Concerning Work Completion Report (Final) (Draft) / Technology Dissemination Seminar

Explanations will be made to / discussions will be held with JICA concerning the content of the Work Completion Report (final) (draft) and technology dissemination seminar, and agreement will be obtained.

b0.4 Preparation of Technology Dissemination Seminar Materials

Materials will be prepared for the technology dissemination seminar.

b0.5 Preparation of Technology Transfer Implementation Report

b0.6 Preparation of Work Completion Report (Final)

Regarding the technology transfer to the C/P implemented through this survey and the technology dissemination seminar, the output and other details will be compiled for each field, and a Technology Transfer Implementation Report will be prepared, and attached to the Work Completion Report (final).

Chapter 2 **Activities at Output Level**

Output 1: Development of National Forest Type and Carbon Maps

a.1 Activities Related to Output 1

During the second phase, forest classification, which was determined in the first phase activities will be discussed and agreed in order to determine final classification and forest stratification method. Based on this classification, correction and creation of the 2010 national forest type map, which will serve as the forest base map, and 2005 / 2000 national forest type maps will be continued and the accuracy verified at the end. Above-mentioned forest stratification will be used to prepare national forest carbon maps (2000, 2005, and 2010)

a1.1 Continuing Correction of National Forest Type Maps (2000, 2005, 2010)

Correction of the 2010 national forest type map, which will serve as the forest base map, and 2005 / 2000 national forest type maps prepared during the first phase will be continued.

In addition, lectures will be implemented as shown in the table below with the objective of advancing the level of knowledge concerning theories related to satellite image analysis.

<table>
<tr><td colspan="2">Theme: Theoretical Lecture Concerning Satellite Image Analysis,
Schedule: Late July – Early August 2014 (15 days)</td></tr>
<tr><td colspan="2">Objectives of Training
The C/P is capable of analysis software operation based on the satellite image analysis techniques, but there are few persons that understand the theoretical background of image processing/analysis, etc. The objective of implementing this training is to provide an understanding of the physical, mathematical and information processing theory of each forest analysis process that is performed with remote sensing (RS) technology, give meaning to the results that are obtained by image processing/analysis software, and in turn improve the quality of quality management and other such work results (output).</td></tr>
<tr><td>Lecture Theme</td><td>Description</td></tr>
<tr><td>Principle of RS Technology</td><td>Physical meaning of information (data converted into images) obtained from RS technology
Principle of multi-band satellite RS system
Spectroscopic characteristics of forests
Basic flow of forest RS analysis for REDD+
Technical issues with RS technology for REDD+ and ways to supplement information</td></tr>
<tr><td>Feature Extraction from Forest Information</td><td>Image calculation based feature extraction method
NDVI theory</td></tr>
<tr><td>Preparation of Thematic Map Using Image Classification</td><td>Theory of supervised classification method
ISODATA method
Object-based image classification</td></tr>
<tr><td>Analysis of Time-Series Data</td><td>Forest information for time-series analysis based on RS
Change analysis method
Using two time period synthetic images, etc. to visualize and extract change points (sites)</td></tr>
<tr><td colspan="2">Objectives to be Achieved by Training
Attain level where C/P has certain amount of understanding of the content of various types of data processing that is being performed behind the scenes from operation of the analysis software by the C/P.
Upgrade level of basic mathematical / physical knowledge being used with RS technology by the C/P.</td></tr>
</table>

a1.2 Accuracy Verification of National Forest Type Maps (2000, 2005, 2010)

Accuracy verification will be performed for the 2010 national forest type map, which will serve as the forest base map, and 2005 / 2000 national forest type maps that were corrected in a1.1.

a1.3 Verification of Factors That Have a High Level of Correlation to Carbon stock

Verification of the factors identified to have a high level of correlation to carbon stock will be performed.

a1.4 Determination of Forest Stratification Method

Examination of an appropriate forest stratification method will be performed using GIS analysis and satellite image analysis in accordance with the identified factors. In addition, discussions will be held on the results with the C/P and other donors to determine the method.

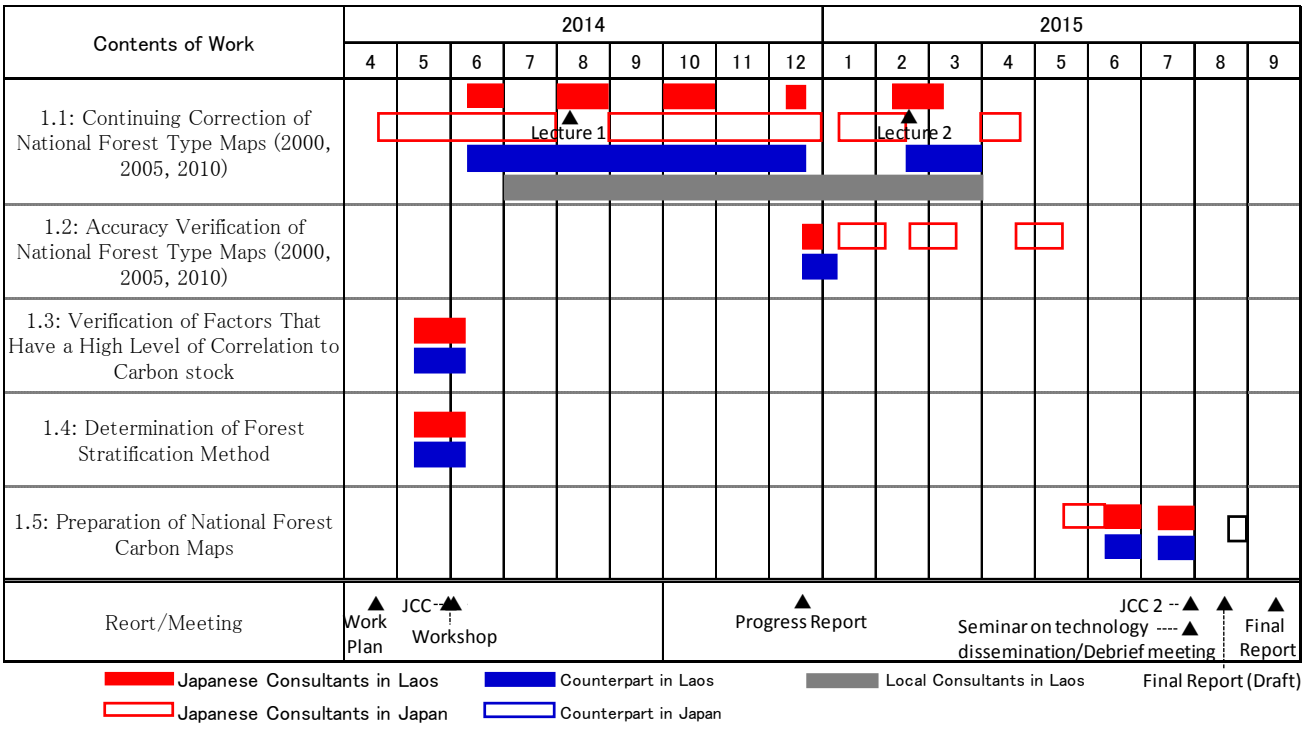
In addition, the lectures in the table below will be implemented with the objective of improving the understanding of the theory concerning stratification analysis.

<table>
<tr><td colspan="2">Theme: Theoretical Lecture Concerning Stratification Analysis
Schedule: Late February – Early March 2015 (15 days)</td></tr>
<tr><td colspan="2">Objectives of Training
Plans call for practical training in stratification analysis to be separately implemented in order to estimate the forest carbon accumulation volume. However, a lecture will be conducted on a background of the discussions that are taking place around the world, necessity/theory of stratification analysis with the objective of making a contribution to upgrading the basic capacity of the C/P in this field.</td></tr>
<tr><td>Lecture Theme</td><td>Description</td></tr>
<tr><td>Introduction to Forest Carbon Accumulation Volume Estimation</td><td>Forest carbon accumulation volume estimation methods that are being discussed internationally
Fundamental information and theory required for forest carbon accumulation volume estimation
Methods for/characteristics of forest carbon accumulation volume estimation used during this work</td></tr>
<tr><td>Stratification Analysis Methods</td><td>Methods for and necessity of stratification analysis / Theory for stratification extraction methods / Stratification extraction elements</td></tr>
<tr><td>Correlation Analysis</td><td>Correlation analysis elements / Theory for correlation analysis / Correlation analysis methods / Correlation analysis practical training</td></tr>
<tr><td>Preparation of Stratification Matrix</td><td>Stratification matrix table preparation methods / Preparation standard for stratification matrix table</td></tr>
<tr><td>Estimation of Forest Carbon Accumulation Volume</td><td>Obtaining grasp of change in forest carbon accumulation volume from past to present (preparation of maps)
Prediction of future forest carbon accumulation volume (preparation of maps)
NFI stratification extraction</td></tr>
<tr><td colspan="2">Objectives to be Achieved by Training
Attain level where C/P understands the necessity of stratification analysis as part of estimation of forest carbon accumulation volume, estimation of change in forest carbon accumulation volume from past to present (setting of RL), necessity of future predictions and techniques for stratification estimation.</td></tr>
</table>

Advance level of basic knowledge on techniques using during forest sampling and other surveys conducted by the C/P.

a1.5 Preparation of National Forest Carbon Maps

The 2010 national forest type map, which will serve as the forest base map, and 2005 / 2000 national forest type maps for which correction / accuracy verification was performed in a1.1 and a1.2 will be used to prepare national forest carbon maps for the respective years, and accuracy assessment will be performed.



Output 2: Design of Prototype of NFIDB

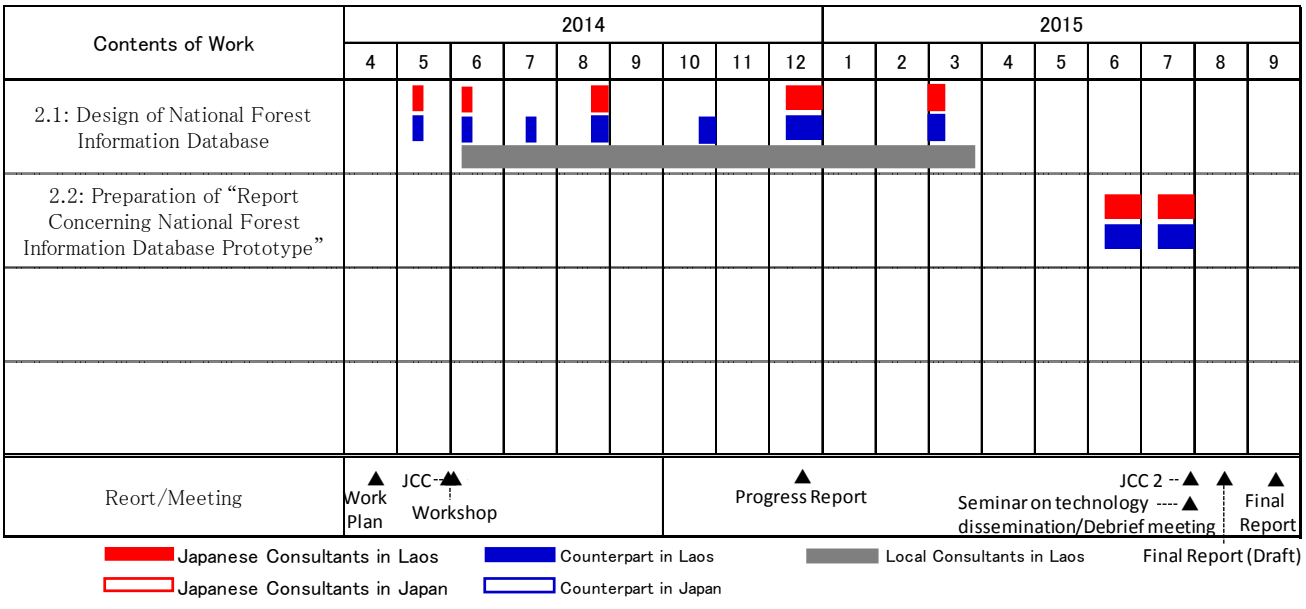
a.2 Activities Related to Output 2

a2.1 Design of National Forest Information Database

Specified internal/international statistics and reporting function/specification will be discussed with C/P. The national forest information database will be redesigned, taking into consideration the review results of subcontracted work, content of carbon stratification and NFI design for which review is proceeding in parallel, and trends in international discussions at COP and SBSTA. Furthermore, function of arranged data based on the department as forest management application will be conducted. In the second phase, work will be performed on the detailed design, such as the definition of tables and fields, rather than on the specific conceptual design (that will serve as the basis for adjustments at the stage of implementation).

a2.2 Preparation of "Report Concerning National Forest Information Database Prototype"

Based on the national forest information database for which final design was performed in a2.1, data product specification will be prepared include existing/new forest information data kinds and structure which was arranged in the first phase activity. Implementation of function will be reported for required domestically/internationally for statistics and report, etc., identification of forest information data as Functional requirements definition document. Furthermore, "Report concerning National Forest Information Database Prototype" will be created include conclusions, discussion process and reference information which will be implemented with C/P that has a policy decision making authority from DOF and DFRM



Output 3: Design of Next Round of NFI

a.3 Activities Related to Output 3

Based on the results of phase one, status and contents of SOP (Standard Operation Guidelines) development, and inventory designs and implementation results of other projects, study on methods and implementation arrangement for the next round NFI will be conducted and some options will be proposed. Some inventory proposals selected from the options will be piloted in field with different conditions through local sub-contract in order to examine their efficiency, accuracy and so on. Based on the analysis of inventory pilot results and consultation with C/P and relevant agencies/projects, a field manual for next NFI based on the existing manual will be developed.

a3.1 Study of Options for Next National Forest Inventory

The items and conditions, etc. that are expected to be needed in the next period NFI from the perspective of REDD+ and sustainable forest management (macro management policy) will be reviewed, and the options for an overview of survey methods will be studied.

a3.2 Study of Implementation Arrangement for Next National Forest Inventory

The survey system and capacity, etc. related to the FIPD and related local organizations will be investigated/checked, and the implementation arrangement will be studied according to the options for the above survey methods.

a3.3 Proposals of Next Period National Forest Inventory Survey Methods

Regarding the next period NFI options studied in a.3.1 and a.3.2, the feasibility of stratified sampling surveys based on the 2010 forest base map, cost, time and other issues will be reviewed and, through discussion and agreement with FIPD and the Project experts, compiled in the next period NFI proposals (objectives, sampling methods, plot design, survey items, etc.) in close cooperation with the sub-contractor for Inventory Piloting.

a3.4 Proposals of Next Period National Forest Inventory Implementation Arrangements

The institutional arrangements (such as number of field crews, composition of field crews, and delineation of responsibilities of field crews) for implementation of the next period NFI proposals, which are determined above, will be compiled as the final proposals in close cooperation with the sub-contractor for Inventory Piloting and through discussion and agreement with FIPD and the Project experts.

a3.5 Implementation of Inventory Piloting by sub-contractor

Some inventory proposals selected from the options will be piloted in field with different conditions through local sub-contract in order to examine their efficiency, accuracy and so on.

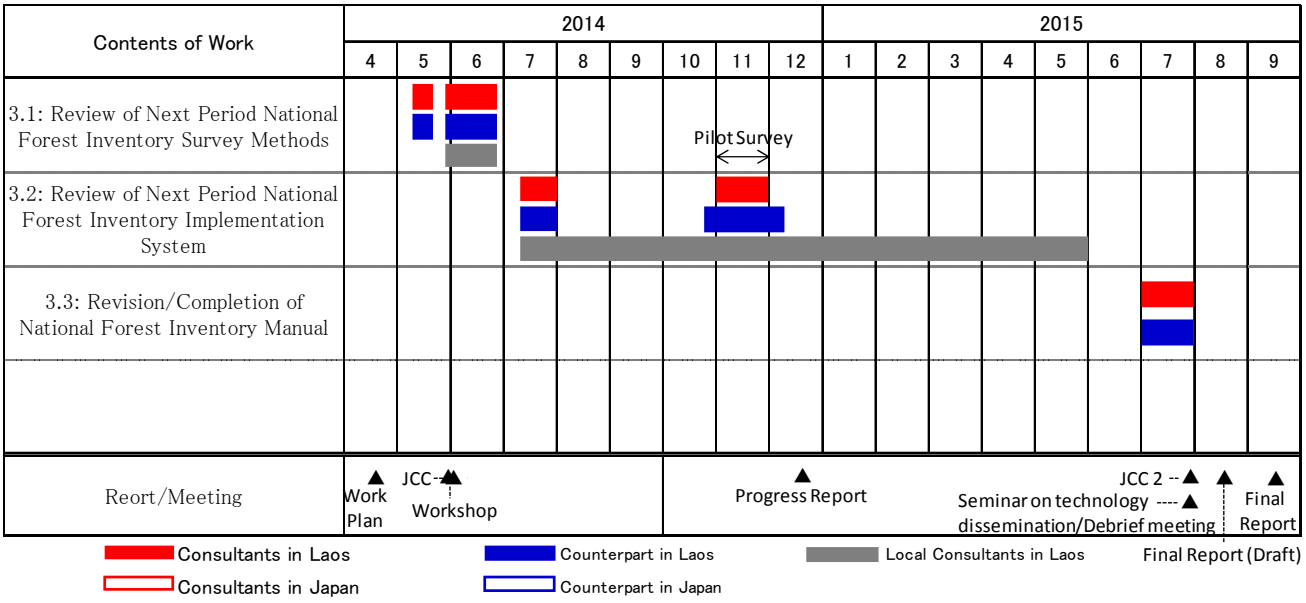
a3.6 Selection of NFI method and implementation arrangement

Based on the review of Inventory Piloting results and discussion and agreement with FIPD, the Project experts and the sub-contractor, the most appropriate NFI method and institutional arrangement will be selected with necessary corrections and changes.

a3.7 Revision of Field Manual

Draft forest inventory field manual applicable to the country of Lao PDR will be developed, based on 1993

NFI Field Manual. This will include objectives, design, implementation arrangement, and recommended field methods



Output 4: Examination of Methods for REDD+

a.4 Activities Related to Output 4

a4.1 Review of REL/RL Preparation Methods

Based on the national forest type maps / carbon maps at three points of time that are completed in output 1, the gross emissions (basis for REL), net emissions/removals values (basis for RL) and other values calculated from the change in the carbon stock in two periods due to deforestation / forest degradation /carbon stock enhancement will be demonstrated, and the preparation techniques reviewed in the first phase, which are internationally applied, will be used to examine options and other issues for REL and RL.

a4.2 Review of Harmonization Methods Related to MRV at Various Scales

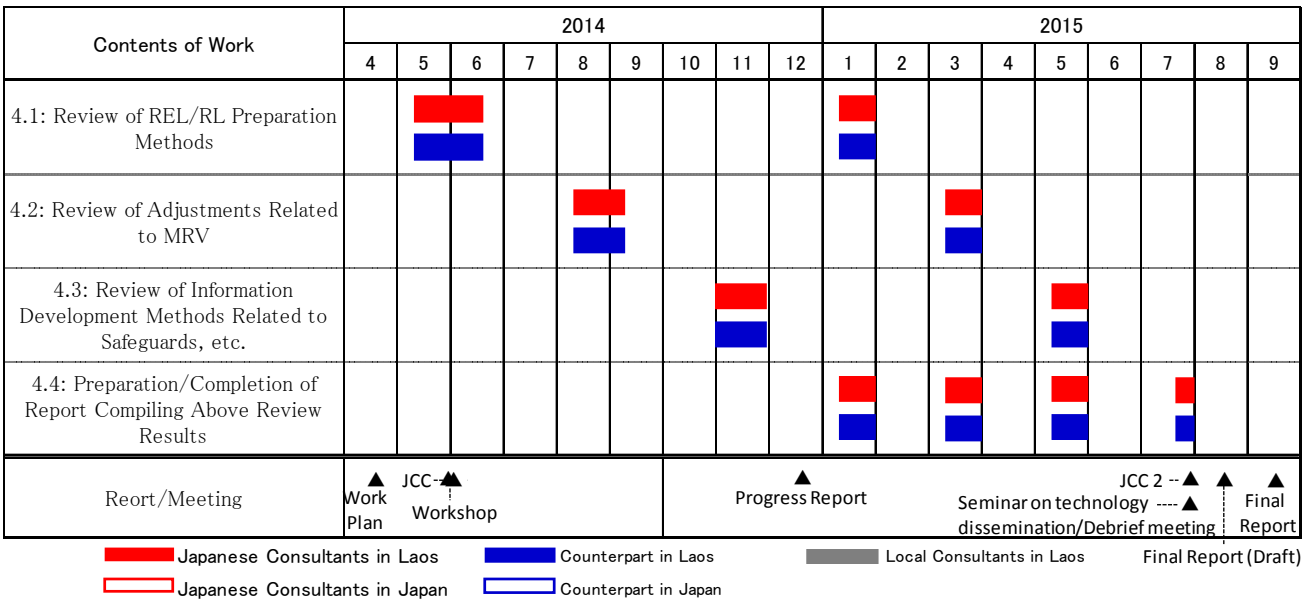
The relevance of and relationship between the MRV status of the current REDD+ projects collected during the first phase, the forest base maps prepared during this project and the next period NFI design will be examined, and the MRV harmonization methods at a project, sub-national and national level will be studied using the adjustment rules in VCS/JNR for reference purposes.

a4.3 Review of Information Development Methods Related to Safeguards, etc.

Following the first phase, trends in discussions at the UNFCCC, FCPF Carbon Fund participating country's safeguards and PaMs information development techniques/proposals, relevant components for the FCPF preparatory project and other such information will be analyzed/organized, and the information development methods will be studied based on analysis of safeguards related components in the current legal system and the monitoring status of policies/measures implementation in Laos.

a4.4 Preparation/Completion of Report Compiling Above Review Results

Following the first phase, study will be conducted for the REDD+ reference level (REL/RL) preparation methods, the harmonization methods concerning MRV at the national/sub-national/project levels, and the information development methods concerning safeguards and other issues. A "Report on Organization/Analysis of REDD+ Reference Level (REL/RL) Development Methodology (including MRV arrangement)" and a "Report on Organization/Analysis of Information concerning REDD+ Safeguards" that compile the above study results will be prepared and completed.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4.2: Review of Adjustments Related to MRV
4.3: Review of Information Development Methods Related to Safeguards, etc.
4.4: Preparation/Completion of Report Compiling Above Review Results
Reort/Meeting
Work Plan
JCC
Workshop
Progress Report
JCC 2
Seminar on technology dissemination/Debrief meeting
Final Report
Final Report (Draft)
Japanese Consultants in Laos
Counterpart in Laos
Local Consultants in Laos
Japanese Consultants in Japan
Counterpart in Japan

Chapter 3 **Options for technical issues**

3.1 Accuracy assessment of 2010/2005/2000 national forest type maps and correction

3.1.1 Accuracy Assessment

The accuracy assessment of 2010/2005/2000 national forest type maps by the method which was developed in 1st year will be conducted when these maps are completed. Data/images to be used for accuracy assessment of 2010 national forest type map will be ALOS pan-sharpened images prepared in FIM supplemented by RapidEye images for clouded areas as well as by FIM inventory data (forest types and photos). Data/images to be used for accuracy assessment of 2005 national forest type map will be SPOT4/5 multi-spectral images. Data/images to be used for accuracy assessment of 2000 national forest type map will be LANDSAT images.

In the event the results of accuracy assessment indicate that there are classification items with very low accuracy, integration with other items will be considered if the cause is limits related to the specifications for satellite images not the inadequate capacity of image interpreters.

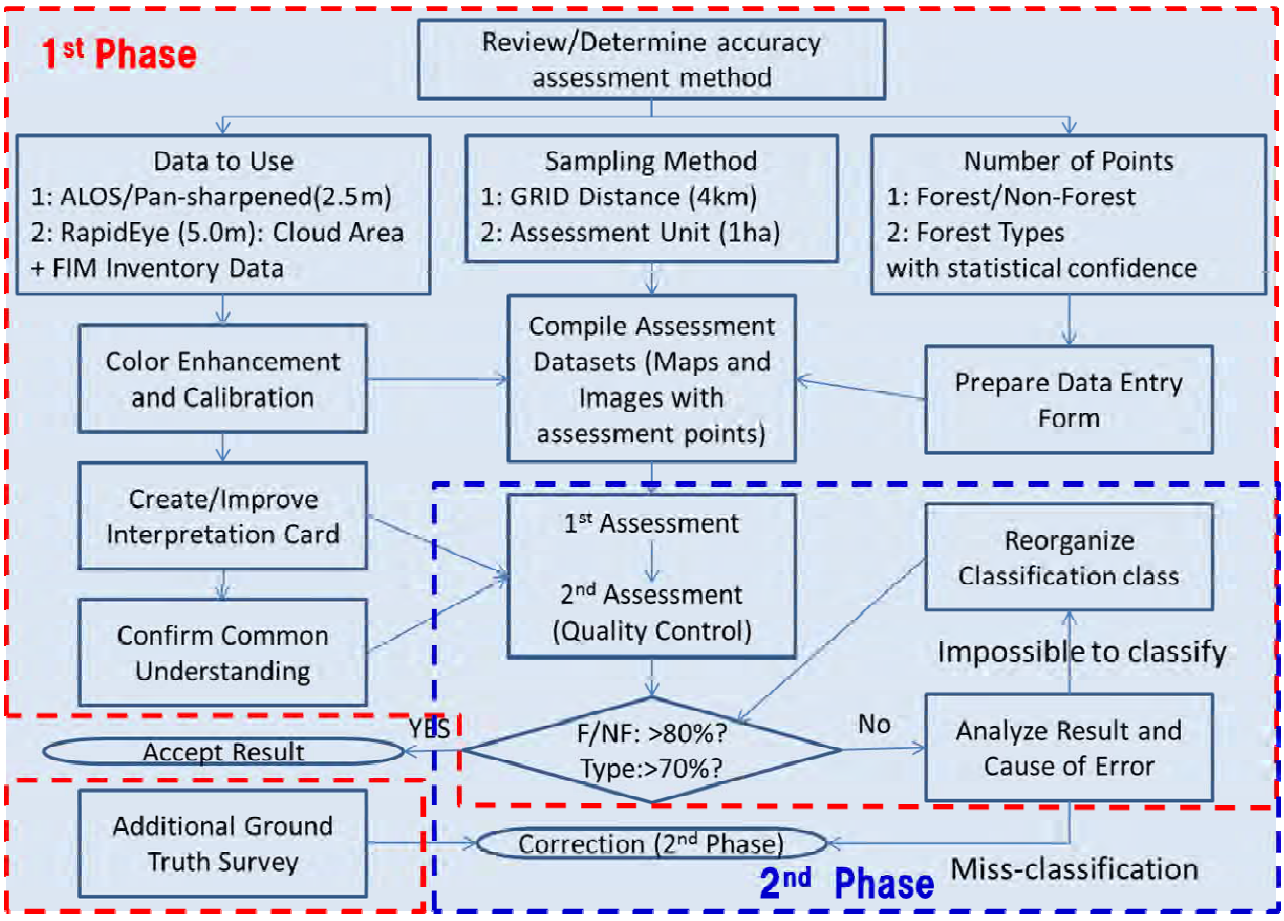
Furthermore, since plans call for review of accuracy assessment and stratification by carbon stock to be performed simultaneously in parallel, it will be possible to compare/review the results of accuracy assessment and review the results for the stratification by carbon stock. Regarding the former, technology transfer will be performed to improve the capacities of FIPD staff who perform interpretation, and the correction work will be started according to the methods stated in the section 3.1.2 below.

3.1.2 Correction of National Forest Type Maps

After reorganization and redefinition of the forest types and improvement of interpretation capacity, correction of the 2010 and 2005 national forest type maps prepared in FIM will be initiated, and preparation of 2000 national forest type map will be started.

Regarding classification accuracy, efforts will be made to achieve the accuracy of the 2010 national forest type map at 70% or higher through the methods and procedures in the chart below.

Methods and Process of Map Accuracy Assessment and Correction

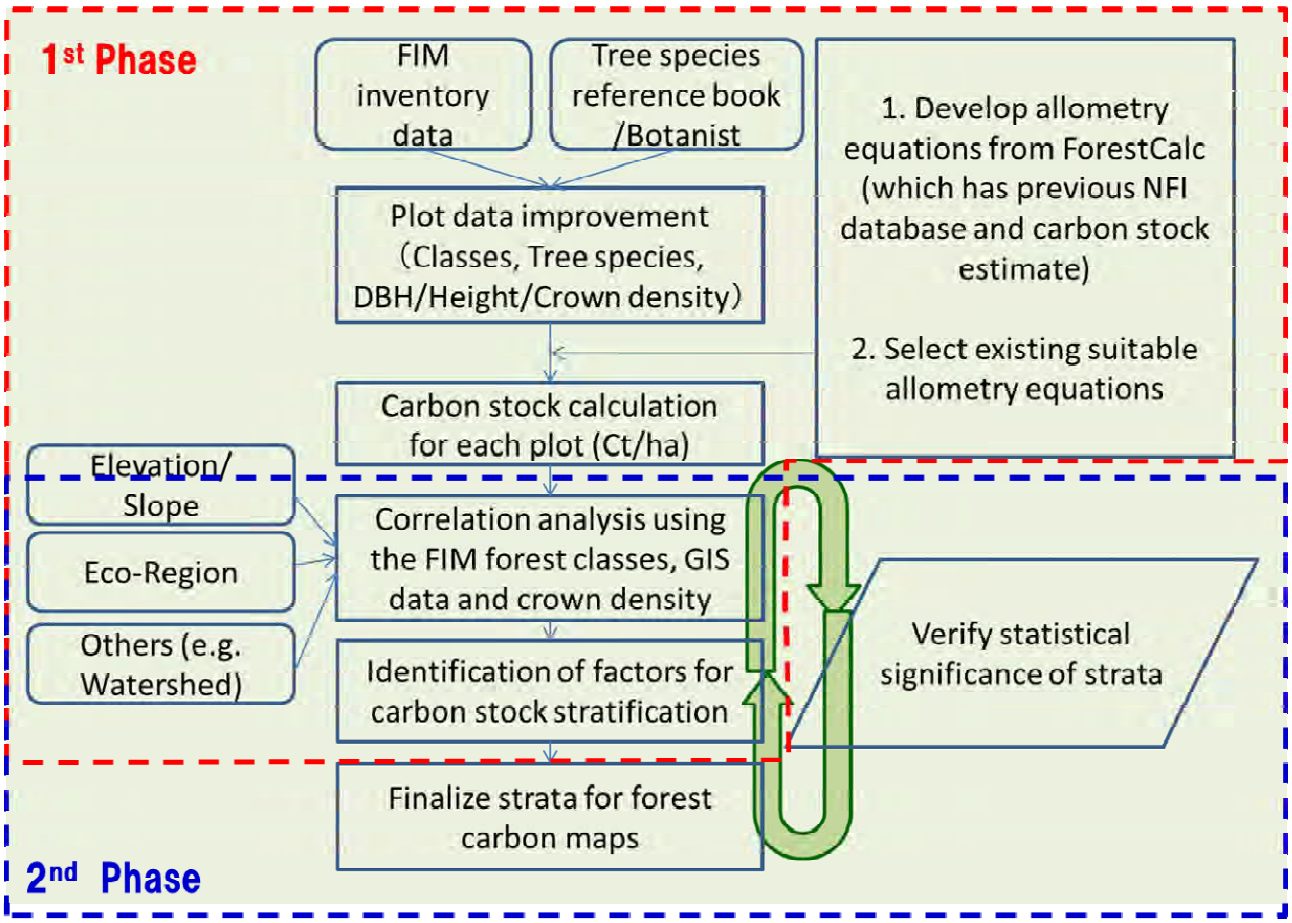


3.2 Carbon stratification

The main procedure for stratification based on carbon stock is shown in the chart below. Then, correlation analysis using the existing GIS data (region data, altitude, eco-region, etc.), forest type, canopy cover and other such data in order to review valid factors for stratification according to carbon stock.

In this process an acceptable uncertainty level for national carbon stock will be taken into account by verifying statistical significance for each candidate stratum.

Methods and Process of Carbon Stratification



Lao People's Democratic Republic
The Capacity Development Project for Establishing National Forest Information System for Sustainable Forest Management and REDD+ (Phase Ⅱ)

Completion Report

Annex2-1 : Minutes of Workshop(Project outline)

Technical Workshop on the Capacity Development Project for
Establishment of National Forest Information System
for Sustainable Forest Management and REDD+ (NFISP)

1. Date and venue

Date: Afternoon, 30th (Wed) October 2013

Venue: Conference Room, Department of Forestry, VTE

2. Objectives of the workshop

1) To present an outline of NFISP and get feed-back from other related projects/donors for coordination and cooperation
2) To present options for methods and processes for map accuracy assessment/correction and carbon stratification and get feed-back from concerned projects/donors for coordination and cooperation

3. Chair

Chairperson: Mr. Somchay SANONTRY, DDG, DOF

4. Participants

30 people from various organizations/projects

5. Agenda

Time	Items
13:00-13:30	Registration
13:30-13:40	Introduction and welcome *(Mr. Linthong, Project Director, NFISP)*
13:40-13:50	Opening speech by Department of Forestry, MAF *(Mr. Somchay Deputy Director General of DOF)*
13:50-14:10	Presentation of NFISP Outline *(Mr.Soukanh, Project Manager, NFISP)*
14:10-14:25	Q&A for NFISP Outline
14:25-14:45	Coffee break
14:45-14:55	Presentation on Background and Requirements (Mr. Kitamura, CTA, NFISP)
14:55-15:20	Presentation on Proposal for Map Accuracy Assessment and Correction (Dr. Kajiwara, RS, NFISP)
15:20-15:45	Discussion on Map Accuracy Assessment and Correction
15:45-16:05	Presentation on Proposal for Carbon Stratification (Mr. Harguchi, Deputy CTA/DB, NFISP)
16:05-16:25	Discussion on Proposal for Carbon Stratification
16:25-16:30	Conclusion and closing *(Mr. Somchay Deputy Director General of DOF)*

6. Summary

1) Outline of NFISP

Period: Two Years from Sep 2013 to Sep 2015

1st Phase: from Sep 2013 to Mar 2014, 2nd Phase: from Apr 2014 to Sep 2015

Implementing Agency: FIPD/DOF

Project Director: Mr. Linthong Khamdy, Director, FIPD

Project Manager: Mr. Soukanh BOUNTHANBABDID, Chief, Forest Resource Information Center

Technical Assistance: Joint Venture

Kokusai Kogyo Co., Ltd (KKC) and Asia Air Survey Co., Ltd (AAS)

Objectives & Outputs

Overall Goal

National Forest Information System (NFIS) in Lao PDR is established.

Project Purpose

Essential components for the establishment of NFIS are in place.

Outputs

(1) Information on forest carbon dynamics at national level is compiled.

(2) Prototype of National Forest Information Database (NFIDB) is designed.

(3) The next round of National Forest Inventory (NFI) is designed.

(4) Other relevant information required for REDD+ is compiled.

2) Technical Proposal

A) Map Accuracy Assessment

・Assessment Points Selection:

- ✓ GRID Distance: 4 x 4 km: consistence with FIM and Quick Assessment 2009
  - ➢ systematic sampling (whole country) and random selection (based on strata), time series (2010,2005,2000)
  - ➢ image interpretation (whole country, 14,400 points) and field verification (selected sample, 2,400 points)
- ✓ Assessment Unit: 1ha (100m x 100m)
  - ➢ 25 assessment points in 1ha for forest/non-forest decision support with canopy cover rate

・Reference Data:

- ✓ Image Interpretation
  - ➢ Mostly ALOS pan-sharpen (2.5m resolution) and RapidEye (5.0m resolution) for clouded areas
- ✓ Field Verification
  - ➢ Field inventory　survey results in 2011 by FIM (Forest Information Management Program)

・Target Accuracy: 80% for Forest/Non-Forest, 70% for Forest-Type

B) Carbon Stratification

・Information/Method to Apply

- ✓ Developing desk-based allometric equations from NFI data (1991-1999)
  - ➢ Extracting/summarizing information from ForestCalc(SUFORD)
  - ➢ Developing by Forest-Type/Province, by Tree-Species/Province
- ✓ Applying existing allometric equations in neighboring country
  - ➢ Vietnam (Eco-Region/Forest-Type), Cambodia (Generic model)
  - ➢ Thailand needs to be reviewed to fill a few more Eco-Region in Lao

・Calculate Carbon-stock

- ✓ Extracting/summarizing ForestCalc Inventory DB, improving tree species code/data of FoCAS (by FIM)
- ✓ Applying allometric equations to inventory survey data in 2011 by FIM to calculate carbon stock/ha by plot

・Correlation Analysis

- ✓ FIM forest classes, GIS data (Elevation/Slope, Eco-Region, Others (Watershed etc)), crown density

7. Points of Discussion

Sharing and maintaining data with other organizations/projects

- The sharing and maintenance of map or database is not included in the project scheme (SNV/LEAF, MAF)
  - The main objective of the project is capacity building on creating carbon map and designing database for REDD+ and SFM. The method of sharing/maintaining map and database will be decided by the government in consultation with stakeholders

Cooperation and coordination with other projects on mapping

- Many projects have already carried out. How do you collect the information from other project (SNV/LEAF)
  - It is true that so many projects are on-going and not everyone in DOF knows the contents of them. It is a good opportunity to review the available information/data in DOF (FIPD/FRIC)

Addressing satellite image interpretation of fallow land

- In current definition, old fallow is categorized as potential forest (non-forest). On the other hand, old fallow could be counted as forest for REDD+ esp. plus purposes. Moreover, it is difficult to distinguish transition of fallow land (SUFORD)
  - In NFIS project, in order to distinguish fallow into forest and non-forest time series satellite image analysis (ALOS/PALSAR from 2006 to 2010) will be conducted to identify location of slash and burn area and to analyze transition of shifting cultivation (NFIS)

Addressing on gap between forest definition and forest on image

- It is difficult to distinguish fallow or young forest. It is required to use external data/knowledge. There is an idea to exclude land cover categories such as fallow lands demarcated in land use plans from carbon stock estimation (CliPAD)
  - IPCC allows using either land use or landing cover based classification, the inclusion of land cover categories such as fallow lands to carbon stock estimation should be determined taking into account cost and REDD+ benefits. (NFIS)
  - In SFM and REDD+, the threshold between forest and non-forest does not match completely so it is possible to have another definition with different threshold of forest and non-forest from carbon point of view(FSCAP)

8. Closing

NFIS project has just started. It is necessary to set forest definitions for forest mapping in REDD+ as well as forest management in SFM, or it could be one definition. There is a definition of forest from last NFI. But the application of this forest definition for forest classification using satellite imagery would be difficult. More consultation and discussion will be made in the course of NFIS project implementation. (Chair).

Annex1: Pictures of Workshop

Chair (Mr.Somchay, DDG/DOF)

Venue and Participants

Project Manager (Mr. Soukanh, Chief/FRIC)

Question from LEAF (Mr.Sengkham)

Explanation from NFISP (Mr. Kitamura, CTA)

Question from MAF (Dr.Thatheva)

Technical Proposal from NFISP (Dr. Kajiwara, RS)

Comment form SN-REDD (Mr.Peter)

Annex2: Participants List

No	Name and Surname	Position	Organization
1	Mr. Linthong Khamdy	Project Director	FIPD
2	Mr. Siamphone Siboun		FIPD
3	Mr. Khampheuy Sosengphet	Director of DIC	MONRE
4	Mr. Soukan Bounthabandid	Director FRIC	FIPD
5	Mr. Khamkhong Inthavong	Staff	FRIC
6	Mr. Sombath Pangnasack	Deputy	FIPD
7	Mr. Savanh Chanthakoummane	Director of REED+	DOF
8	Dr. Chansamone P.	Director	NAFRI/FRC
9	Mr. Souvanna Chanthaluesy	Staff	FIPD
10	Mr. Hideaki Takai	CTA	FSCAP
11	Mr. Kenji Nakajime	Adviser	FSCAP
12	Mr. Steffen Lackmann	Adviser	CLIPAD
13	Mr. Peter Schwah	CTA	Prime/NCX
14	Mr. Somchay Sanontry	Deputy Director of DOF	DOF
15	Mr. Thongsoune	NTC_TL	CLIPAD
16	Mr. Bounkong Phothisane		Science Assembly
17	Mr. Phoukhong Phongsa	Consultant	CLIPAD
18	Ms. Syphavanh Inthapatha	D. Head REED Division	DFRM
19	Mr. Itthiphonh Chanthalinh	Division	DFRM
20	Mr. Viengsavanh	P.O	JICA
21	Mr. Denis Smirnov	Coordinator	WWF
22	Mr. Namura Takayuki	TA	FSCAP
23	Mr. Boungnadeth Phouanmala	Coordinator	World Bank
24	Mr. Thattheva Saphangthong	Deputy of Assembly	Science Assembly
25	Mr. Sengkham	Adviser	SNV-LEAF
26	Mr. Esa	CTA	SUFORD
27	Dr. Ryota Kajiwara	Consultant	NFIS
28	Mr. Masamichi Haraguchi	Consultant	NFIS
29	Mr. Toru Furuya	Consultant	NFIS
30	Mr. Noriyoshi Kitamura	CTA/NFIS	KKC/FIPD

Lao People's Democratic Republic
The Capacity Development Project for Establishing National Forest Information System for Sustainable Forest Management and REDD+ (Phase Ⅱ)

Completion Report

Annex2-2 : Minutes of Workshop(Forest Classification)

MINUTES OF MEETING

THE MEETING ON NATIONAL LEVEL CLASSIFICATION SYSTEM AND NATIONAL FOREST/LAND CLASSES FOR GHG INVENTORY/REDD+ IN LAO PDR

1. Time
   13:30-15:30 24th Oct 2014

2. Venue
   Office of Mr. Khamphay, DOF

3. Participants

Lao Side	Japan Side
Mr. Khamphay MANIVONG, Deputy DG, DOF	Mr. Noriyoshi KITAMURA, Chief Adviser, NFIS
Mr. Somchay SANONTRY, Deputy DG, DOF	Dr. Ryota KAJIWARA, R/S Adviser, NFIS
Mr. Linthong KHAMDY, Director, FIPD	

4. Objective
   To agree on the national level forest classification system and forest/land classes based on discussions in several workshops on these topics

5. Result
   The national level forest classification system and forest/land classes were agreed between participants as Summary of Meeting.

6. Future Actions
   i. Definition of each forest/land class needs to be developed in consultation with concerned GOL agencies and projects.
   ii. Regarding the agreed forest/land classification system and classes, DOF will consult with concerned Departments and Ministries including Department of Agriculture Land Development of MAF and Departments of Forest Resource Management and Land Management of MONRE in order to have an official land/use classification system and classes for both domestic and international reporting purposes.

Mr. Khamphay MANIVONG
Deputy Director General
Department of Forestry
Ministry of Agriculture and Forestry
Lao People's Democratic Republic

Summary of Meeting

National Level Classification System for Lao PDR

It was agreed as Annex 1.

- Name of "Other Wooded Areas" was changed to "Other Vegetated Areas".
- Name of "Permanent Agriculture Area" was changed to "Cropland".
- Name of "Fallow Land" which includes any stage of fallow land not reaching the forest definition and bamboo was changed to "Regenerating Vegetation".
- "Fallow Land" and "Degraded Forest" which are subdivided classes at Level 3 was set under "Regenerating Vegetation".
- Name of "Slash and Burn Land" was changed to "Upland Crop".
- "Upland Crop" was moved from under "Potential Forest" to under "Cropland".
- "Barren Land" and "Rock" were aggregated to "Barren Land and Rock".

Correspondence between National Forest/Land Classes and IPCC Land categories/REDD+ activities

IPCC Land Categories

- There were four options of corresponding national forest/land classes and IPCC Land Categories.
  1. "Upland Crop" and "Regenerating Vegetation" belong to Forest Land.
  2. "Upland Crop" and "Regenerating Vegetation" belong to Cropland.
  3. "Upland Crop" belongs to Cropland, "Regenerating Vegetation" belongs to Forest Land.
  4. "Upland Crop" and "Regenerating Vegetation" will be assigned with Forest Land and Cropland based on statistic estimate without mapping.
- Option 3 was selected.

REDD+ Activities

- Correspondence between land conversion and REDD+ activities are as follows.
  a. Conversion of "Regenerating Vegetation" and "Current Forest" to "Upland Crop" and other IPCC Land Categories is deforestation. Conversion of "Current Forest" to "Regenerating Vegetation" is degradation. Conversion of Cropland esp. "Upland Crop" and "Regenerating Vegetation" to "Current Forest" is carbon stock enhancement.

Annex 1

National Level Classification System for Lao PDR

National Level Classification System for Lao PDR is shown below in comparison with IPCC land use categories.
'Level 1' have to be used for any level of map.
'Level 2' should be used for any level of map.
'Level 3' can be used for Sub-National/Project Level.

IPCC Definition	*National Level Classification System for Lao PDR*				
	Level 1	*Level 2*		*Level 3*	
Forest Land	**Current Forest**	Evergreen Forest	EF	High Density Evergreen Forest	HEF
				Low Density Evergreen Forest	LEF
		Mixed Deciduous Forest	MD	High Density Mixed Deciduous Forest	HMD
				Low Density Mixed Deciduous Forest	LMD
		Dry Dipterocarp Forest	DD	High Density Dry Dipterocarp	HDD
				Low Density Dry Dipterocarp	LDD
		Coniferous Forest	CF		
		Mixed Coniferous and Broadleaved Forest	MCB		
		Forest Plantation	P	Evergreen Forest Plantation	EP
				Deciduous Forest Plantation	DP
	Regenerating Vegetation	Regenerating Vegetation	RV	Fallow Land	FL
				Degraded Forest	DF
Grassland	**Other Vegetated Areas**	Savannah	SA		
		Scrub	SC		
		Grassland	G		
Wetlands		Swamp	SW		
Cropland	**Cropland**	Upland Crop	UC		
		Rice Paddy	RP		
		Other Agriculture	OA		
		Agriculture Plantation	AP		
Settlements	**Non Vegetated Areas**	Urban	U		
Other Land		Barren Land and Rock	BR		
	Other Land	Other Land	O		
Wetlands	**Water**	Water	W		
	Other	Cloud	CL		
		Shadow	SH		

Lao People's Democratic Republic
The Capacity Development Project for Establishing National Forest Information System for Sustainable Forest Management and REDD+ (Phase Ⅱ)

Completion Report

Annex2-3 : Minutes of Workshop(NFI)

MINUTES OF MEETING

THE MEETING ON KEY APPROACHES OF NEXT NATIONAL FOREST INVENTORY

Time: 10:00-15:30 10th Oct 2014
Venue: Meeting room, FIPD
Participants:
Lao Side
Mr. Khamphay MANIVONG, Deputy DG, DOF
Mr. Somchay SANONTRY, Deputy DG, DOF
Mr. Linthong KHAMDY, Director, FIPD
Mr. Soukanh Sanontry, DDG,FIPD
Mr. Bounpheng VICHITH, DDG, FIPD

Japan Side
Mr. Noriyoshi KITAMURA, Chief Adviser, NFIS
Dr. Ryota KAJIWARA, R/S Adviser, NFIS
Mr. Gabriel EICKOFF, Forest Inventory Adviser, Forest Carbon
Mr. Yuta MORIKAWA, Forest Inventory Adviser, NFIS

Objective: To discuss about the overview of potential National Forest Inventory (hereinafter referred to as NFI) approaches and to agree on key approaches .

Reference: Overview of potential NFI design approaches

Mr. Khamphay MANIVONG
Deputy Director General
Department of Forestry
Ministry of Agriculture and Forestry
Lao People's Democratic Republic

Summary of Meeting

Key NFI Objectives

Main views and clarifications .

- ✓ In the PFA survey, "0.65" is used as form factor for all trees. Thus, volume functions need to be developed in the next NFI.
- ✓ Volume function development can be done in the biomass survey (allometric equation development).
- ✓ It must be checked first to confirm for which tree species volume function was developed in the 1st NFI.
- ✓ PFA data have to be utilized for the next NFI.
- ✓ Differences between NFI and PFA data, e.g. Survey items, plot design, and so on should be considered.
- ✓ Sample plot intensity might be low in PFA area.

Followings were agreed.

- Next NFI should mainly focus on Carbon/biomass stocks.
- Timber volume should be estimated in the next NFI including PFA areas.
- Volume functions for main species, which are not developed in the 1st NFI, need to be developed in the biomass survey.
- Sample plot intensity in three forest categories should be different
- As for NTFP, it is enough to check if they exist or not.

Land cover types used for NFI

Main views and clarifications .

- ✓ Non-forest area should be covered in the NFI also.
- ✓ Biomass of Non-forest area must be surveyed in Biomass survey as much as possible
- ✓ In the fallow land, average AGB must be surveyed, not each growing year's AGB.
- ✓ Sampling intensity should be low in Non-forest area

Followings were agreed

- ✓ Land/Forest classes and definition have to be decided officially as soon as possible.
- For non-forest classes, although field survey will still be taken, the number will be lower.

Sample Distribution Design

Sample Distribution Options

Main views and clarifications .

- ✓ FAO suggests 10km grid permanent plot sampling.
- ✓ Random and pre-stratified sampling is better for fragmented and small scale land use situation like Laos.

Followings were agreed

- Basically, systematic random, pre-stratification is agreed.

Sampling plot type

Main views and clarifications .

- ✓ Permanent plot sampling will be implemented by other survey including XXX?
- ✓ PFA's PSP is 1ha (100m by 100m) /plot based on the researcher's recommendation for growth measurement.

Followings were agreed

- Temporary plots must be used mainly.
- Some permanent plots also should be used for growth measurement.

Institutional Arrangements

Followings were agreed

	National	Provincial	District	Local
Key Task				
Sampling design	×			
Field SOP manual	×			
Training materials	×			
Conduct Training	×			
Conduct field inventory		×	×	×
Reporting on field inventory		×	×	
Enter data into database		×	×	
Data analysis	×			
Summary Reporting	×			

Frequency and Timeline

Main views and clarifications .

- ✓ Setting asidefinance availability, forest inventory survey needs to be implemented within one year because land use/cover rapidly changes in Laos.
- ✓ NFI in one year means mostly local staff implementation and huge cost and human resources for training is necessary.
- ✓ Training for PAFO does not take a long time if only for measuring.
- ✓ According to the UNFCCC, the GHG report has to be submitted every other year (for LDCs like Laos, this is not an obligation, just a target).
- ✓ No country is able to submit reports in such short frequency.
- ✓ The disadvantage of Figure 1 style (refer to "Overview of potential NFI design approaches") is the need to do training in the whole country
- ✓ Advantage of Figure 1 style is producing work opportunity every year
- ✓ Frequency and Timeline have to be considered under the condition of cost and human resources.
- ✓ It is not issue that NFI implementation will be delayed for a couple of yeras due to map creation

Followings were agreed

- Setting aside finance availability, forest inventory survey has to be implemented in one year. But, 2-3 years are acceptable depending on the kind and number of survey items and other conditions. The shorter, the better.

Future Actions

【NFI】

- ➢ Collect following data from SN-REDD, WWF and PAREDD.
  - ・Land cover maps
  - ・Volume estimates
  - ・Allometric Eauations
  - ・Biomass/Carbon data
  - ・Other related data

  Above data can be used for the NFI design including potential optimization of carbon strata and customization of plot distribution.
- ➢ Compare differences between NFI and PFA data in order to examine the sample plot intensity of next NFI in PFA, e.g., Survey items, plot design, and so on.
- ➢ Consider the feasibility of forest inventory survey frequency and timline

【Biomass Survey】

- ➢ The scope of allometric equation development can be narrowed down by analyzing above mentioned data from related projects.
- ➢ Analyze the data from CliPAD and other REDD+ projects in order to find out the necessity of carbon estimate for litter, dead wood and non-tree vegetation at the national level. .

Lao People's Democratic Republic
The Capacity Development Project for Establishing National Forest Information System for Sustainable Forest Management and REDD+ (Phase Ⅱ)

Completion Report

Annex4 : Transfer items list

Attachment４：Transfer items list

Followings are the list which were purchased in this project.

Name	Num	Specification
Copy Machine	1	Num: Canon IRC2020 Spec: Color, Copy, Scan, Others
Printer	1	Num: HP　MFP M276 Spec: A4、A3, Black and White/Color
Laptop	1	Num: Toshiba M840-1022X Spec: 4G memory, 640GHDD, DVD,Others

Lao People's Democratic Republic
The Capacity Development Project for Establishing National Forest Information System for Sustainable Forest Management and REDD+ (Phase Ⅱ)

Completion Report

Annex5 : List of collected material

List of collected material

Region	Asia	Name of project	Lao People's Democratic Republic The Capacity Development Project forEstablishing National Forest Information System for Sustainable Forest Management and REDD+	Kind of survey	Development survey technical cooperation project	Responsible department	Deputy Director, Natural Environment Team 1, Forestry and Nature Conservation Group
Country	Laos	C/P	Department of Forestry	Period	Sep/2013～Mar/2016	Responsibility	Takao Nagumo

Number	Name	Book or Video or Map or Electrical data	Collected	Expert report	JICA report	Text	Issued by	Note	Note
1	FRA2015 THE LAO PEOPLE'S DEMOCRATIC REPUBLIC	Electrical data	○				Food and Agriculture Organization of the United Nations	JR・CR（ ）・SC	
2	Overarching Steps for Developing a Two-Stage Stratified Sampling Design for REDD+	Electrical data	○				Winrock International	JR・CR（ ）・SC	
3	Assessment and Conceptualization of a Jurisdictional REDD+ Approach in Houaphan Province, Lao PDR	Electrical data	○				Colin Moore, Jeremy Ferrand & Xaisavan Khiewvongphachan	JR・CR（ ）・SC	
4	LEAF TECHNICAL GUIDANCE SERIES FOR THE DEVELOPMENT OF A NATIONAL OR SUBNATIONAL FOREST CARBON MONITORING SYSTEM FOR REDD+	Electrical data	○				LEAF(Lowering Emission from Asia's Forest)	JR・CR（ ）・SC	
5	Guidelines for Stratification for REDD+ Using a National Inventory	Electrical data	○				LEAF(Lowering Emission from Asia's Forest)	JR・CR（ ）・SC	
6	FCPF Carbon Fund Methodological Framework	Electrical data	○				FCPF	JR・CR（ ）・SC	
7	LEAF Decision Support Tool Integrated REDD+ accounting frameworks; Nested national approaches	Electrical data	○				LEAF(Lowering Emission from Asia's Forest)	JR・CR（ ）・SC	
8	Safeguard Roadmap for Vietnam's National REDD+ Action Program	Electrical data	○				Steve Swan	JR・CR（ ）・SC	
9	UN-REDD Programme Social and Environmental Principles and Indicators	Electrical data	○				UN-REDD	JR・CR（ ）・SC	
10	R-PP Lao PDR	Electrical data	○				Ministry of Agriculture and Forestry	JR・CR（ ）・SC	
11	Environment Protection Law Lao PDR (2012)	Electrical data	○				National Assembly	JR・CR（ ）・SC	

Number	Name	Book or Video or Map or Electrical data	Collected	Expert report	JICA report	Text	Issued by	Note	Note
12	National Forest Monitoring Systems; Monitoring, Measurement, Reporting and Verification (M&MRV) in the context of REDD+ Activities	Electrical data	○				UN-REDD	JR・CR（ ）・SC	
13	Decision Support Tool for Developing Reference Levels for REDD+	Electrical data	○				Winrock International Forest Carbon Asia	JR・CR（ ）・SC	
14	Second National Communication on Climate Change of Lao PDR	Electrical data	○				Ministry of Natural Resources and Environment	JR・CR（ ）・SC	
15	(Draft) Proposed National Forest Carbon Assessment Standard Operating Procedures (SOPs)	Electrical data	○				Ministry of Natural Resources and Environment (MoNRE), and Ministry of Agriculture and Forestry (MAF)	JR・CR（ ）・SC	
16	(Draft) Concept note for the establishment of a national greenhouse gas inventory system for the Agriculture, Forestry and Other Land Use Sector (AFOLU)	Electrical data	○				CliPAD	JR・CR（ ）・SC	
17								JR・CR（ ）・SC	
18								JR・CR（ ）・SC	
19								JR・CR（ ）・SC	
20								JR・CR（ ）・SC	

Lao People's Democratic Republic

The Capacity Development Project for Establishing National Forest Information System for Sustainable Forest Management and REDD+ (Phase Ⅱ)

Completion Report

Annex6 : Action plan for NFMS and suggestion for capacity building

Lao People's Democratic Republic

Department of Forestry, Ministry of Agriculture and Forestry

Lao People's Democratic Republic

The Capacity Development Project for Establishing National Forest Information System for Sustainable Forest Management and REDD+ (Phase Ⅱ)

NFMS Establishment Action Plan and Recommendations on Capacity Building

2015 September

Japan International Cooperation Agency

Joint Venture
KOKUSAI KOGYO CO., LTD.
ASIA AIR SURVEY CO., LTD.

Acronyms

AGB	Above Ground Biomass
AFOLU	Agriculture, Forestry and Other Land Use
ASEAN	Association of Southeast Asian Nations
AWLCA	Ad hoc Working Group on Long-Term Cooperative Action
BGB	Below Ground Biomass
CIFOR	Center for International Forestry Research
CliPAD	Climate Protection through Avoided Deforestation Project
COP	Conference of the Parties
C/P	Counterpart
DAFO	District Agriculture and Forestry Office
DB	Database
DBH	Diameter at breast height
DFRM	Department of Forest Resource Management
DG/DGG	Director General / Deputy Director General
DOF	Department of Forestry
DOFI	Department of Forest Inspection
EDN	ESRI Developer Network
FAO	Food and Agriculture Organization (of the United Nations)
FCPF	Forest Carbon Partnership Facility
FFPRI	Forestry and Forest Products Research Institute
FIM	The Programme for Forest Information Management
FIP	Forest Investment Program
FIPD/DOF	Forest Inventory and Planning Division (Department of Forestry)
FOMIS	Forest Inventory and Management Information System
FPP	Forest Preservation Program
FRA	Global Forest Resources Assessments
FRIMS	Forest Resources Information Management System
FSCAP	Forest Sector Capacity Development Project
GIS	Geographic Information System
GIS/RS	Geographic Information System / Remote Sensing
GIZ	Gesellshaft fuer Internationale Zusammenarbeit
GOL	Government of Lao PDR
IFC	International Financial Cooperation
IT	Information Technology
ITTO	International Tropical Timber Organization
JICA	Japan International Cooperation Agency
JICS	Japan International Cooperation System
JV	Joint Venture
LEAF	Lowering Emission in Asia's Forest
MAF	Ministry of Agriculture and Forestry
MONRE	Ministry of Natural Resources and Environment
MRV	Measuring, Reporting and Verifying
NFCMs	National Forest Carbon Maps
NFI	National Forest Inventory
NFIDB	National Forest Information Database
NFIS	National Forest Information System
NFMS	National Forest Monitoring System
NTFP	Non-Timber Forest Product
NGD	National Geographic Department
PAFO	Provincial Agriculture and Forest Office
PaMs	Policy and Measures
PAREDD	Participatory Land-use and Management for Reducing Deforestation
R/D	Record of Discussion
REDD	Reducing Emissions from Deforestation and Forest Degradation

REDD+	Reducing Emissions from Deforestation and Forest Degradation and the role of conservation of forests and enhancement of forest carbon stocks
REL	Reference Emission Level
RL	Reference Level
R-PP	Readiness preparation proposal
RS	Remote Sensing
SG	Safeguards
SIDA	Swedish International Development Cooperation Agency
SBSTA	Subsidiary Body for Scientific and technological advice
SUFORD	Sustainable Forest and Rural Development (Project)
TA	Technical Assistance
TF	Task Force
TWG	Technical Working Group
UNFCCC	United Nations Framework Convention on Climate Change
USAID	United States Agency for International Development
VCS	Verified Carbon Standard
WCS	Wildlife Conservation Society
WG	Working Group
WS	Workshop

Outline

Chapter1 Overview of Action Plan

1.1 Background

In the Lao People's Democratic Republic (hereinafter Lao PDR), forest coverage which was 70% or more in the 1940's had declined to 47% in 1989 and 40% in 2010. The government of the Lao PDR (hereinafter GOL) endorsed the "Forestry Strategy 2020" with the objective of restoring a forest coverage of 70%. GOL also views REDD+ as valid means for strengthening of management capacities on all levels, increasing government revenues and improving the livelihood of local residents. . Therefore, GOL has been keen in preparations for implementation of REDD+ including establishment of a REDD+ Task Force (TF) while receiving support from many donors including Japan.

On the other hand, in order to promote forest conservation through REDD+, while the development of forest resource information with high accuracy using satellite information analysis and other means is indispensable, the hardware / software processing capability and capacity that are required for forest resource information management are inadequate, and human resources that perform collection / analysis of related information are in extremely short supply in the Lao PDR, meaning that the infrastructure to further forest conservation through REDD+ is weak.

Consequently, under the "Programme for Forest Information Management" (FIM) grant aid cooperation project, the hardware, software and other resources and equipment required for forest resource surveys and satellite image analysis, etc. have been provided and support has been provided to acquire the basic technology required for the utilization of these, and a "Forest Base Map" has been prepared as part of the outputs.

However, in order to deal with REDD+, which is still in the formulation process, in accordance with international discussions, the development of human resources to perform estimation of carbon stock volume utilizing forest information, conduct prediction of forest carbon dynamics prediction, forest resource monitoring and other related works is a pressing issue in the Lao PDR.

Considering the situations, the project (NFIS) has been implemented with Department of Forestry (DOF) under Ministry of Agriculture and Forestry (MAF) as a counterpart for the purpose of capacity building of the Lao counterparts as well as contributing to the sustainable forest management through the development of necessary components towards building the forest information system in Lao forestry sector for about two years from September 2013 to September 2015.

This document summarizes the current situation and the challenges organizing National Forest Monitoring System (NFMS) action plan and recommendations on the capacity building for the purpose of contributing to the project on supporting sustainable forest management and REDD+ (implementing phase) planned in JICA.

1.2 Basic Policies of NFMS

A) Targeting the main component of NFMS which is aimed to be established in implementation phase, not the wide range of forest administrative information database

B) Complying with the relavent UNFCCC resolutions and the existing Laos official documents on laws and regulations (which include NFIS and the PDM and inception report of implementation phase, etc)

C) Selecting the hardware, software and the system to be able to be maintained and managed by Lao side after the completion of implementation phase

D) Assuming the NFMS shall be established and maintained at center for the time being, not involving the locals such as province specifically

Chapter2 Action Plan

2.1 Summary of the decisions of UNFCCC related to NFMS

The Warsaw REDD+ Framework agreed at COP19 provides comprehensive requirements and procedures for developing countries to implement REDD+ and request for results-based payment excluding further guidance on Safeguards and more detailed procedures and amounts related to the results-based payment. This section reviews the main parts of decisions of the UNFCCC related to NFMS and MRV. (Important phrases are underlined)..

UNFCCC Decisions on NFMS

Decision 14/CP.15

1. Requests developing country Parties, on the basis of work conducted on the methodological issues set out in decision 2/CP.13, paragraphs 7 and 11, to take the following guidance into account for activities relating to decision 2/CP.13, and without prejudging any further relevant decisions of the Conference of the Parties, in particular those relating to measurement and reporting:

(d) To establish, according to national circumstances and capabilities, robust and transparent national forest monitoring systems and, if appropriate, sub-national systems as part of national monitoring systems that:

(i) Use a combination of remote sensing and ground-based forest carbon inventory approaches for estimating, as appropriate, anthropogenic forest-related greenhouse gas emissions by sources and removals by sinks, forest carbon stocks and forest area changes;

(ii) Provide estimates that are transparent, consistent, as far as possible accurate, and that reduce uncertainties, taking into account national capabilities and capacities;

(iii) Are transparent and their results are available and suitable for review as agreed by the Conference of the Parties;

Decision 1/CP.16

71. *Requests* developing country Parties aiming to undertake the activities referred to in paragraph 70 above, in the context of the provision of adequate and predictable support, including financial resources and technical and technological support to developing country Parties, in accordance with national circumstances and respective capabilities, to develop the following elements:

(c) A robust and transparent national forest monitoring system for the monitoring and reporting of the activities referred to in paragraph 70 above, with, if appropriate, subnational monitoring and reporting as an interim measure, in accordance with national circumstances, and with the provisions contained in decision 4/CP.15, and with any further elaboration of those provisions agreed by the Conference of the Parties;

Decision 11/CP.19 **Modalities for national forest monitoring systems**

2. *Decides* that the development of Parties' national forest monitoring systems for the monitoring and reporting of the activities, as referred to in decision 1/CP.16, paragraph 70, with, if appropriate, subnational monitoring and reporting as an interim measure, should take into account the guidance provided in decision 4/CP.15 and be guided by the most recent Intergovernmental Panel on Climate Change guidance and guidelines, as adopted or encouraged by the Conference of the Parties, as appropriate, as a basis for estimating anthropogenic forest-related greenhouse gas emissions by sources, and removals by sinks, forest carbon stocks, and forest carbon stock and forest-area changes;

3. *Also decides* that robust national forest monitoring systems should provide data and information that are transparent, consistent over time, and are suitable for measuring, reporting and verifying anthropogenic forest-related emissions by sources and removals by sinks, forest carbon stocks, and forest carbon stock and forest-area changes resulting from the implementation of the activities referred to in decision 1/CP.16, paragraph 70, taking into account paragraph 71(b) and (c) consistent with guidance on measuring, reporting and verifying nationally appropriate mitigation actions by developing country Parties agreed by the Conference of the Parties, taking into account methodological guidance in accordance with decision 4/CP.15;

4. *Further decides* that national forest monitoring systems, with, if appropriate, subnational monitoring and reporting as an interim measure as referred to in decision 1/CP.16, paragraph 71(c), and in decision 4/CP.15, paragraph 1(d) should:

(a) Build upon existing systems, as appropriate;

(b) Enable the assessment of different types of forest in the country, including natural forest, as defined by the Party;

(c) Be flexible and allow for improvement;

(d) Reflect, as appropriate, the phased approach as referred to in decision 1/CP.16, paragraphs 73 and 74;

5. *Acknowledges* that Parties' national forest monitoring systems may provide, as appropriate, relevant information for national systems for the provision of information on how safeguards in decision 1/CP.16,

appendix I, are addressed and respected.

UNFCCC Decisions for MRV

Decision 14/CP.19 Modalities for measuring, reporting and verifying

3. *Decides* that the data and information used by Parties in the estimation of anthropogenic forest-related emissions by sources and removals by sinks, forest carbon stocks, and forest carbon stock and forest-area changes, as appropriate to the activities referred to in decision 1/CP.16, paragraph 70, undertaken by Parties, should be transparent, and consistent over time and with the established forest reference emission levels and/or forest reference levels in accordance with decision 1/CP.16, paragraph 71(b) and (c) and chapter II of decision 12/CP.17;

4. *Agrees* that, consistent with decision 12/CP.17, paragraph 7, the results of the implementation by Parties of the activities referred to in decision 1/CP.16, paragraph 70, measured against the forest reference emission levels and/or forest reference levels should be expressed in tonnes of carbon dioxide equivalent per year;

5. *Encourages* Parties to improve the data and methodologies used over time, while maintaining consistency with the established or, as appropriate, updated, forest reference emission levels and/or forest reference levels in accordance with decision 1/CP.16, paragraph 71(b) and (c);

6. *Decides* that, consistent with decision 1/CP.16 and decision 2/CP.17, annex III, the data and information referred to in paragraph 3 above should be provided through the biennial update reports by Parties, taking into consideration the additional flexibility given to the least developed countries and small island developing States;

7. *Requests* developing country Parties seeking to obtain and receive payments for results-based actions, when submitting the data and information referred to in paragraph 3 above, through the biennial update reports, to supply a technical annex as per decision 2/CP.17, annex III, paragraph 19;

9. *Decides* that the data and information provided in the technical annex referred to in paragraph 7 above shall be consistent with decisions 4/CP.15 and 12/CP.17 and follow the guidelines provided in the annex;

11. *Further decides* that, as part of the technical analysis referred to in decision 2/CP.17, annex IV, paragraph 4, the technical team of experts shall analyze the extent to which:

(a) There is consistency in methodologies, definitions, comprehensiveness and the information provided between the assessed reference level and the results of the implementation of the activities referred to in decision 1/CP.16, paragraph 70;

(b) The data and information provided in the technical annex is transparent, consistent, complete2 and accurate;

(c) The data and information provided in the technical annex is consistent with the guidelines referred to in paragraph 9 above;

(d) The results are accurate, to the extent possible;

Annex **Guidelines for elements to be included in the technical annex referred to in decision 14/CP.19, paragraph 7**

1. Summary information from the final report containing each corresponding assessed forest reference emission level and/or forest reference level, which includes:

(a) The assessed forest reference emission level and/or forest reference level expressed in tonnes of carbon dioxide equivalent per year (CO2 eq);

(b) The activity or activities referred to in decision 1/CP.16, paragraph 70, included in the forest reference emission level and/or forest reference level;

(c) The territorial forest area covered;

(d) The date of the forest reference emission level and/or forest reference level submission and the date of the final technical assessment report;

(e) The period (in years) of the assessed forest reference emission level and/or forest reference level.

2. Results in tonnes of CO2 eq per year, consistent with the assessed forest reference emission level and/or forest reference level.

3. Demonstration that the methodologies used to produce the results referred to in paragraph 2 above are consistent with those used to establish the assessed forest reference emission level and/or forest reference level.

4. A description of national forest monitoring systems and the institutional roles and responsibilities for measuring, reporting and verifying the results.

5. Necessary information that allows for the reconstruction of the results.

6. A description of how the elements contained in decision 4/CP.15, paragraph 1(c) and (d), have been taken into account.

As seen in the relevant UNFCCC decisions, NFMS needs to monitor implementation of the 5 REDD+ activities as well as estimates of emission reductions/removal enhancement suitable to the MRV as the results of REDD+ activities. Further, the data and information, which NFMS uses and produces, need to be transparent, consistent over time, complete, and accurate.

Establishment of NFMS is one the four elements required for REDD+ countries to develop, and its descriptions, both technical and institutional, are necessary to be included in the technical annex to the biennial update report for MRV of results. Therefore, NFMS needs to be established with both technical and institutional aspects.

2.2 Current state, establishment and utilization of NFMS in Lao PDR

2.2.1 Current State of Forest Monitoring in Laos

The current state (progress and issues) of the forest monitoring in Laos was analyzed by comparing it with the requirements for NFMS provided in the decisions of UNFCCC mentioned in 2.1. The current state was also compared with the requirements for MRV which was closely related to NFMS (and, therefore, shared many requirements with NFMS).

UNFCCC Decisions on NFMS

Decision 14/CP.15

1. (d) Robust and transparent NFMS:	Current state (progress and issues)
(i) Use a combination of remote sensing and ground-based forest carbon inventory approaches as appropriate	・ Remote sensing and ground-based forest carbon inventory approaches are used in an appropriate combination (capacity development phase).
(ii) Provide estimates that are transparent, consistent, as far as possible accurate, and that reduce uncertainties	・ The estimation is being conducted and the agencies involved in NFMS are having discussions to make it transparent. ・ The 2010 forest type maps are planned to be used as the basis of the establishment of the consistency. ・ The accuracy of the forest type maps has been verified and improved for the assurance of the accuracy. ・ A study to reduce uncertainties has been conducted and the result of the study is being analyzed.
(iii) Are transparent and their results are available and suitable for review as agreed by the Conference of the Parties	・ Preparation is being made for the implementation of the review as agreed by the Conference of the Parties. ・ Further studies and discussions are required for the establishment of the technical and institutional aspects.

Decision 1/CP.16

71.	Current state (progress and issues)
(c) Development of robust and transparent NFMS for the monitoring and reporting of the REDD+ activities (Provisionally as a sub-national system)	・ The preparation for the monitoring of "REDD+ activities" is not sufficient in such aspects as the analysis of drivers, monitoring intervals/methods and budgetary allocation. ・ Measures are being taken and coordination is being made for the development of national and sub-national systems.

Decision 11/CP.19

Modalities for NFMS	Current state (progress and issues)
2. Subjects of the monitoring and reporting of the	

REDD+ activities	
Forest-related emissions and removals	・ The emissions and removals are to be estimated from matrixes of forest type change and average carbon stock change which have been discussed and agreed upon.
Forest carbon stocks	・ At present, average carbon stocks are estimated from forest types and area-specific equations. ・ A study on carbon stratification has been conducted using the existing data.
Forest carbon stock changes	・ At present, the change in the forest carbon stocks is estimated by multiplying the change in the forest area in different time periods (see below) with the average carbon stock.
Forest-area changes	・ The changes in the forest area between 2000 and 2005 and between 2005 and 2010 have been estimated using the forest type maps created in accordance with the forest classification which has been discussed and agreed upon. ・ The change between 2010 and 2015 is to be estimated in 2016.
3. The data and information provided by NFMS should:	
Be transparent	・ The transparency of the definitions of forests and the forest classification has been established by disclosing and sharing them. ・ The transparency of the methodologies has been established with the development of a (draft) NFI manual. ・ Competent office: Forest Inventory and Planning Division (FIPD), Department of Forestry (DOF)
Be consistent	・ The consistency of the forest type maps has been established with the creation of the 2005 and 2000 maps with the same forest classification as those used in the creation of the 2010 maps. ・ The formulation of SOP of NFI has contributed to the establishment of the consistency of collected data.

Be Suitable for MRV	・ The preparation for the implementation and designing of the measuring and reporting is in progress. ・ A study on the verification of internal accuracy and the quality control has been conducted.
Be compliant with the guidance of NAMA	・ The consistency with the guidance of NAMA has not been discussed sufficiently.
4. NFMS should:	
(a) Build upon existing systems, as appropriate	・ Forest type maps have been created using the existing definitions and classification of forests. ・ A NFI manual based on the existing field survey methodologies has been developed. ・ The existing databases have been analyzed and a prototype database has been designed.
(b) Enable the assessment of different types of forest in the country, including natural forest, as defined by the Party	・ Level-1, -2 and -3 forest classification has been established and assessed. ・ At the national level, forest type maps have been created at Level-2 and the created maps have been assessed. ・ Discussions and studies on Level-3 (including forest degradation) have been commenced.
(c) Be flexible and allow for improvement	・ Flexibility of the system has been ensured with the use of a system which has been widely used. ・ The ease of improvement of the system has been established with the preparation of relevant reference materials and the capacity development.
(d) Reflect the phased approach as referred to in decision 1/CP.16, paragraphs 73 and 74	・ REDD+ activities to be monitored and reported (Phase 1: deforestation, Phase 2: forest degradation and sustainable forest management) ・ Allometric equations (Phase 1: i) for the existing NFI, ii) for neighboring countries and iii) for the general purpose use, Phase 2: country-specific equations on the basis of the deforestation survey) ・ Emission factors (Phase 1: those for the existing NFI/those provided by IPCC, Phase 2: those for the next NFI and country-specific allometric equations)

5. Provide information for systems to provide information on REDD+ safeguards	・ Case studies of SG in other countries and the laws and regulations on SG of Laos have been analyzed. ・ Studies and demonstration of the information system which is the foundation of NFMS have been conducted.

UNFCCC Decisions for MRV

Decision 14/CP.19

Modalities for MRV	Current state (progress and issues)
3. Data and information for MRV should:	*Some of the data and information are the same as those provided by NFMS.
Be transparent	・ The transparency of the definitions of forests and the forest classification has been established by disclosing and sharing them. ・ The transparency of the methodologies has been established with the development of a (draft) NFI manual. ・ Competent office: Forest Inventory and Planning Division (FIPD), Department of Forestry (DOF)
Be consistent	・ The consistency of the forest type maps has been established with the creation of the 2005 and 2000 maps with the same forest classification as those used in the creation of the 2010 maps. ・ The formulation of SOP of NFI has contributed to the establishment of the consistency of collected data.
Be consistent with the forest reference emission levels and/or forest reference levels	・ The information created with the same specifications (definitions and methodology) as those used in the creation of the reference levels is to be used in MRV.
4. Agrees that, consistent with decision 12/CP.17, paragraph 7, the results of the implementation by Parties of the activities referred to in decision 1/CP.16, paragraph 70, measured against the forest reference emission levels and/or forest reference levels should be expressed in tons of	・ A study on the reference levels (version 1) is being conducted. The resultant levels are to be established so that they are expressed in tons of carbon dioxide equivalent per year.

carbon dioxide equivalent per year	
5. Encourages Parties to improve the data and methodologies used over time, while maintaining consistency with the established or, as appropriate, updated, forest reference emission levels and/or forest reference levels in accordance with decision 1/CP.16, paragraph 71(b) and (c)	・ The data and methodologies are to be improved with the phased approach.
6. Decides that, consistent with decision 1/CP.16 and decision 2/CP.17, annex III, the data and information should be provided through the biennial update reports (BURs) by Parties	・ It is necessary, at first, for MONRE to prepare (update) and submit a country report using the information being developed by DOF/FIPD.
7. Developing country Parties seeking to obtain and receive payments for results-based actions to supply a technical annex through the BURs	See * below.
Article 11: The requirements on the technical analysis of the data and information provided in the technical attachment	See * below.
(a) Consistency with reference level (methodologies, definitions, comprehensiveness and information)	・ The reference levels have been established using the data provided by NFMS. The same methodologies, definitions and information are to be used in MRV.
(b) Transparency, consistency, completeness and accuracy	・ See above for the transparency, consistency and accuracy. ・ A system and database for data provision have been developed for the establishment of completeness.
(c) The data and information provided in the technical annex is consistent with the guidelines referred to in paragraph 9 above	・ See * below. It is necessary to verify the consistency with the guidelines. (Preparation of a checklist, etc. is required)
(d) The results are accurate, to the extent possible	・ The accuracy of the forest type maps is being verified and improved. ・ In the (next) NFI, the quality of the data is to be ensured with the development of a manual and tools.

* Annex Guidelines for elements to be included in the technical annex referred to in decision 14/CP.19, paragraph 7

1. Summary information from the final report containing each corresponding assessed forest reference emission

level and/or forest reference level, which includes:

(a) The assessed forest reference emission level and/or forest reference level expressed in tons of carbon dioxide equivalent per year (CO_2 eq);

(b) The activity or activities referred to in decision 1/CP.16, paragraph 70, included in the forest reference emission level and/or forest reference level;

(c) The territorial forest area covered;

(d) The date of the forest reference emission level and/or forest reference level submission and the date of the final technical assessment report;

(e) The period (in years) of the assessed forest reference emission level and/or forest reference level.

2. Results in tons of CO_2 eq per year, consistent with the assessed forest reference emission level and/or forest reference level.

3. Demonstration that the methodologies used to produce the results referred to in paragraph 2 above are consistent with those used to establish the assessed forest reference emission level and/or forest reference level.

4. A description of NFMS and the institutional roles and responsibilities for measuring, reporting and verifying the results.

5. Necessary information that allows for the reconstruction of the results.

6. A description of how the elements contained in decision 4/CP.15, paragraph 1 (c) and (d), have been taken into account.

2.2.2 Contents, Purposes and Utilization of NFMS in Laos

The measures focused on the points mentioned below are considered to be required as the contents and for the purposes and utilization of NFMS in Laos when the current state (progress and issues) of the forest monitoring in Laos summarized in 2.2.1, more specifically, the contents of the decisions at COP15 and COP16 and the modalities of NFMS (and MRV) decided in the Warsaw REDD+ Framework at COP19 formulated after the discussions on the decisions at COP15 and COP16, are taken into consideration.

(1) Monitoring of the progress of REDD+ activities,

(2) Assistance to MRV of the REDD+ at the national level, and

(3) Assistance to the development of FREL/REL at the national level

The points (2) and (3) above, in particular, shall be addressed in the project in the next phase as they are also mentioned in the Narrative Summary/Activities of Output 2 in the PDM of F-PREP.

2.3 Area and change of land use and forestry by satellite imagery in Lao PDR

2.3.1 Current siuation

The analysis of the area and change of land use and forestry by satellite imagery in Lao PDR has to proceed by following the requirements provided in the decisions of UNFCCC mentioned in 2.1. The current situation of this area and change of land use and forestry in Lao PDR, in the light of the requirements provided in the decisions of UNFCCC mentioned in 2.1., was organized as follows.

The forest definition and classification system in Lao PDR has been discussed openly for a long time with the members of the government, university, and other donors, and the system was agreed as shown in Table 2-1 and Table 2-2 (transparency).

The forest definition, which has been agreed this time, and the forest definition, which was used for the past NFI, are the same (consistency based on the existing system). Furthermore, the threshold of the forest definition, which is more than 10 cm of DBH (diameter at breast height), is comparatively familiar with the resolution of the RapidEye imagery, which is used to develop forest base map; therefore, the forest classification can be closer to the truth (ensuring accuracy).

The classification system of Level 1 and 2 shown in Table 2-1, which are targets for the national level, are basically recommended to be used for the sub-national level as well (coordination between national and sub-national systems). Actually, the national and sub-national level projects in Lao PDR have been discussed and coordinated for the consistent classification system for each level so far (coordination between national and sub-national systems). Furthermore, the Table 2-3 shows the comparison of the previous and new classification system at the national level, the new classification system agreed this time, follows the previous classification system even though there is some restructuring on Level 1 (Table 2-3) (consistency based on the existing system). Level 2 includes several types of forest which include natural forest; therefore, measuring, reporting, and verifying can be carried out for each forest type (evaluation according to the definition of each different forest types is possible).

After developing the 2010 forest type map as base map, the 2000 and 2005 forest type maps, which are required to establish REL/RL, were developed on the same forest classes of the 2010 forest type map based on the change detection between the two times periods of the satellite imagery(consistency). Furthermore, the accuracy assessment and revision for all the developed forest type maps were conducted (ensuring accuracy), and illogical changes were removed through the verification of the all time periods (ensuring consistency and accuracy). On the other hand, all required information for the next MRV will be prepared with the same specification of data that is used for the establishment of REL/RL (consistent with REL/RL).

Table 2-1 : National level classification system for Lao PDR

Land/Forest Classification at National Level for Lao PDR

Land/Forest Classification at National Level for Lao PDR is shown below in comparison with IPCC land use categories.
'Level 1' have to be used for any level of map.
'Level 2' should be used for any level of map.
'Level 3' can be used for Sub-National/Project Level.

IPCC Definition	*National Level Classification System for Lao PDR*				
	Level 1	*Level 2*		*Level 3*	
Forest Land	**Current Forest**	Evergreen Forest	EF	High Density Evergreen Forest	HEF
				Low Density Evergreen Forest	LEF
		Mixed Deciduous Forest	MD	High Density Mixed Deciduous Forest	HMD
				Low Density Mixed Deciduous Forest	LMD
		Dry Dipterocarp Forest	DD	High Density Dry Dipterocarp	HDD
				Low Density Dry Dipterocarp	LDD
		Coniferous Forest	CF		
		Mixed Coniferous and Broadleaved Forest	MCB		
		Forest Plantation	P	Evergreen Forest Plantation	EP
				Deciduous Forest Plantation	DP
	Regenerating Vegetation	Bamboo	B	Bamboo	B
		Regenerating Vegetation	RV	Fallow Land	FL
				Degraded Forest	DF
Grassland	**Other Vegetated Areas**	Savannah	SA		
		Scrub	SC		
		Grassland	G		
Wetlands		Swamp	SW		
Cropland	**Cropland**	Upland Crop	UC		
		Rice Paddy	RP		
		Other Agriculture	OA		
		Agriculture Plantation	AP		
Settlements	**Non Vegetated Areas**	Urban	U		
Other Land		Barren Land and Rock	BR		
	Other Land	Other Land	O		
Wetlands	**Water**	Water	W		

Table 2-2 : Minimum thresholds of the revised forest definition

Minimum Threshold of Forest Definition		
DBH	Crown Density	Area
10cm	20%	0.5ha

Table 2-3 : Comparison previous and new classification system

Original Classification System			New Classification System		
Level 1	Level 2		Level 1	Level 2	
Current Forest	Dry Evergreen Forest	EG	Current Forest	Evergreen Forest	EF
	Mixed Deciduous Forest	MD		Mixed Deciduous Forest	MD
	Dry Dipterocarp Forest	DD		Dry Dipterocarp Forest	DD
	Coniferous Forest	S		Coniferous Forest	CF
	Mixed Conif/Broadleaved Forest	MS		Mixed Coniferous/Broadleaved Forest	MCB
	Forest Plantation	P		Forest Plantation	P
Potential Forest	Bamboo	B	Regenerating Vegetation	Bamboo	B
	Unstocked	T		Regenerating Vegetation	RV
Other Wooded Area	Savannah/Open Woodlands	SH	Other Vegetated Area	Savannah	SA
	Scrub, Heath	SR		Scrub	SR
Other Non-Forest Area	Grassland	G		Grassland	G
	Swamp	SW		Swamp	SW
Potential Forest	Ray	RA	Cropland	Upland Crop	UC
Permanent Agriculture Area	Rice Paddy	RP		Rice Paddy	RP
	Agriculture Plantation	AP		Agriculture Plantation	AP
	Other Agriculture Area	OA		Other Agriculture	OA
Other Non-Forest Area	Rock/Barren Lands	R	Non Vegetated Area	Barren Land and Rock	R
	Urban Area	U		Urban	U
Water	Water	W	Water	Water	W
Other Land	Other Land	O	Other Land	Other Land	O

2.3.2 Assignment and suggestion (including capacity building)

The suggestions to determine the area and change of land use and forestry by satellite imagery in Lao PDR are as follows.

The required 2000, 2005 and 2010 forest type maps for the establishment of REL/RL have been created, however the establishment of the monitoring system will be carried out in the near future. However, it is considered that the monitoring methodology itself will be established based on the change detection methodology developed through the development of forest type maps. The preparation of organizing the required drivers, budget, frequency, and monitor method for the establishment of the monitoring system are not enough. These issues have to be addressed through the activities in the future.

Development of methodology for the classification with high accuracy is required to solve the difficult classes, which were clarified through the development of 2000, 2005 and 2010 forest type maps, for ensuring accuracy and reducing uncertainty. Moreover, it is considered that the classification methodology needs to be improved by using various multi-temporal data for these classes, which are particularly difficult to classify with satellite imagery in a single time period, resulting in being changed continuously in temporal sequence. Furthermore, it is necessary to proceed with further consideration, discussion, and consensus building on carbon stratification when the necessary data such as next NFI are prepared because uncertainty can be reduced by applying suitable carbon stratification.

From the point of view of the institutional aspect of the implementation and capacity building, several issues still need to be resolved to maintain a constant quality of the output results without the experts' support, because of the dificulties to manage the progress of work and to keep the specific quality of the outputs by the C/P themselves. Even though the individual image interpretation skill and the operation skill of RS/GIS software have certainly been enhanced through the capacity building, the individual differences vary greatly. It is important that capacity building is provided continuously to reduce the individual differences and to enable to manage a certain level of progress and quality by the C/P themselves.

2.4 Carbon estimation for each forest/land use type in Lao PDR

2.4.1 Current siuation

Estimation of carbon stocks in unit area can be estimated from the resulr of NFI(National fosre Inventory) survey(ex: DBH and/or height) and allometry equation which can estimate amount of biomass from part of tree.

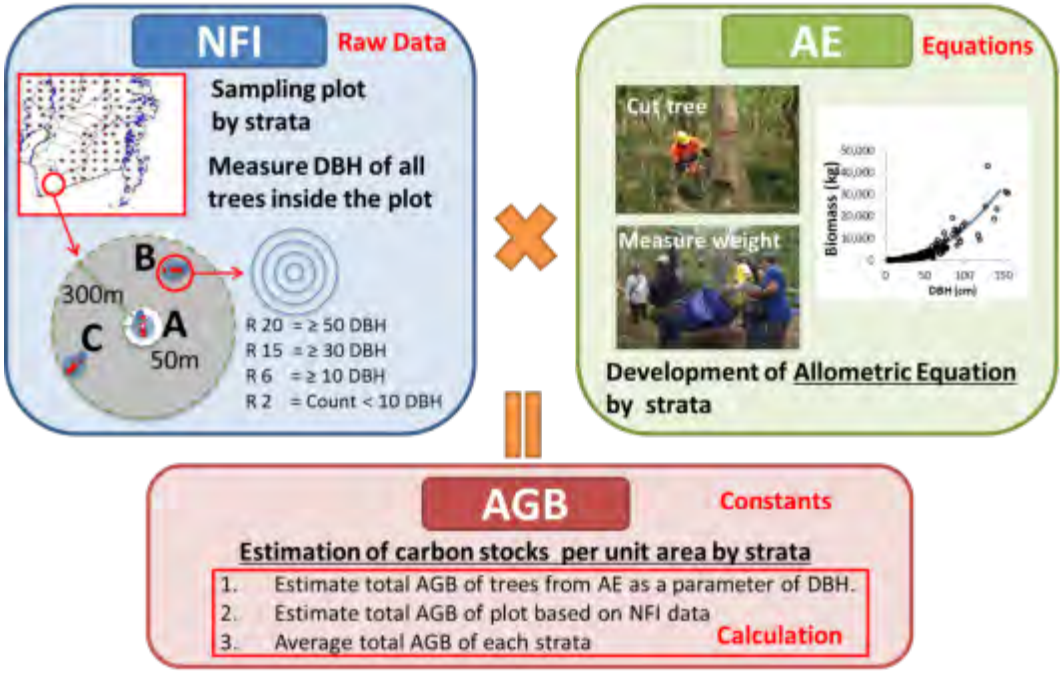


Figure 2-1 : Outline of data and function which will be install on NFIDB

(Ex : Above Ground Biomass(AGB))

Each content are decribed in followings.

1. NFI : NFI was implemened in whole Laos country during 1991~1999. This is the only result which cover whole country.
2. Allometory Equation(AE) : There is no Laos specific AE. So far, global euations which were developed for tropical/sub-tropical region were used. It is called Tier1 level.
3. Carbon stratification : Stratification is carried out in order to improve the accuracy (reduce the uncertainty) in the estimation of the quantity of reduction in GHG emissions, so if there was a high level of uncertainty, it would be necessary to conservatively evaluate the estimated reduction in quantity of GHG emissions. Factors effective for carbon stratification were studied by performing correlation analysis of average carbon volume per unit area of each plot, existing GIS data and the uncertainty of average carbon volume per unit area of each forest type was calculated and the result showed that the uncertainty was not high for any of the forest types. It was determined that it was not necessary to divide the items any further as far as the carbon volume is concerned. On the contrary, integration of the items was studied instead. Based on the existing data, uncertainty of average carbon

volume per unit area and uncertainty of classified area were calculated and overall uncertainty of each forest type and that in the case of integrating the items were tentatively assessed, respectively. Although the assessment was performed only tentatively due to unavailability of the information internationally required for the assessment of comprehensive uncertainty, discussions were held with the C/P with this as a tentative forest stratification proposal to obtain their understanding.

2.4.2 Assignment and suggestion (including capacity building)

Assingment anf plan related to the carbon estimation from forest and land use as arranged 2.4.1are followings.

1) 2ndNFI

2nd NFI which will be implemented on dry season 2016-2017 will be included in the activities of Sustainable Forest Management and REDD+ Support Project in JICA next project.

2) Laos specific Allometric Equation

Allometric eauation will be developed for main forest types in the project of Japan's Programme Grant Aid for Environment and Climate Change The Forest Preservation Programme(TA6) in Lao People's Democratic Republic. It will be compled untill June 2016. As a result of 2nd NFI and new Allometric equation, estimation of carbon stocks in unit area can be estimated with higer accuracy, it is called Tier 2.

3) Cooperation and information exchange between inventory section and GIS/RS section

From the viewpoint of sustainability, there is issue that no communication between the side of field survey and the side of data analysis. In particular, there are limited communication between FIPD inventory section which cover the preparation and implementation of NFI and Allometry equation field survey and FIPD GIS/RS section which cover the data preparation and analysis. Especially, administrators of database have to be familiar with survey items and human error to maintain well. It is necessary to have a consideration for the GIS/DB staff in order to participate the training for promotion better understanding.

4) Stratification review

It was decided that the final forest stratification should be studied again and determined after preparing the forest type map of 2015 and implementing the NFI in the next phase to obtain the necessary data.

2.5 Current state of and Issues in the database for NFMS in Lao PDR

2.5.1 Outline and Current State of the Database for NFMS

The data, analysis results and functions mentioned below are required for the establishment of a robust and transparent NFMS.

(1) To store remote sensing data and ground-based forest carbon inventory data appropriately,

(2) To estimate forest areas by forest type and average carbon stocks by analyzing the data and to store the estimates,

(3) To estimate forest carbons stocks by examining and analyzing carbon sequestering using the stored data and information

The above-mentioned data, analysis results and functions are to be stored in a database for NFMS (NFIDB). They are also to be used in the formulation of the reference (emission) levels. NFMS is a system to monitor the impact of REDD+ activities and to measure, report and verify (MRV) it "repeatedly." The "changes" in the forest areas and forest carbon stocks which contribute to REDD+ are estimated in this system.

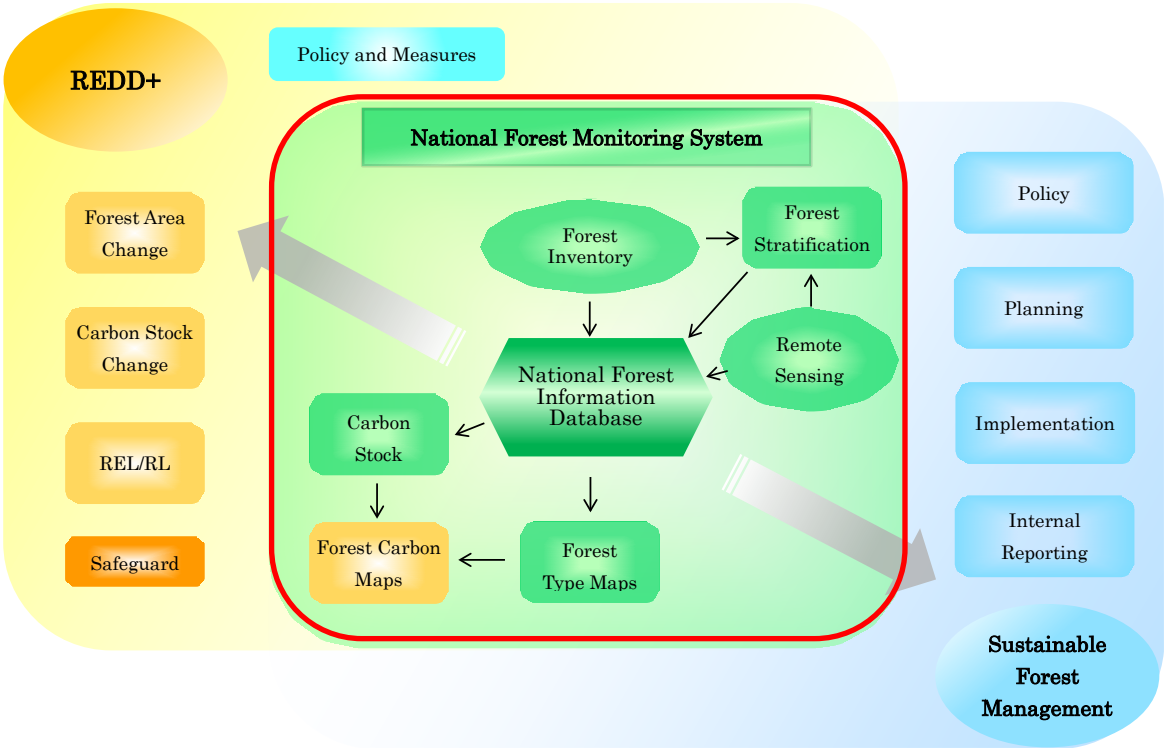


Figure 2-2: Outline of the Database for the National Forest Monitoring System (NFMS)

So far, both the designing of a mechanism (1) to collect and store remote sensing data and forest inventory data and a study on methodologies (2) to estimate the forest areas by forest type and the average carbon stocks have been completed. The methodologies (3) to measure areas of land and forests by their use and their changes

and to estimate a carbon stock in each type of forest and land used for each purpose have also been established. Therefore, the preparation for the development of NFMS and a database which forms a core component of the system (NFIDB) from these data and information has just been completed.

2.5.2 Issues and Recommendations (including those in human resource development)

The establishment of the NFIDB described in 2.5.1 will require the development of the functions i) to store, calculate and output activity data, ii) to store, calculate and output emission factors and iii) estimate, assess and output CO_2 emission.

The technical issues so far revealed in the establishment of such database are as follows:

(1) Automatic Import and Conversion of Survey Data into DB

As the scope of the work of this project includes designing of a prototype DB, a demonstration version of the R script for the quick analysis of the survey data of the pilot NFI has been developed. Meanwhile, although a relational database structure is used in the designing of the database for the combined use with the existing data, a function to import and convert groups of survey data into a relational database automatically has not been developed. It is necessary to implement an import/conversion function with the database system as the need arises in the project in the next phase after re-examining its future operation methods.

(2) Customizable Statistical/Reporting Functions

Studies have been conducted on the data to be stored in the DB, calculation equations, constants and the information required in the international reporting throughout the project period. It is also convenient to have statistical and reporting functions which can be customized by users for their needs for the practical use of the database in the system. As browser-based interactive and customizable services other than Microsoft Report Builder are available, it is necessary to implement one of such services with the system while the trends and development of new technologies are being monitored constantly.

In addition to the technical issues mentioned above, there are the following institutional issues including those on human resource development.

(3) Capacity of the C/Ps and Concentration of workload on the Engineers in Charge

The agencies involved in the forest monitoring in Laos have limited numbers of engineers who have sufficient technical capacity and knowledge in the IT sector. Some of those engineers have acquired the capacity to renovate and operate a database system by themselves in the technical cooperation activities conducted so far. However, the number of the capable engineers is so small that they are forced to handle a large workload. Therefore, the number of such engineers has to be increased urgently. However, because even those engineers who have acquired the

technical capacity do not have sufficient experience in handling the entire designing and development of a national database, it is essential to utilize local resources.

(4) Institutional Aspect of the Development of the System and its Future Maintenance and Operation

The shortage of the local resource in the IT sector with the understanding of the work in the forestry sector has created an issue of putting too much work on a limited number of workers. Therefore, it is assumed necessary to study the possibility of establishing a development and operating system not only with the resources in Laos and in the forestry sector but also with resources in neighboring countries (Thailand, in particular, for the similarity of the languages). As it is not practical to develop the DB with the short-term assignment of Japanese consultants, it will be necessary to secure budget and establish a development and operating system involving the C/Ps of this project for the DB development with local resources in the project in the next phase.

2.6 Institutional aspects of NFMS development

2.6.1 Summary of roles, activities and capacity of existing agencies related to land/forest monitoring

There are several agencies involved in land/forest monitoring under two Ministries; the Ministry of Agriculture and Forestry (MAF) and the Ministry of Natural resources and Environment MONRE). Summary of their roles, actual works and capacity is provided below.

Ministry of Natural Resource and Environment (MONRE)

1. Department of Forest Resource Management (DFRM)

Duties (DECISION regarding the Organization and Activities of the Department of Forest Resource Management No.3121/MONRE dated 18 May 2012)

3.4 Conducting the surveys, zoning and management planning for Protection forest, Conservation forest, corridor zones, specific conservation areas and, management planning for up-stream forest areas of hydropower dams, including the creation of favorable conditions to facilitate the data collection, model establishment and scientific and technical studies;

Activities and capacity

DFRM has the Protection Forest and Conservation Forest Inventory Service in order to fulfill the duties of surveying, zoning and management planning of Protection and Conservation Forest and other forests stated above. However, the number of staff is only 5-6 people with limited experience in forest survey, GIS and others. Therefore, the staff is attending the FIPD's field survey, technical workshops and so on, which are mostly supported by JICA projects and others, to improve their capacity.

2. Department of Land Planning and Development (DLPD)

Duties; (Document unknown. Taken from MONRE Website)

- To manage and conduct survey and planning for land use, zoning, allocation of land use categories, determination of land area for lease and concession
- To create land use master plans at local, province and national levels, and to establish plan for use and development of land

Activities and capacity

DLPD has the Land Survey and Planning Division (LSPD), which sets out to fulfill the duties stated above. LSPD has four units as follows; Land Master Plan, Detailed Land Use Map, Land Survey, and Land mapping. However, the number of staff, equipment and actual activities are unknown at the time of writing this report.

3. Natural Resource and Environment Institute (NREI)

Duties; (Document unknown. Taken from MONRE Website)

- To study, research and expand the use of space technology, remote sensing and geographic information for management planning of natural resource and environment.

Activities and capacity

NREI has several research centers and one of them is the remote sensing center, which is given the above duties. However, the total number of staff is 5 or 6 people whose activities are not known at the time of writing this report.

Ministry of Agriculture and Forestry

1. Forest Inventory and Planning Division (FIPD)/Department of Forestry (DOF)

Duties (Minister's Decision Regarding the organization and Activities of the Department of Forestry No 1887/AF dated 9 August 2012)

Acting as core agency to carry out the survey, monitoring on the change in forest resources as well as management of information on forest resources over the country;

Activities and capacity

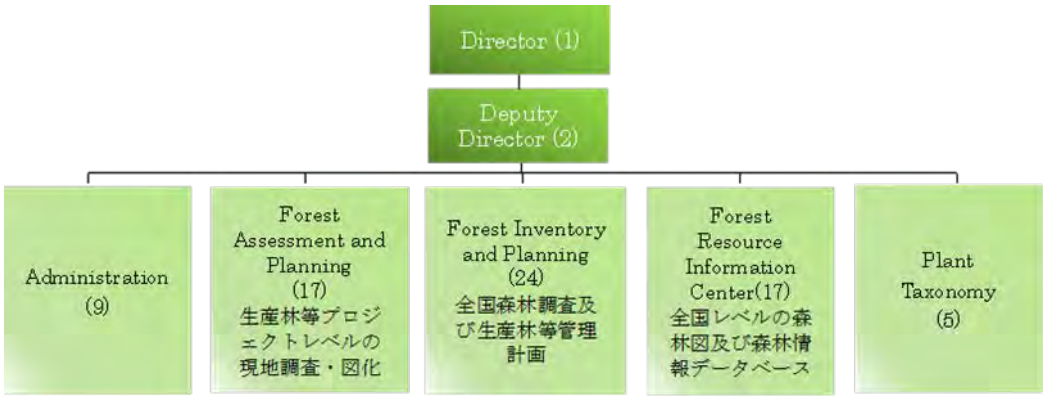
FIPD plays the central and major role for this duty. This is the only agency in Laos which has conducted the first-ever national forest inventory in the 1990s with Swedish assistance. They also conduct detailed surveys and planning for Production Forest for management and harvest and initial forest/land surveys for potential concession areas.

FIPD conducted forest cover assessment for 1982, 92, 02, and 2010. The 2015 assessment is under way with

Japan's support. Under FIM and JICA project, they are completing forest/land use maps for 2000, 2005, and 2010.

FIPD is equipped with modern hardware and software for field survey, remote sensing/mapping and so on, most of which are provided through Japan/JICA and other donor projects such as CliPAD, SUFORD and so on.

It has one director, two deputy directors and 5 units as follows;



2. Department of Agriculture Land Management and Development (DALMAD)

Duties (Minister's Decision Regarding the Organization and Activities of the Department of Agricultural Land Management and Development No. 2267/AF dated 19 September 2012)

1. Undertaking the surveys, classifications, zoning of agricultural lands, land areas in the water bodies, land areas for irrigation construction, as well as submitting the proposals for registering these lands in collaboration with the concerned parties, so that their uses become more adequate and fit to the concrete conditions;
2. Studying and undertaking the zoning and classifications of agricultural lands; preserving, managing the uses and developing the agricultural lands in a sustainable manner, based on the potentials of each locality;

Activities

GIS database of DALMAD consists of soil map, land use map (agriculture land use map), land suitability map, slope map, etc. By combination of climate data including rainfall, temperature, and potential evaporation with soil map, an agro-ecological zoning map is created.

Agriculture Land Use Map is provided by DOF while Climate data is obtained from the Department of Meteorology and Hydrology of MONRE. The original GIS data of Land Department is only soil map.

2.6.2 Issues for institutional set-up of NFMS

As stated above, the agencies directly involved in the forest survey and monitoring are DOF and DFRM.

However, the national level forest mapping by remote sensing (R/S) and ground surveys are duties of DOF which has the experience and capability. DFRM is responsible for the surveys of both Protection and Conservation Forests, and accompany the FIPD's forest surveys, workshops and so on supported by JICA and other organizations, in other to strengthen its capacity..

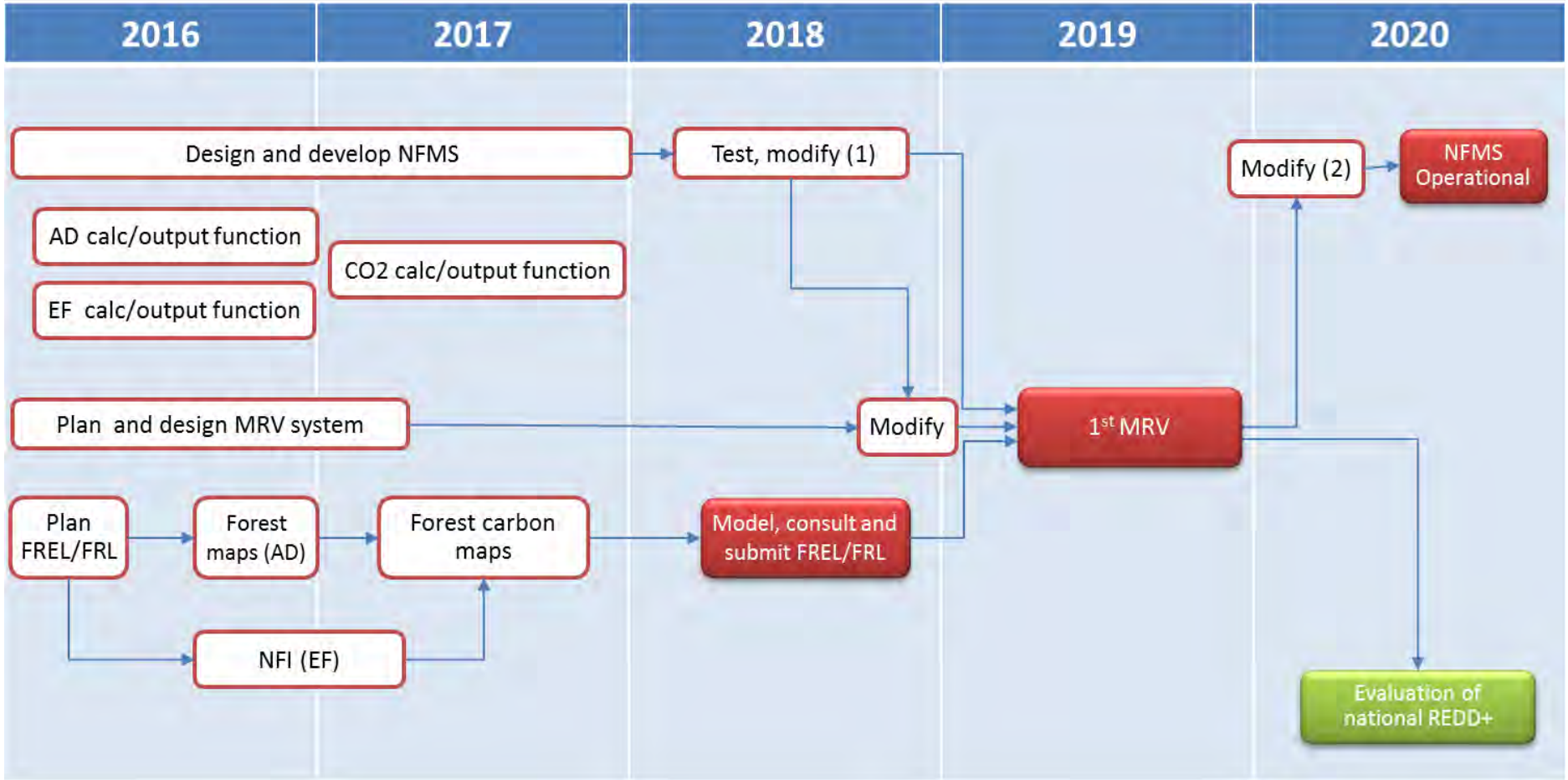
As for the overall land survey and planning, which is responsibility of MONRE's Department of Land Planning and Development, its internal institutions, equipment, capacity and actual activities/results are unknown at the time of writing this report. Likewise, MONRE has a remote sensing center, however small, its activities and other operations are not clear at this time.

The two components of NFMS, which are land/forest monitoring (activity data) through remote sensing and assessment of carbon stored in vegetation/forest, seem to be FIPD/DOF's responsibilities from the capacity and experience points of view. However, the original data and obtained/processed information including land/forest type maps and biomass estimates are useful for other agencies and moreover it is essential for efficient land/forest administration and management that the concerned agencies use the same set of data, information and definitions for zoning of land including forest categories and agricultural land. Furthermore, consultation and coordination among these agencies is indispensable for GHG inventory in the national communications or biennial update reports.

It is necessary for institutional decisions of NFMS to include these agencies in the technical working group on REL/MRV established under NRTF and agree on the procedures and responsible agencies for types/acquisition of original data, processing, verification and so on. In addition, NFMS needs to monitor REDD+ interventions in order to link forest area/carbon changes with these interventions. Therefore, identifying and coordinating with the agencies which are implementing these interventions is also very important.

2.7 Schedule for NFMS Establishment Process

Taking the REDD+ Readiness Preparation Proposal for Laos into account, the establishment of NFMS requires that the development of an MRV function (AD storage, calculation, output; EF storage, calculation, output; CO2 estimation, assessment, output) proceed in parallel with and in collaboration with the preparation for implementation of MRV (FREL/FRL plan, preparation of forest type maps (AD), preparation of forest carbon maps), as well as its testing and operation.



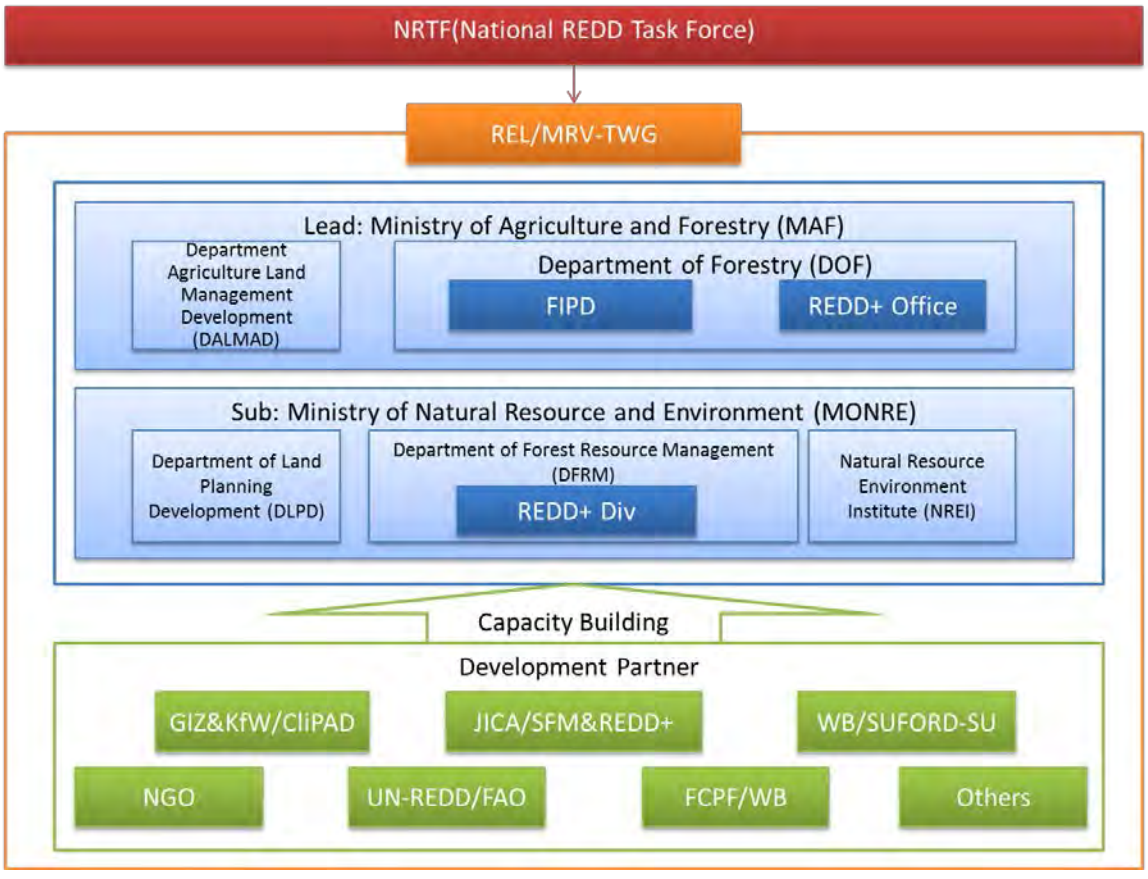
Chapter3 Recommendations on the Future Development of Human Resources in the Field of Forest Monitoring in Laos

3.1 Implementation System

As was set out in 2.6 On the Provision of a Structure and System for the Establishment of NFMS, the agencies directly concerned with national forest monitoring are DOF and DFRM. The FIPD of DOF is considered responsible for the monitoring by satellite of land and forests (understanding of AD) and for the verification through ground surveys of the carbon stock of the vegetation including mainly the forests.

However, since as things stand at present neither DOF nor DFRM have the necessary capacity or organization to establish and operate NFMS, the situation is such that there is a need for development partners, including JICA, to undertake human resources development; it is important that those involved work together to ensure that capacity building is systematic and coordinated.

To this end, there is a need for the relevant organizations and development partners, in the REL/MRV-related TWG established within NRTF, to undertake human resource development within the various fields of original data type/method of acquisition, processing, verification procedures, etc. by sharing the duties, experiences, capacities, achievements etc. that they each possess.



3.2 Method for Securing Financial Resources

In addition to the limited clerical and travel expenses from the general budget, forestry sector funding from the Laotian side consists of the Forest and Forest Resources Development Fund; the financial resources for this come mainly from the transfer of a fixed amount from the proceeds of logging, which is distributed in response to requests from relevant organizations (DFRM, DOF, DOFI and provincial organizations). However, the annual budget, amounting to one hundred million yen or so, is extremely restricted in comparison to what is needed, and the true situation is that most of the work is financed by donor projects.

In this situation and in the face of these issues, in order to secure the budget/financial resources necessary to establish and operate NFMS and to develop the human resources needed to do so, the determination of the Who, When, Where, What, Why and How of MRV and monitoring implementation, full consultation with the decision-makers/managers of the relevant organizations, and the preparation of an operating plan (including processes and regulations), will provide the information that will be the basis and rationale for the securing of the budget and financial resources.

In the operating plan, events such as international reports and training relating to NFMS and activities (OJT) such as the preparation of forest type maps, forest inventory surveys, etc., will be inserted into the schedule, and these activities together with hardware and software maintenance costs, the cost of purchasing satellite images and other data, etc., will be included in an annual budget. Then, it will be necessary to run, on the basis of the operating plan, a simulation of "How much it will cost", and to propose the necessary budgetary measures and financing (including donor aid).

Lao People's Democratic Republic

The Capacity Development Project for Establishing National Forest Information System for Sustainable Forest Management and REDD+ (Phase Ⅱ)

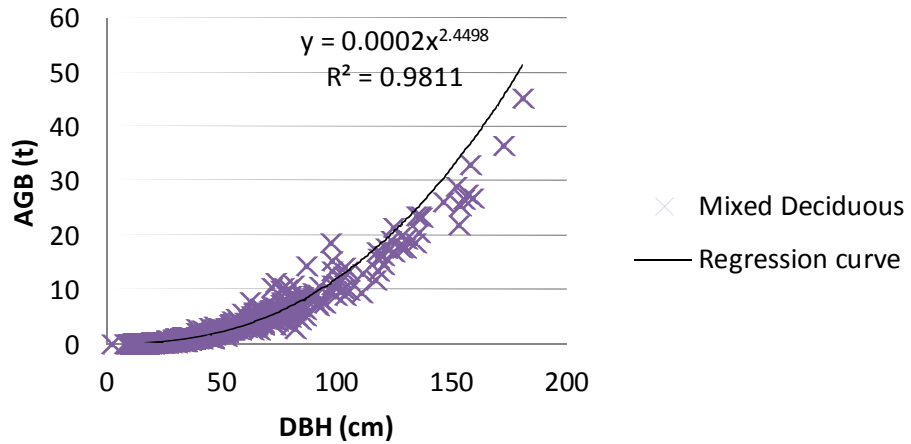
Completion Report

Annex7 : Single Regression Analysis between Diameter At Breast Height and Ground Biomass for Each Province Vegetation Type

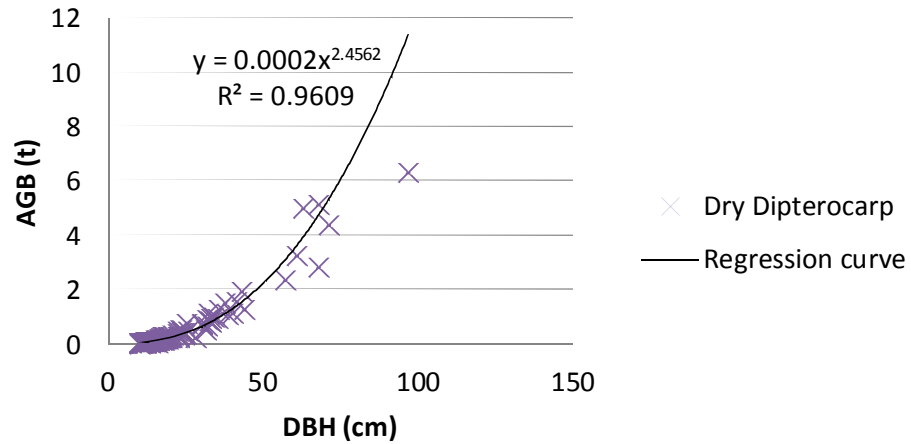
Single Regression Analysis between Diameter at Breast Height and Ground Biomass for Each Province /Vegetation Type

The following figures show that single regression analysis which was carried out with respect to the diameter at breast height and the ground biomass for each vegetation type and province.

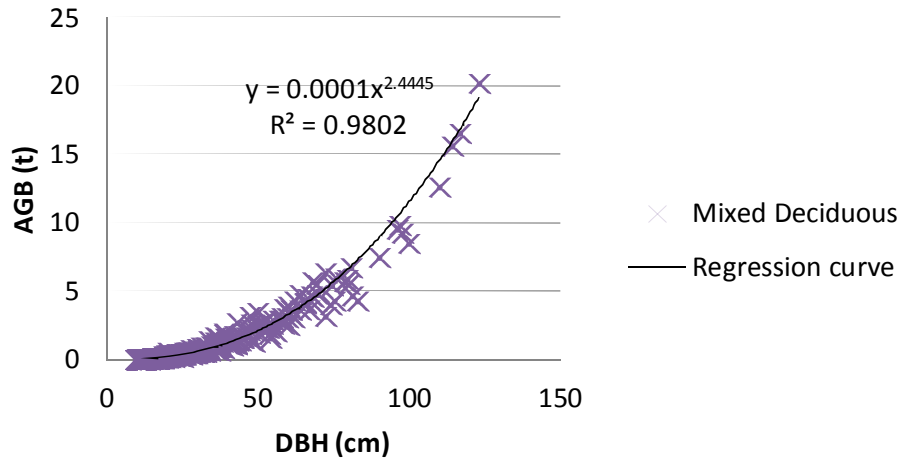
Vientiane Municipality
Mixed Deciduous Forest



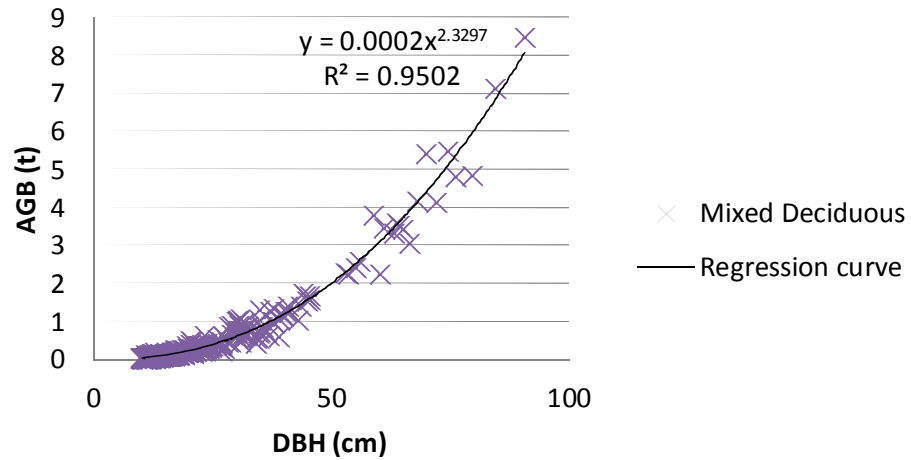
Vientiane Municipality
Dry Dipterocarp Forest



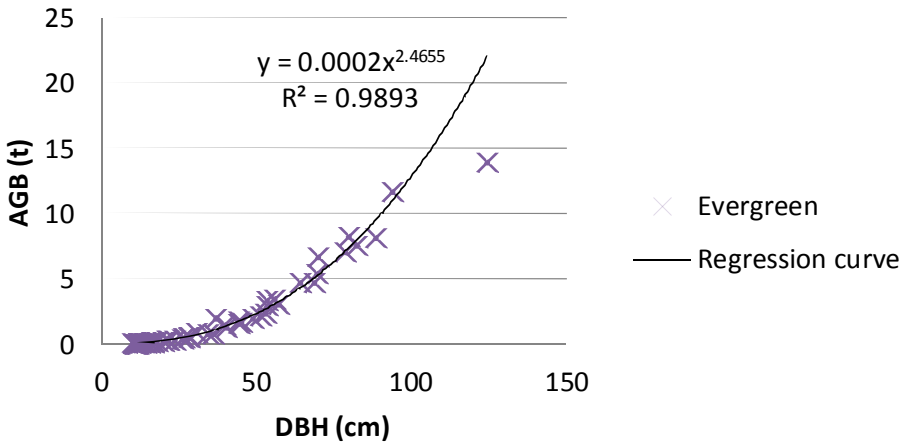
Phonsaly Province
Mixed Deciduous Forest



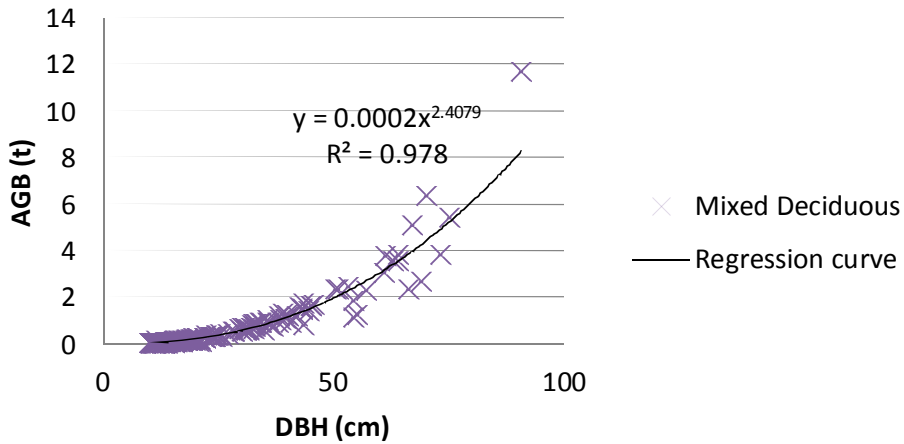
Luang Namtha Province
Mixed Deciduous Forest



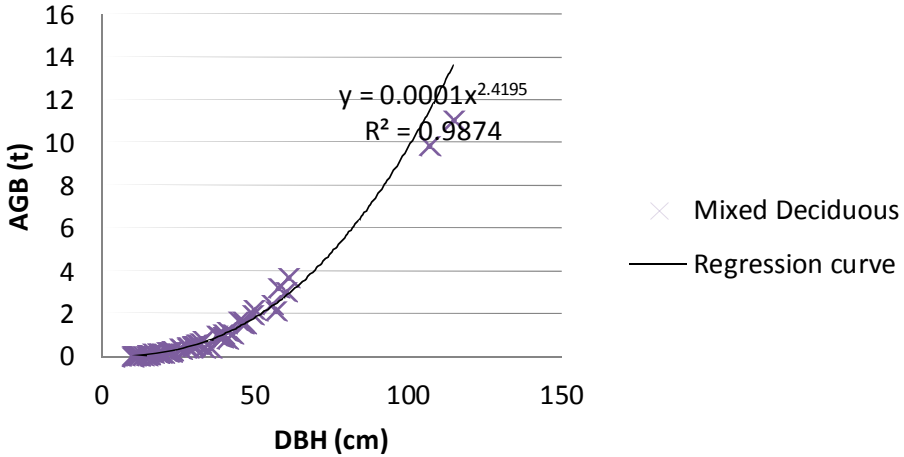
Oudomxay Province
Evergreen Forest



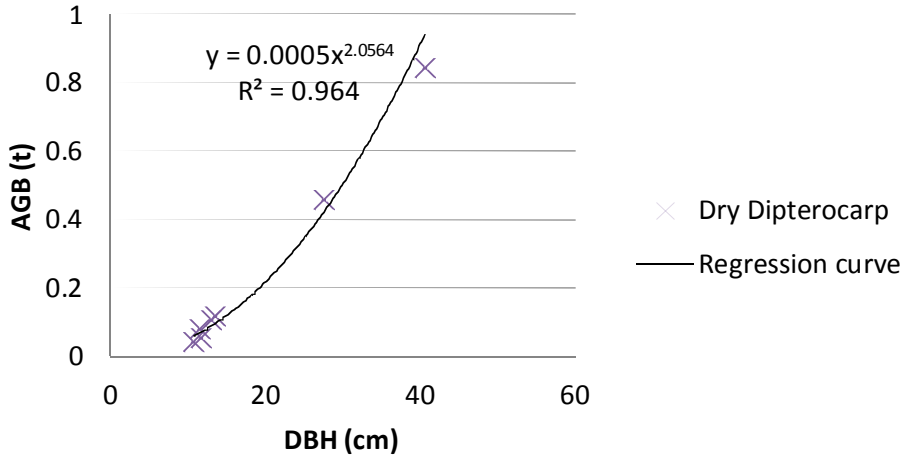
Oudomxay Province
Mixed Deciduous Forest



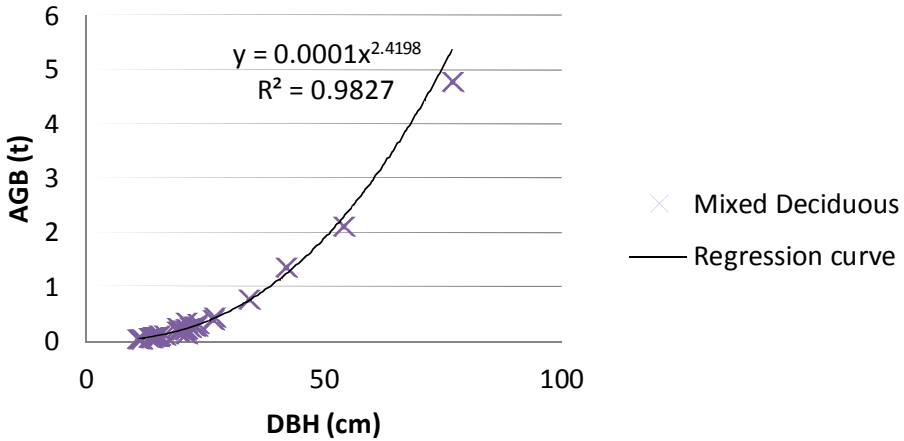
Bokeo Province
Mixed Deciduous Forest



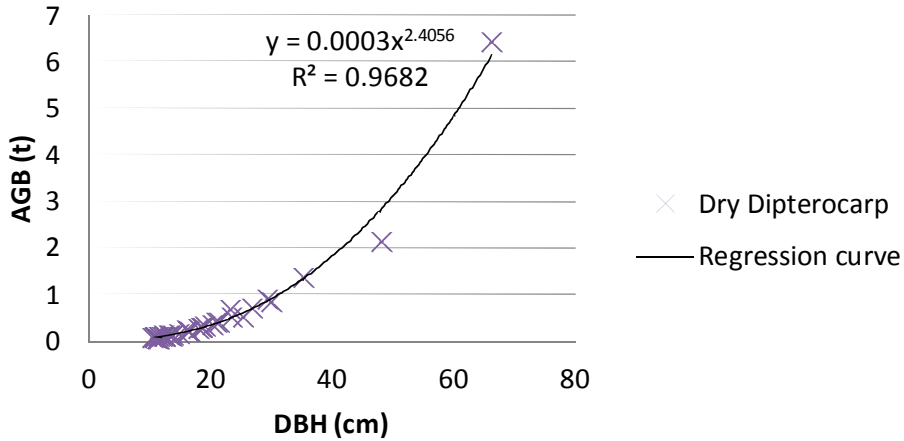
Bokeo Province
Dry Dipterocarp Forest



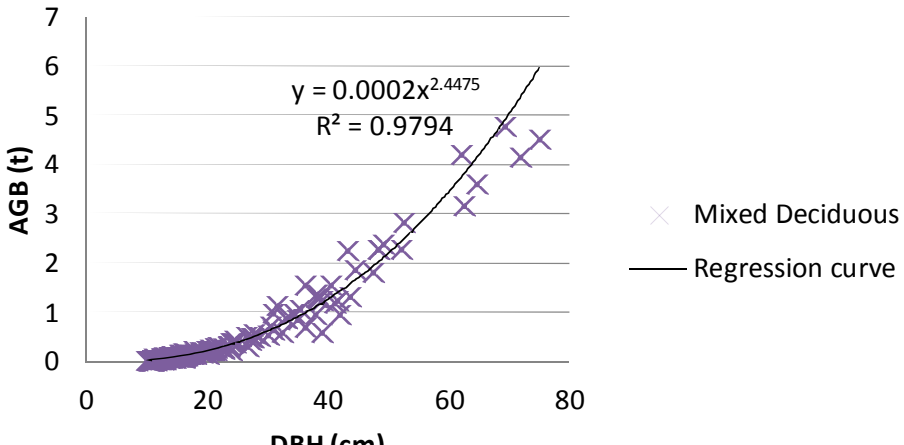
Luangprabang Province
Mixed Deciduous Forest



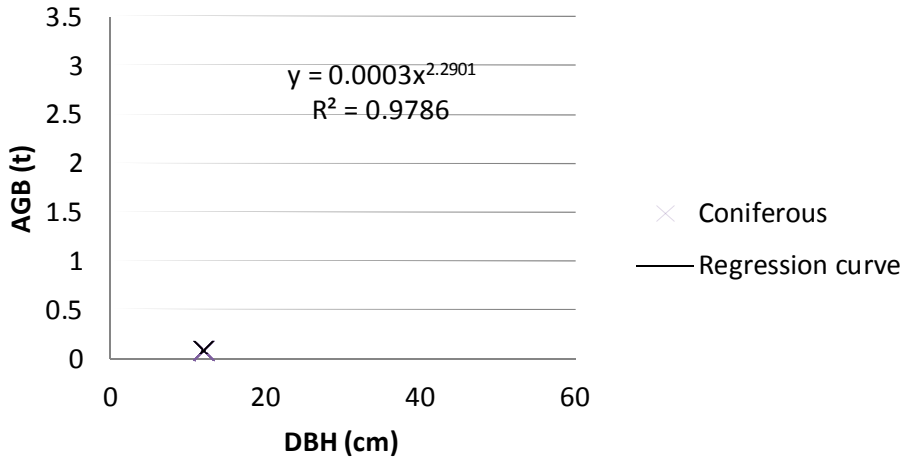
Luangprabang Province
Dry Dipterocarp Forest



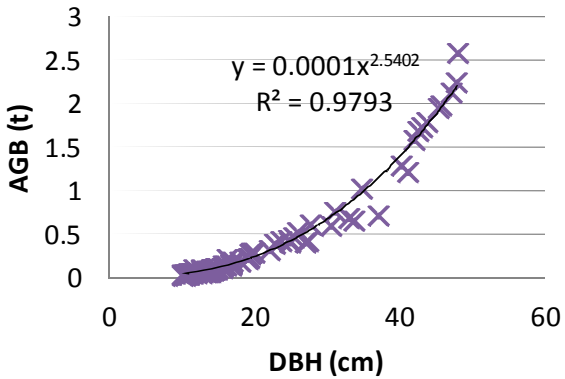
Huaphane Province
Mixed Deciduous Forest



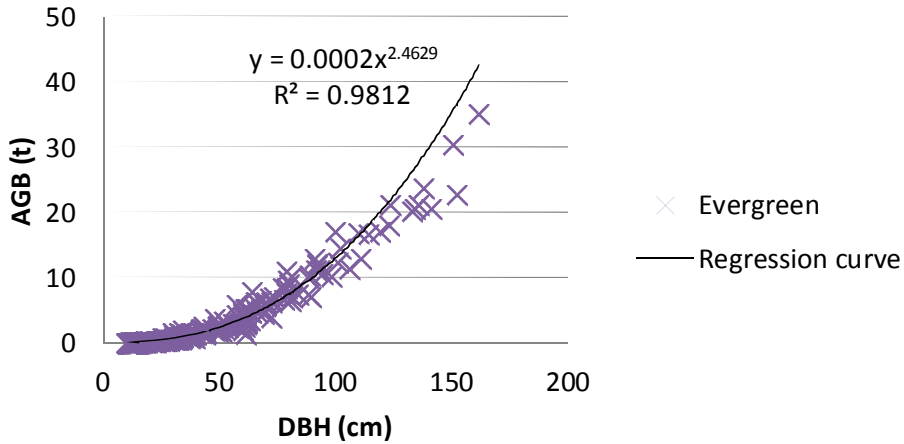
Huaphane Province
Coniferous Forest



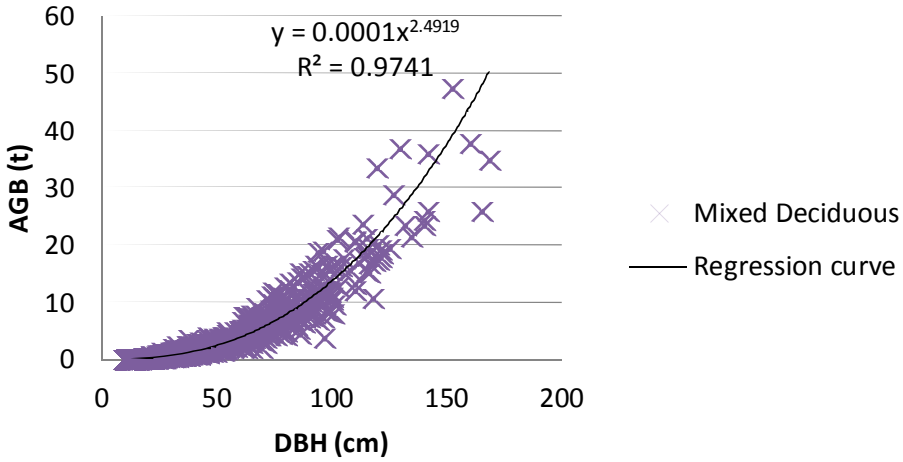
Huaphane Province
Mixed Broadleaved and Coniferous Forest



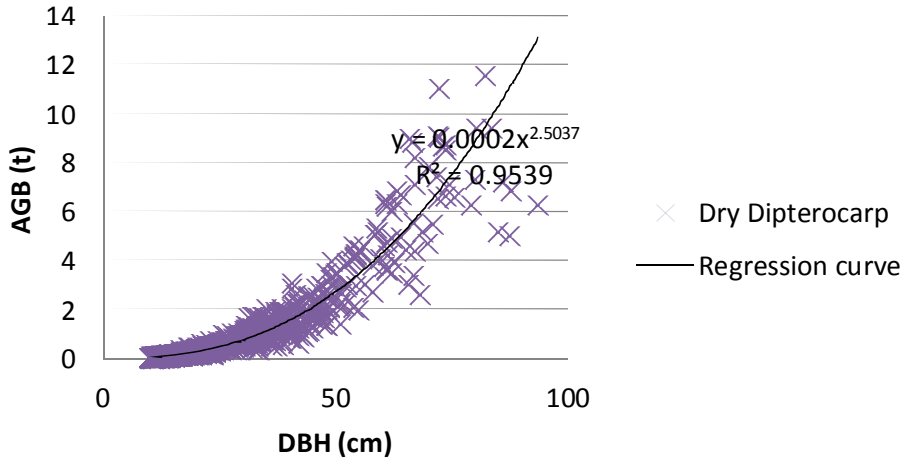
Xayabury Province
Evergreen Forest



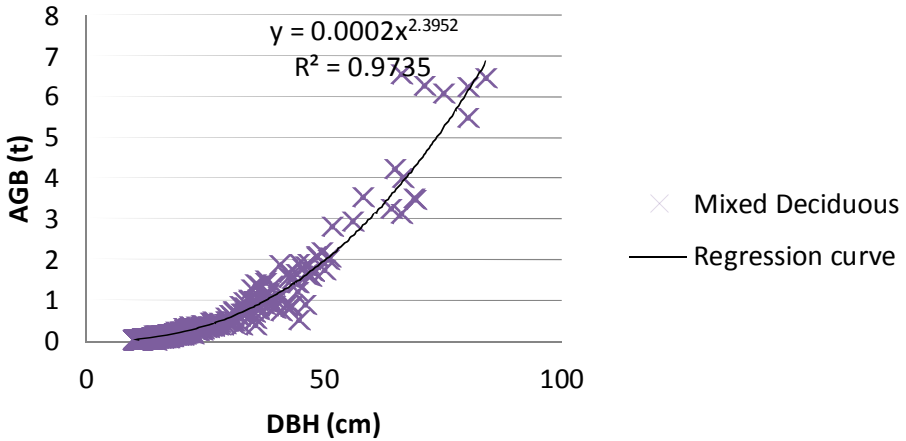
Xayabury Province
Mixed Deciduous Forest



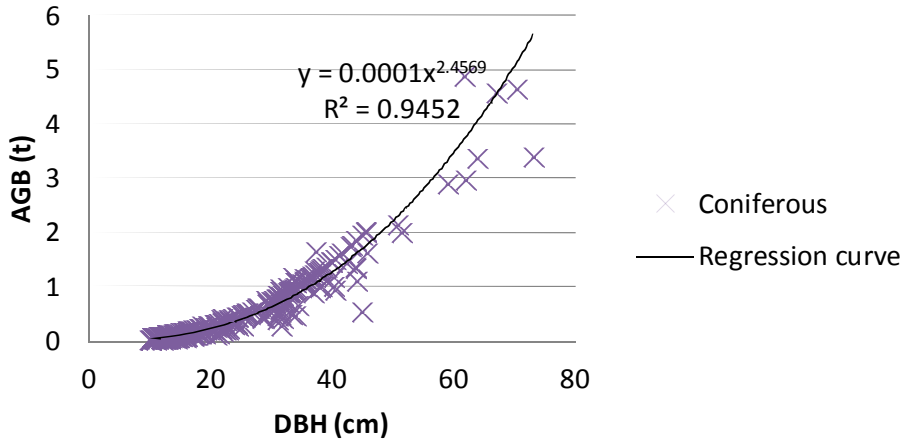
Xayabury Province
Dry Dipterocarp Forest



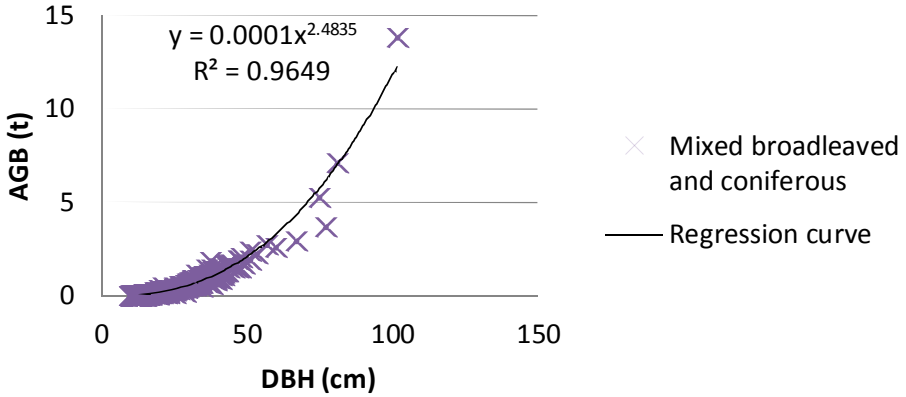
Xieng Khuang Province
Mixed Deciduous Forest



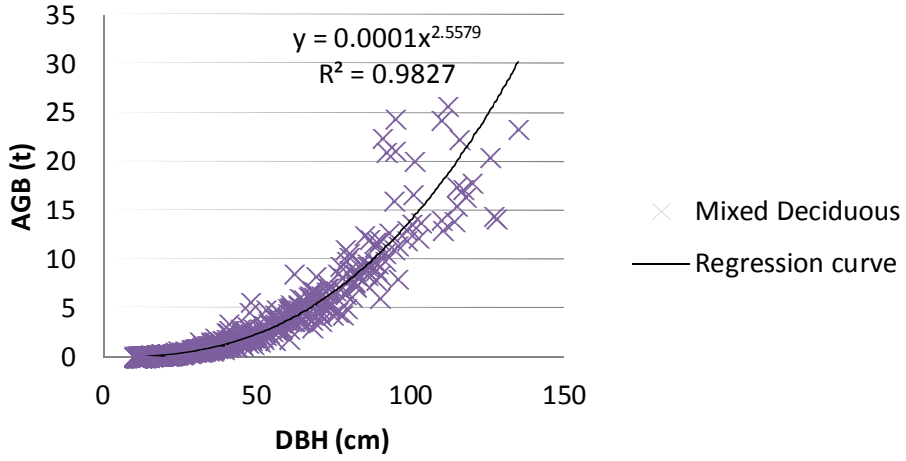
Xieng Khuang Province
Coniferous Forest



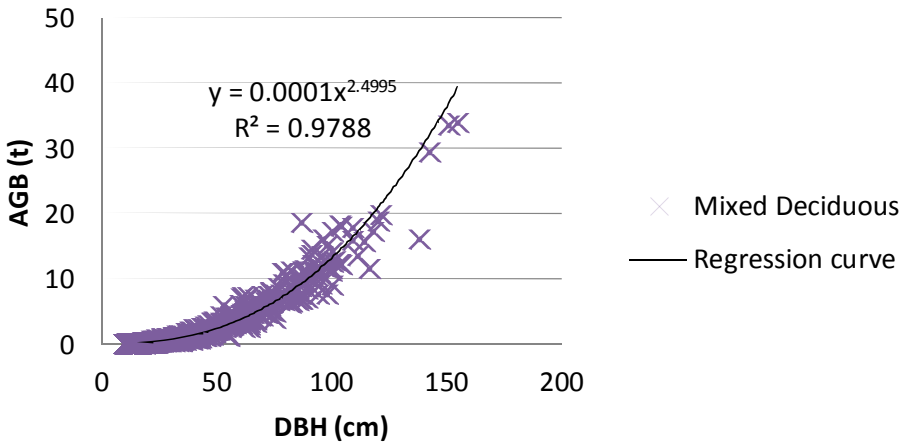
Xieng Khuang Province
Mixed Broadleaved and Coniferous Forest



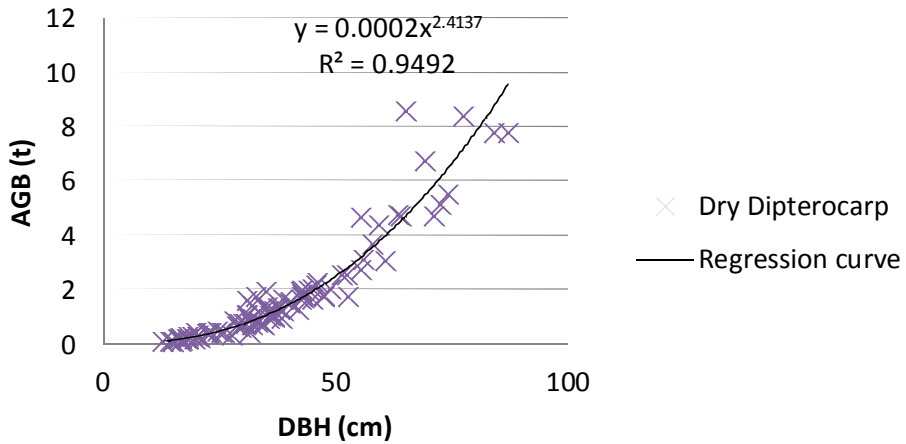
Vientiane Province
Mixed Deciduous Forest



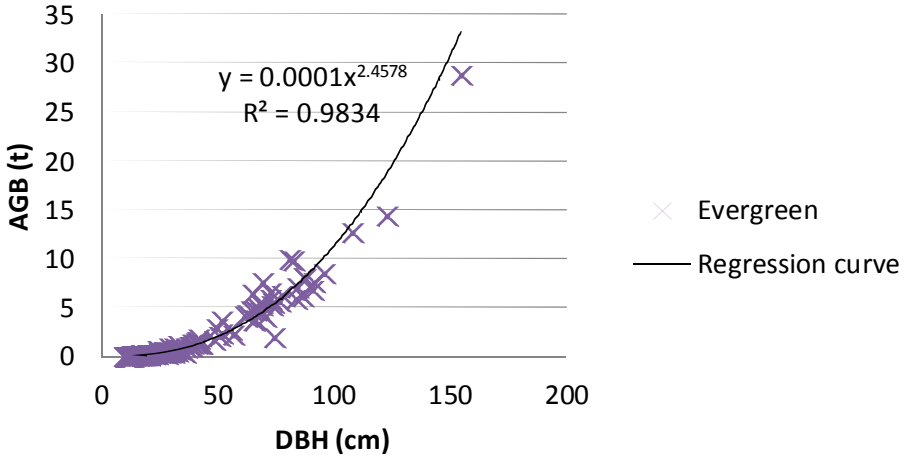
Bolikhamxai Province
Mixed Deciduous Forest



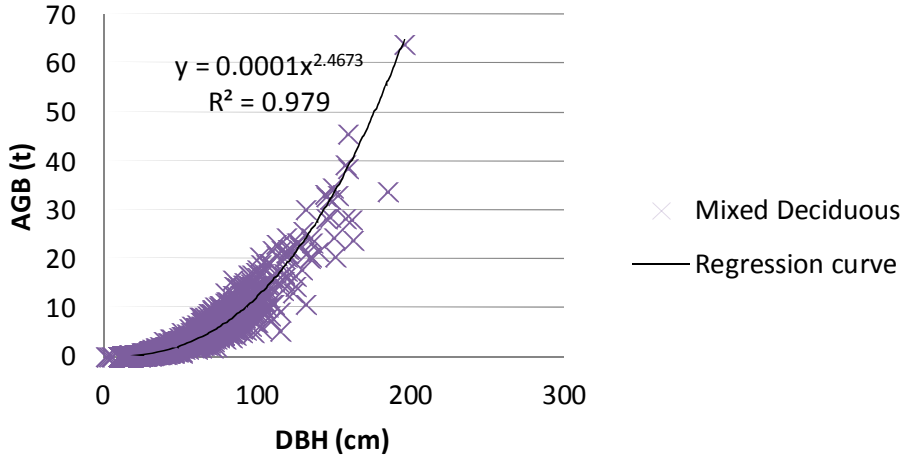
Bolikhamxai Province
Dry Dipterocarp Forest



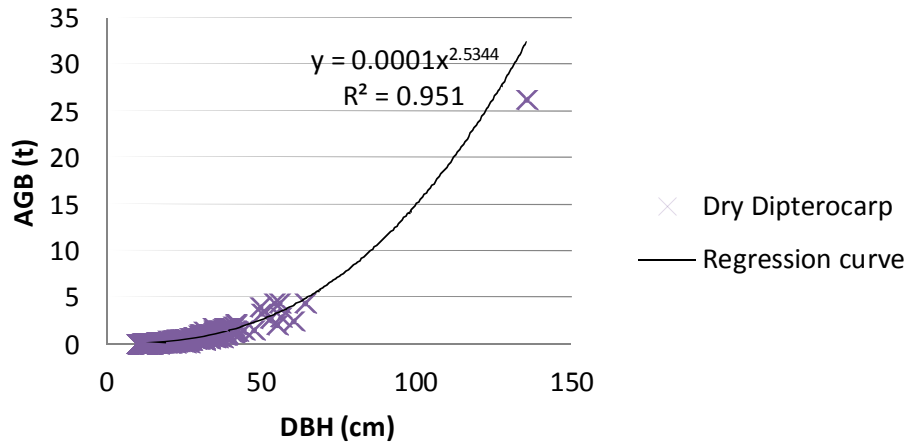
Khammuane Province
Evergreen Forest



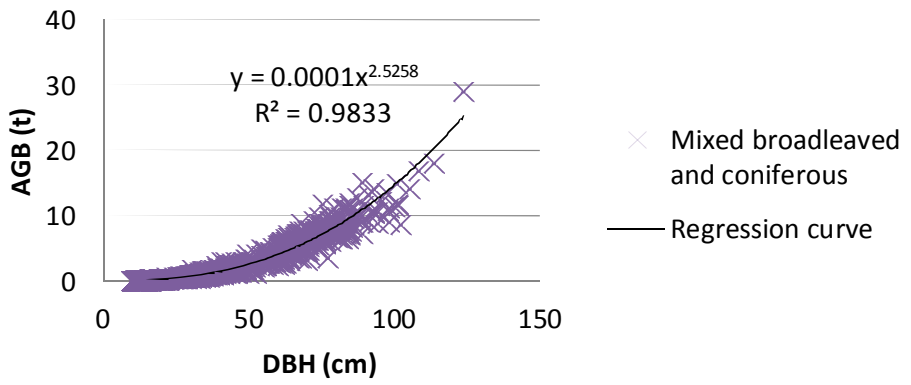
Khammuane Province
Mixed Deciduous Forest



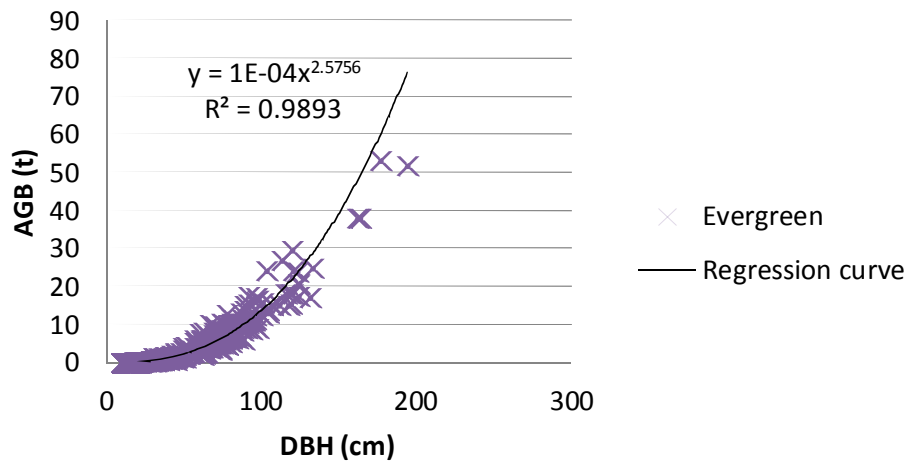
Khammuane Province
Dry Dipterocarp Forest



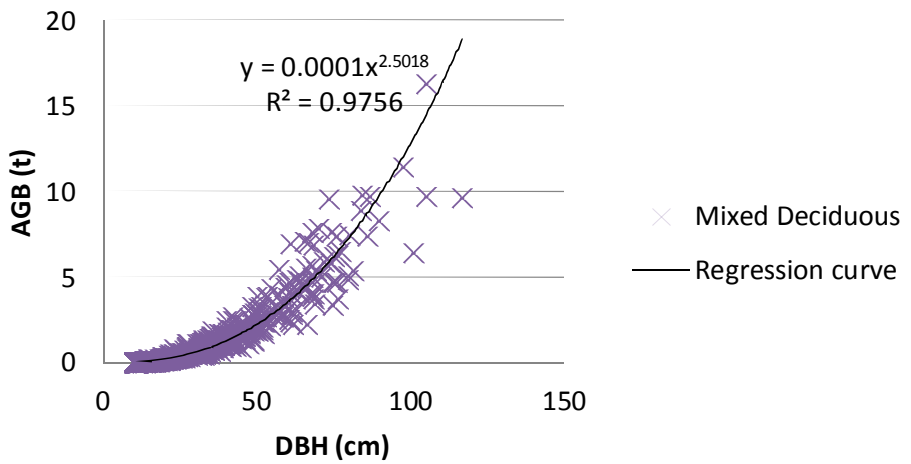
Khammuane Province
Mixed Broadleaved and Coniferous Forest



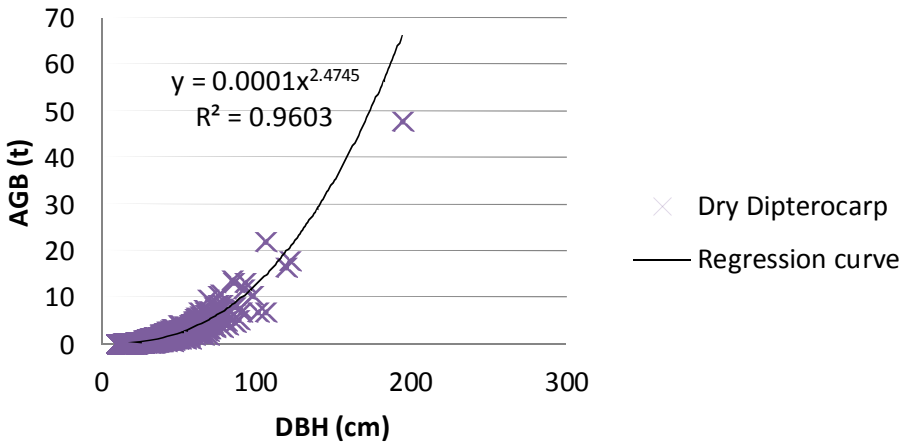
Savannakhet Province
Evergreen Forest



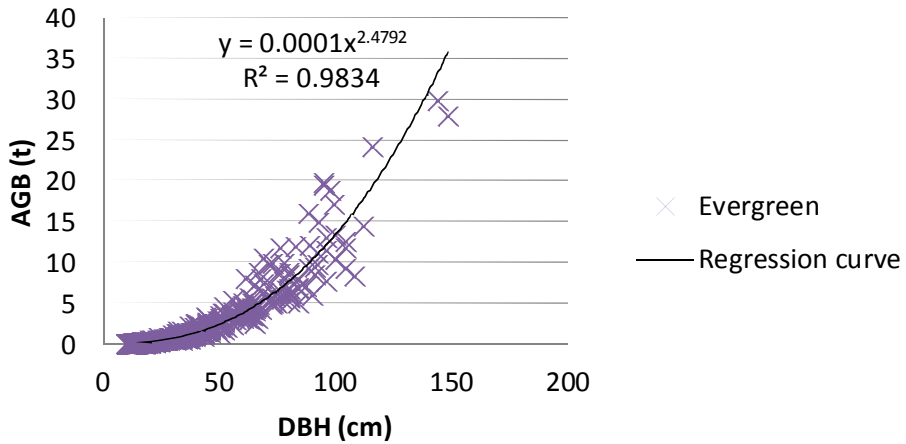
Savannakhet Province
Mixed Deciduous Forest



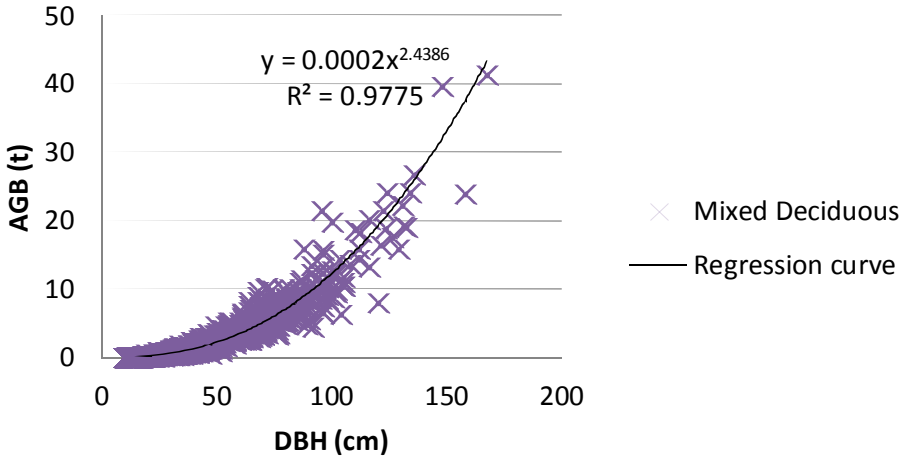
Savannakhet Province
Dry Dipterocarp Forest



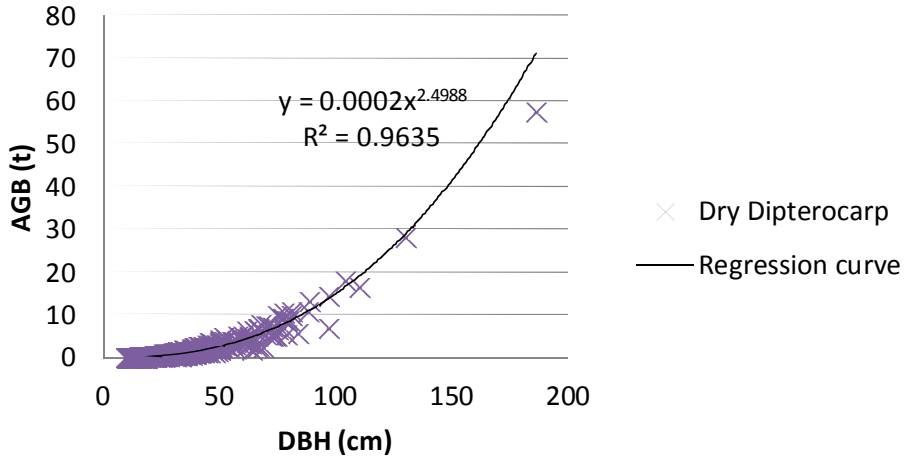
Saravane Province
Evergreen Forest



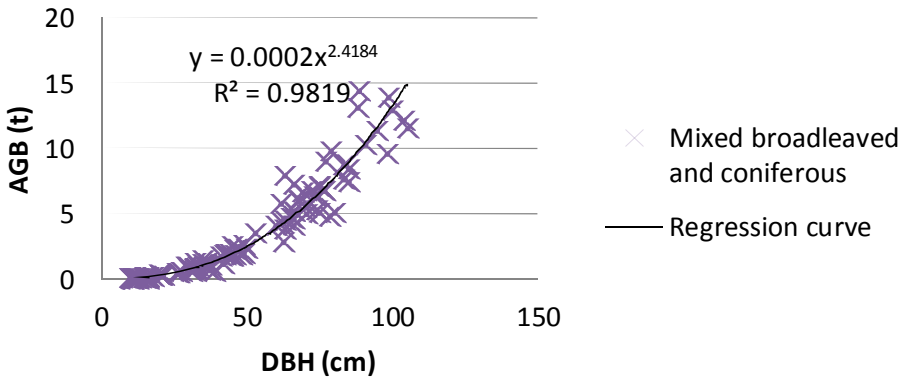
Saravane Province
Mixed Deciduous Forest



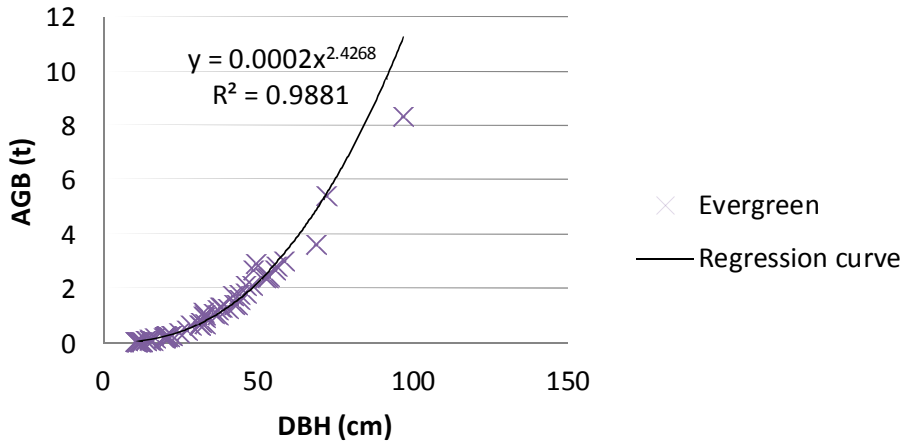
Saravane Province
Dry Dipterocarp Forest



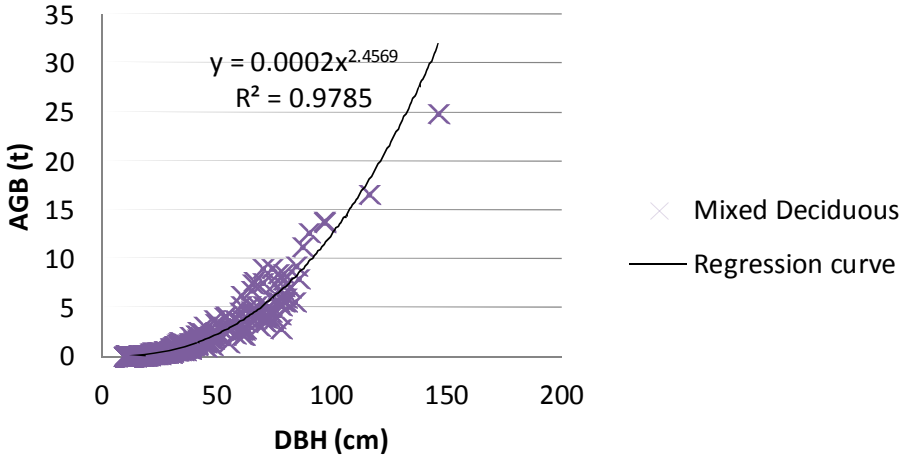
Saravane Province
Mixed Broadleaved and Coniferous Forest



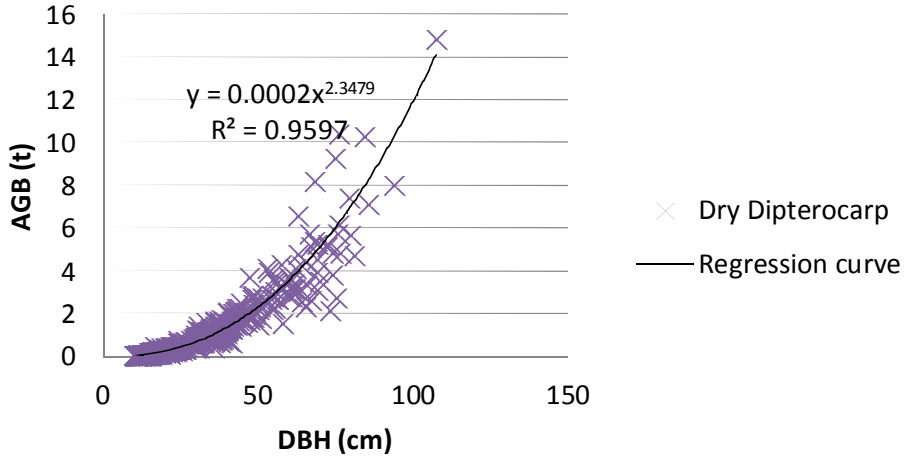
Sekong Province
Evergreen Forest



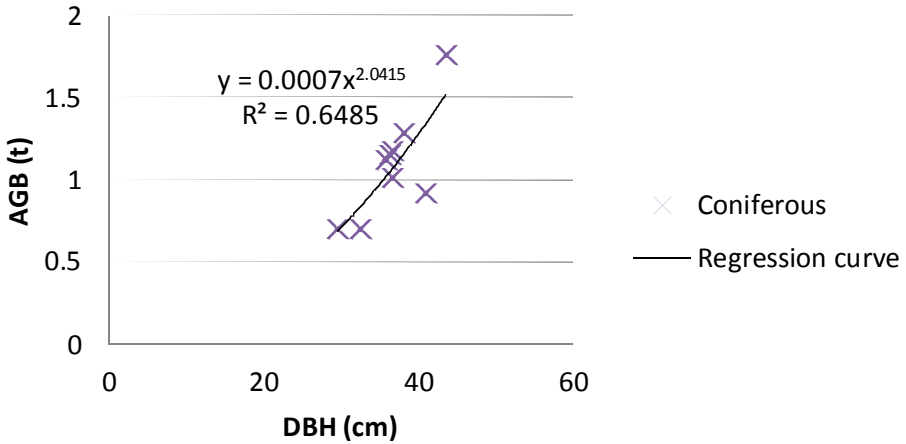
Sekong Province
Mixed Deciduous Forest



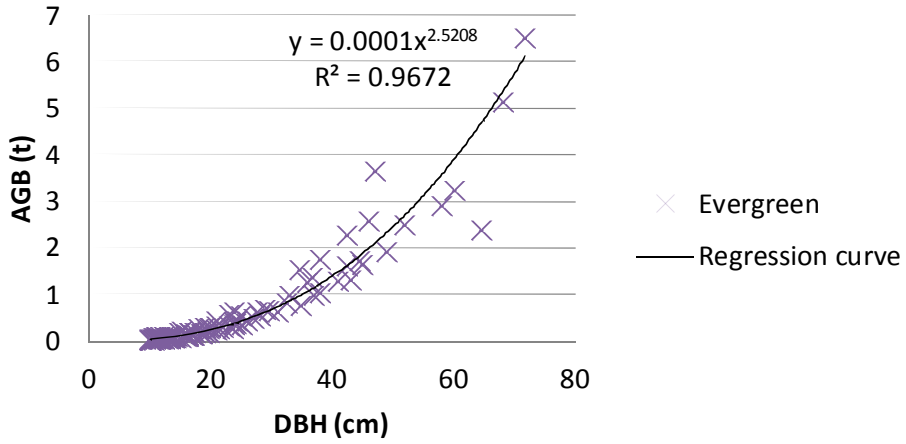
Sekong Province
Dry Dipterocarp Forest



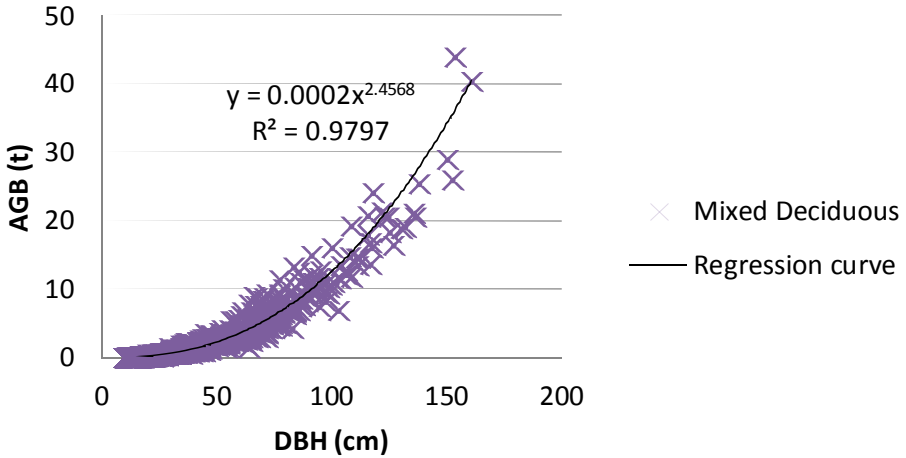
Sekong Province
Coniferous Forest



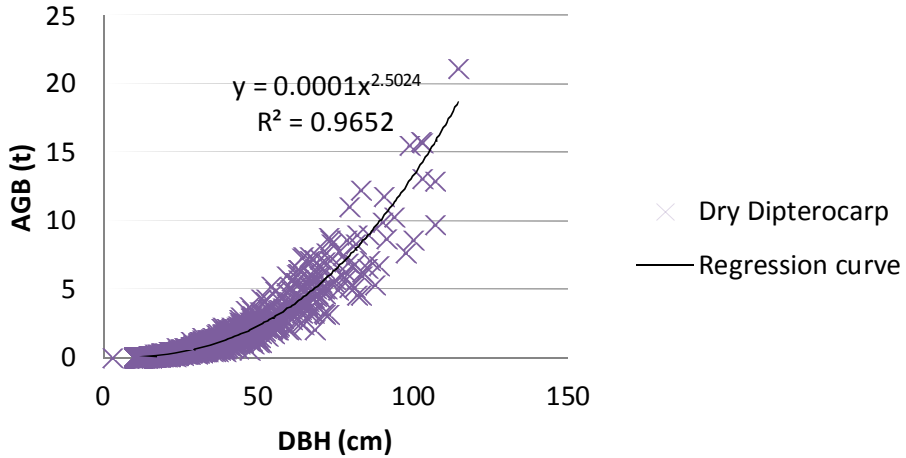
Champasak Province
Evergreen Forest



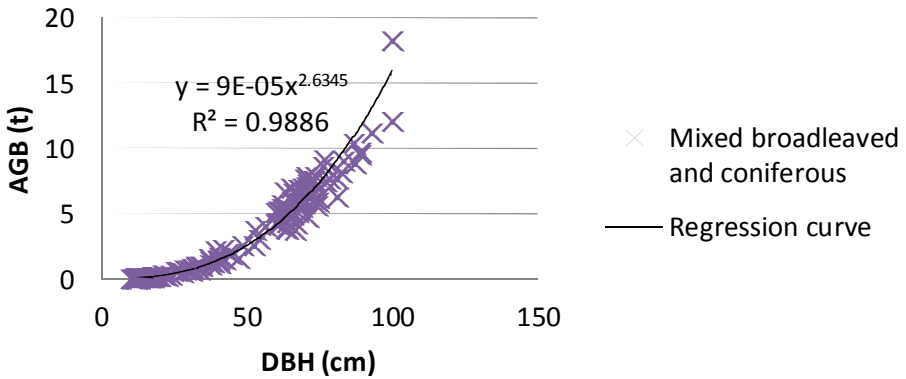
Champasak Province
Mixed Deciduous Forest



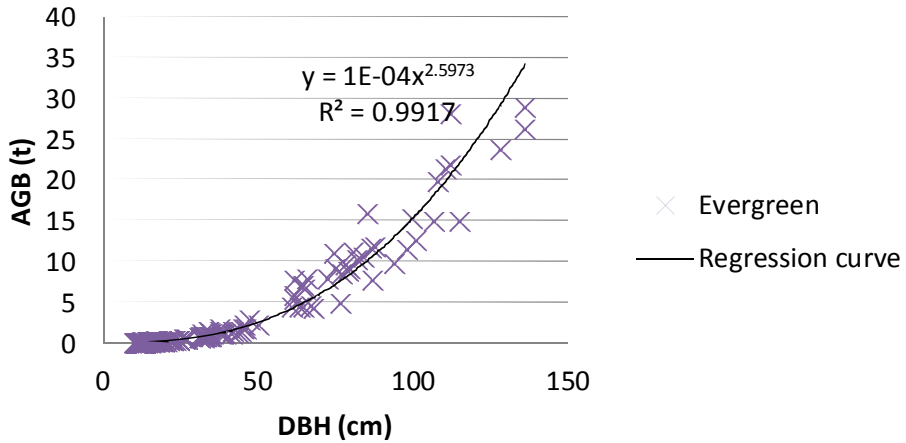
Champasak Province
Dry Dipterocarp Forest



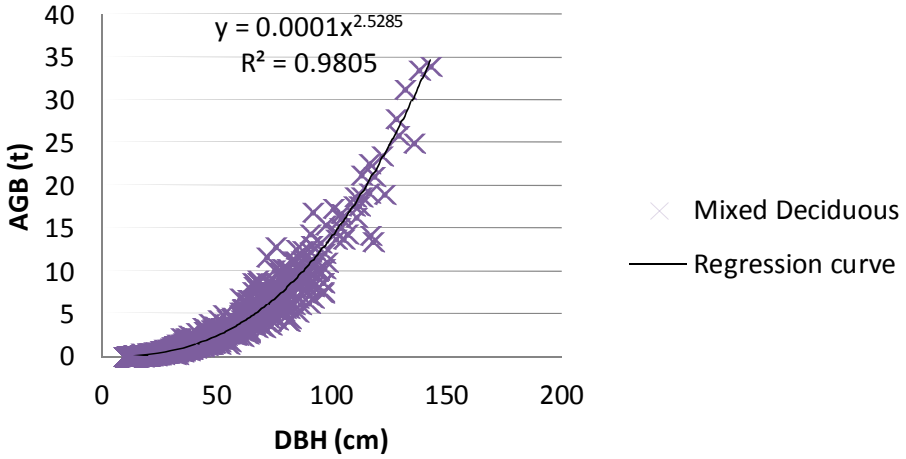
Champasak Province
Mixed Broadleaved and Coniferous Forest



Attapeu Province
Evergreen Forest



Attapeu Province
Mixed Deciduous Forest



Attapeu Province
Mixed Deciduous Forest