NATIONAL PARKS, WILDIFE AND PLANT CONSERVATION DEPARTMENT
OF THAILAND

PROJECT COMPLETION REPORT
2004 - 2007

INTERNATIONAL TROPICAL TIMBER ORGANIZATION
PROJECT:

TO ESTABLISH A NATIONAL MONITORING INFORMATION SYSTEM FOR THE EFFECTIVE CONSERVATION AND SUSTAINABLE MANAGEMENT OF THAILAND'S FOREST RESOURCES

PD 195/03 Rev.2(F)

15 July 2007
Bangkok, Thailand

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ABBREVIATIONS

C&I:	Criteria and Indicators of sustainable forest management
CWD:	Coarse Woody Debris
DNP	National Park, Wildlife and Plant Conservation Department
EFDR:	Electronic Field Data Recorder
GIS:	Geographic Information System
GOT:	Government of Thailand
ITTO:	International Tropical Timber organization
NFI:	National Forest Inventory
NGOs:	Non-Governmental Organizations
NTFPs:	Non-Timber Forest Products
PSC:	Project Steering Committee
RFD:	Royal Forest Department of Thailand
SFM:	Sustainable Forest Management
THAIFORM:	Thailand Forest Resources Monitoring System

PROJECT IDENTIFICATION

a) **Title:** To Establish a National Monitoring Information System for the Effective Conservation and Sustainable Management of Thailand's Forest Resources.

b) **Serial Number:** PD 195/03 Rev. 2 (F)

c) **Executing Agency:** National Parks, Wildlife and Plant Conservation Department

d) **Host Government:** Thailand

e) **Starting Date:** 8 June 2004

f) **Actual Duration:** 36 Months

g) **Actual Project Costs:** $1,060,420

PART I: EXECUTIVE SUMMARY

1. Background Information about the Project

1.1 Problem to be addressed

The kingdom of Thailand recognizes the importance of sustainable forest management (SFM), which now focuses on conserving the remaining natural forests, maintaining ecological balance, and increasing forest cover through tree planting. The Kingdom also recognizes the need to build the necessary information infrastructure to support the evaluation and adoption of proper policies towards SFM.

The main problem to be addressed is the need for information to provide a basis for informed policy decision-making on forest resources and SFM. The policy decisions cover several aspects, including the forest resource base, and social and, economic areas.

This need for information could be addressed if a reliable national monitoring information system, which integrated forest resources data and socio-economic data, was in place. This monitoring system would help define and describe the state of the forest resources, provide reference points, and document trends and achievements in implementing conservation measures and sustainable management.

1.2 Specific Objective

The project Specific Objective was to establish a national forest resources monitoring information system to provide change and trend data on timber and non-timber forest resources.

1.3 Outputs

The main outputs were:

- Output 1: National baseline forest resources monitoring system established.
- Output 2: Use of the forest resources monitoring information promoted.
- Output 3: National baseline C&I (criteria and indicators of SFM) reporting template prepared and promoted.

1.4 Project strategy

The project strategy was to establish a network of forest resources monitoring permanent plots to collect biophysical data over the entire country within a short time-frame, and to link these data with socio-economic data from other relevant institutions, as follows:

- Hold a national workshop to train the field crew and crew chiefs on the use of the THAIFORM procedures developed under ITTO project PD 2/99 Rev. 2 (F) for establishing permanent plots.
- Install permanent plots over the entire country on the 20 km x 20 km grid.
- Prepare products (e.g. thematic maps, statistical tables) from the permanent plot database, and link these with the socio-economic data. The socio-economic data are to be imported and integrated with the forest resources monitoring data through GIS.

- Prepare a baseline C&I reporting template following the ITTO guidelines.
- Hold a joint national workshop of policy makers to promote use of the forest resources monitoring database, Publicize the C&I report, and to provide feedback to data generators.
- Update the monitoring system taking into account the workshop feedback, and develop a strategy to address any emerging issues.

1.5 Planned duration and overall costs

The planned project duration and overall costs are given in Table 1:

Table 1. Planned project duration and overall costs.

DURATION:	3 Years	
STARTING DATE:	8 June 2004	
PLANNED OVERALL COSTS:	*Source of financing*	US $
	Government of Thailand	382,677
	ITTO	677,743
	TOTAL	1,060,420

2. Project Achievements

2.1 Outputs achieved

A forest resources monitoring information system has been established and is operational. Specifically, all the PD 195/03 Rev. 2 (F) project outputs have been realized:

1. Established a national network of permanent monitoring points on a 20 km x 20 km grid, for collecting biophysical data over time. Permanent sample plots were installed at 1,129 monitoring points, out of a total of 1,287 points; plots could not be established at the rest of the points due to unsafe conditions at these locations. The field data were collected on tally sheets. (A pilot project was established to test the suitability and durability of using electronic field data recorders (EFDRs). If the test is successful, the EFDRs will be used in future plot remeasurement.) An independent quality assurance check of 7% of the established plots concluded that the field crew measurements were accurate. A 'panel' approach for plot remeasurement, whereby 1/5th of the plots are remeasured per year, was also developed. Please see the project Technical Report No. 2.
2. Identified a modeling approach for linking the biophysical data from the permanent plots with socio-economic data from other relevant institutions. Please see the project Technical Report No. 3.

OP1: Nat'l baseline forest res. monitoring system est.
OP2: Use of the forest res. monitoring info promoted
OP3: Nat'l baseline C&I report prepared

3. Developed a template to use the forest resource monitoring information for the reporting of the national C&I of SFM. Please see the project Technical Report No. 4.
4. Conducted a national workshop of policy makers to promote use of the forest resources monitoring database, publicize the C&I report, and to provide feedback to data generators. Please see the project Workshop Proceedings report.

This project's immediate achievement is that it has provided national statistics of tree volume, biodiversity and other attributes. These were not previously available, since Thailand did not have a national forest inventory covering the entire country.

2.2 Specific objective achieved

This ITTO project has strengthened Thailand's ability to create and manage forest resources monitoring information for better policy decision making. The DNP will now be responsible for the sample plot remeasurement, development of the socio-economic models when time series data become available, and maintenance of the monitoring information database.

2.3 Situation at end of the Project

Prior to project intervention there were no national data for forest resources monitoring. Now a network of permanent plots has been established, and will be remeasured to collect and process the change and trend data, with the necessary countrywide coverage, for informed policy decision-making.

3. Target Beneficiaries Involvement

The ultimate target beneficiaries (when the monitoring system starts generating time series data nationally) are policy makers in DNP and RFD (Royal Forest Department), academia and NGOs. These stakeholders participated in a national workshop to review the developed monitoring information system, and to recommend the next steps. A key recommendation from this workshop was that the DNP's Forest Resources Assessment Division initiates the development of a regulation requiring the continuous monitoring of Thailand's forest resources, and fund remeasurement of the established plots on a 5-year remeasurmenet cycle and based on a 'panel' approach.

4. Lessons Learned

4.1 Development Lessons

The Development Objective could not be attained during the term of this project. This project established the baseline data for monitoring, however, until the plots are remeasured and start generating time series data nationally, the Development Objective cannot be achieved.

4.2 Operational Lessons

1. Project organization and management:
    - The project had a project management team (PMT) and a team of national experts. The PMT met regularly to review project progress; this ensured smooth project implementation.
    - The field crew faced several challenges in plot establishment as follows
        - Danger from illegal loggers, poachers, land encroachers, national border conflicts, climbing steep terrain, wildlife (e.g., snakes, elephants, and

poisonous insects), and other hazzards (e.g., forest fires, flash floods, booby traps); thus, there is a need for medical as well as life insurance for the crew.
  - Inadequate field equipment and transportation.
  - Use of old topographic maps.
  - Travel from plot-to-plot took a long time due to the wide 20 km x 20 km grid plot spacing.
  - Lack of water for camping during the dry season.
  - Problems with access to restricted areas such as army bases.
  - High turn-over rate of field crew due to low wages and no welfare.
  - Intermittent project implementation due to un-coordinated budget disbursements from ITTO.
  - Inadequate training and support for flora and fauna species identification and soil description. There were many "unknown" flora and fauna, due to the difficulty of field crew identifying especially the non-tree smaller vegetation and seedlings.

- There was a relatively high turnover of computer programmers and GIS project staff, as the recruited staff left for higher paying jobs.

2. Project documentation: The Project prepared several technical reports to document the project results for each output. Copies of these technical reports have been submitted to ITTO and will be posted on the Project's website (www.dnp.go.th).

3. Monitoring, evaluation and project planning: A Project Steering Committee (PSC) monitored the project. The PSC met four times. The implementing agency submitted 5 project progress reports to ITTO. An evaluation is planned for this project.

4. Roles and responsibilities: There was only one institution implementing the project, so there were no problems with definition of roles and responsibilities.

5. Actions to avoid the variations between planned and actual implementation:
   - Engage consultants to do GIS work and computer programming rather than recruiting them as staff, or pay these staff competitive wages.
   - Increase training time for field crews in plant and animal species identification, or plan to have more botanists and wildlife experts available to assist with species identification.

6. External factors that could have been foreseen:
   - Long rainy season that increased the risk to crews and made travel to the plots more difficult.

7. External factors that could not have been foreseen:
   - Increased cost of gasoline for field vehicles since the project planning.

5. Recommendations

The following recommendations are made to improve future effectiveness and efficiency of future similar projects:

1. Identification and Design: Better project formulation, including clear project yearly plan of operations (timing of ITTO disbursements and start of the field seasons).

2. Implementation:

- Provide field crews medical and life insurance, adequate logistical support and equipment, and up-to-date topographic maps.
- Increase training of field crews in plant and animal species identification.
- Recognize the weather limitations during project planning.
- Use permanent staff for database maintenance, rather than contract staff, to ensure continued maintenance of the database and update of the computer software.
- Pay competitive wages to project staff in GIS and computer programming, to reduce turn-over rates.

3. Organization and management:

- Use regional inventory field crews to conduct the yearly remeasurements, and the headquarters Inventory Section to maintain field procedures and standards, plan the remeasurements, and conduct quality assurance.

PART II: MAIN TEXT

1. Project Content

1.1 Background

The kingdom of Thailand recognizes the importance of sustainable forest management (SFM), which now focuses on conserving the remaining natural forests, maintaining ecological balance, and increasing forest cover through tree planting. The Kingdom also recognizes the need to build the necessary information infrastructure to support the evaluation and adoption of proper policies towards SFM.

ITTO provided financial and limited technical support, through ITTO project PD195/03 Rev. 2 (F), to assist Thailand to set up a baseline forest resources monitoring system, to allow for continuous monitoring of forest resources. This project was implemented by the National Park, Wildlife and Plant Conservation Department of Thailand (DNP). The DNP is Thailand government's department responsible for forest conservation. The DNP mandate is to conserve, promote and rehabilitate wildlife and plant species by protecting the original conservation areas and rehabilitating the degraded forest areas, and to ensure a balanced ecosystem, environment and biodiversity.

1.2. Development Objective

To contribute to the effective conservation and management of Thailand's forest resources and the environment.

1.3 Specific Objective

To establish a national forest resources monitoring information system to provide change and trend data on timber and non-timber forest resources.

1.4 Strategy adopted in carrying out project

The proposed project strategy is to establish a forest resources monitoring to collect biophysical data over the entire country within a short time-frame, and to link these data with socio-economic data from other relevant institutions. This proposed strategy involved the following steps:

- Hold a national workshop to train the field crew and crew chiefs on the use of the THAIFORM procedures developed under ITTO project PD 2/99 Rev. 2 (F) for establishing permanent plots. The workshop is to be followed by regional mentoring sessions by the Project's national experts. The field crews consist of crew chiefs, and temporary labor (student field assistants, drivers, and local labor). The students are to be hired to reduce project cost (low unit cost), and to build future capacity to maintain the monitoring system. The student assistants are local senior undergraduate or graduate forestry students. They were used successfully in the PD 2/99 Rev. 2 (F) pilot project. Note that the crew chiefs, who will oversee the work of the student assistants, are seasoned and experienced field staff

of the DNP. The local labor helps with plant and animal species identification.

- Install permanent plots over the entire country in two phases (rather than start from one corner of the country). In phase 1 install plots on the 40 x 40km grid points countrywide and do a preliminary analysis of the results; in phase 2, install plots in the remainder of the 20 x 20 km grid points. This strategy may increase the overall costs slightly, however, it allows for the opportunity to make changes to procedure, and provides usable results in case the project has to stop prematurely for some reason. This approach worked well during the PD 2/99 Rev. 2 (F) pilot project.
- Prepare products (e.g. thematic maps, statistical tables) from the entire permanent plot database, and link these with the socio-economic data. The socio-economic data will be imported and integrated with the forest resources monitoring data through the GIS.
- Prepare a baseline C&I report following the ITTO guidelines.
- Hold a joint national workshop of policy makers to promote use of the forest resources monitoring database, publicize the C&I report, and to provide feedback to data generators.
- Update the monitoring system taking into account the workshop feedback, and develop a strategy to address any emerging issues.

1.5 Work plan

The Project Agreement between the DNP and the ITTO was signed in January 2004. A project work plan was prepared and submitted to ITTO. ITTO transferred the first installment of project funds to the project bank account in Bangkok on 8 June 2004, the effective date the project started. The project implementation followed the project work plan (Figure 1).

Figure 1. Project work plan

OUTPUTS/ACTIVITIES	YEAR 1				YEAR 2				YEAR 3			
	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4
Output 1. National baseline forest resources monitoring system established												
Activity 1.1	■	■										
Activity 1.2				■	■							
Activity 1.3					■	■	■	■	■			
Output 2. Use of forest resources monitoring information promoted												
Activity 2.1	■											
Activity 2.2				■	■	■	■	■				
Activity 2.3								■	■	■		
Activity 2.4											■	■
Output 3. Baseline national C&I report prepared												
Activity 3.1							■	■				
Activity 3.2									■	■		
Activity 3.3											■	■

1.6 Required inputs

The required project financial inputs were from the ITTO and the Government of Thailand (GOT) (Tables 2 and 3, respectively).

Table 2. Yearly project budget by source - ITTO

Annual Disbursements / Budget Components	Total	Year 1	Year 2	Year 3
10. Project Personnel	310,025	93,008	155,012	62,005
20. Sub-contracts	-	-	-	-
30. Duty Travel	193,435	57,051	94,417	41,967
40. Capital Items	-	-	-	-
50. Consumable Items	100,920	58,416	30,360	12,144
60. Miscellaneous	2,000	0	0	2,000
Subtotal 1	606,380	208,475	279,789	118,116
80. ITTO Monitor., Evaluat. and Administ. Costs				
81. Monitoring and Review Costs	18,000			
82. Evaluation Costs	15,000			
Subtotal 2	639,380			
83. Programme Support Costs (6% of Subtotal 2)	38,363			
90. Refund of Pre-Project Costs	-			
ITTO TOTAL	677,743			

Table 3. Yearly project budget by source – Government of Thailand (GOT)

Annual Disbursements / Budget Components	Total	Year 1	Year 2	Year 3
10. Project Personnel	93,170	27,952	46,585	18,633
20. Sub-contracts	-	-	-	-
30. Duty Travel	-	-	-	-
40. Capital Items	105,000	95,000	5,000	5,000
50. Consumable Items	49,500	41,800	5,500	2,200
60. Miscellaneous	6,000	2,000	2,000	2,000
70. Executing Agency Management Costs (15% of Total of Overall Project Budget by Activity)	129,007	38,702	64,504	25,801
EXECUTING AGENCY/GOT TOTAL	382,677	205,454	123,589	53,634

The project human resources are shown in Table 4.

Table 4. Project human resource inputs

Title	Number	Designation
Project Leader	1	DNP staff
Project Coordinators	6	DNP staff
Inventory Experts	6	DNP staff
GIS/Remote Sensing/Database Experts	5	DNP staff
Biodiversity Experts	2	DNP staff
Wildlife Experts	5	DNP staff
Botanists	5	DNP staff
Soil Experts	3	DNP staff
Site/vegetation disturbance Expert	1	DNP staff
Crew Chiefs	20	DNP staff
International Consultant	1	Contract staff
Computer Programmer	1	Contract staff
Office Assistant	1	Contract staff
Social science expert	1	Contract staff
GIS Assistants	2	Contract staff
Inventory Assistants	2	Contract staff
Drivers	20	Temporary labor
Local labor	40	Temporary labor
Student field assistants	50	Temporary labor

1.7 Project rationale

The main problem to be addressed is the need for information to provide a basis for informed policy decision-making regarding forest resources. The policy decisions cover several aspects, including the forest resource base, social, economic and policy areas. These aspects are discussed below:

- *Status of forest resources and the environment.* Thailand recognizes the importance of monitoring the quality and condition of forest resources and biodiversity. In order to make informed policy decisions, reliable estimates of status, changes and trends of forest resources that are consistent across the country are needed.

- *Food security for local communities.* In Thailand, many communities are dependent on the forest for subsistence. They collect mainly non-timber forest products (NTFPs) for food and to supplement their income, since there is a logging ban in the country. In most cases, however, people harvest NTFPs without permits. To ensure a sustainable supply of these resources to benefit the peoples' livelihood and formulation of policies on NTFPs, information on changes and trends in NTFPs linked to socio-economic data, is needed.
- *Economic development.* Thailand's natural forest is divided into two categories: conservation forests and production forests. In conservation forests or protected areas, use of forest areas for recreation, education and research is allowed while consumptive uses such as logging, hunting and collecting of resources are prohibited by law. On the other hand, in production forests uses of the area resources both timber and non-timber products are permitted with official permission. To ensure sustainable economic development, it is important to demonstrate nationally that these economic forests are being sustainably managed. This can be achieved, for example, through C&I reporting.
- *Natural resources and other national policy reviews.* The government of Thailand has in place natural resources policies, however, in many cases systems to monitor the effectiveness of these policies are lacking. It is, therefore, difficult to make informed decisions on forest conservation and sustainable forest management. For example, the effectiveness of the 1989 policy banning logging countrywide is difficult to evaluate without relevant information.

This need for information could be addressed if a reliable national monitoring information system that integrated forest resources data and socio-economic data was in place. If the monitoring information system is not established, it will be difficult to make informed policy decisions regarding the forest resources and the environment. This in turn would affect the quality and abundance of the forest resources, and affect the livelihoods of the people dependent on the forest for food.

1.8 Preparatory activities

This project builds on the completed ITTO project PD 2/99 Rev. 2 (F), whose output was a set of forest-resources monitoring (THAIFORM) procedures that included techniques for establishing monitoring points, collecting and processing field data, and GIS analysis. This project PD195/03 Rev. 2 (F) deals with the following issues that were not addressed by the earlier PD 2/99 Rev. 2 (F) project:

- Setting up a national baseline forest resources monitoring system to provide biophysical data from a network of permanent plots.
- Linking the biophysical data from the forest resources monitoring with socio-economic data from other relevant institutions.
- Linking forest resource monitoring with the reporting of the national C&I of SFM.

1.9 ITTO context

1.9.1 Compliance with ITTO Objectives

This project will contribute to the effective conservation and management of Thailand's forest resources, by installing an efficient and effective system for continuous monitoring of these resources, to support policy decisions. It will supplement the global efforts to ensure sustainable management of the remaining tropical forest resources. Both these goals are consistent with ITTO Objective (c), as outlined in Article 1 of the ITTA, 1994.

1.9.2 Compliance with ITTO Criteria

This project relates to the operational activity of natural forest management. It complies with all ITTO Criteria outlined in Article 23 of the ITTO Agreement:

a) It is related to the conservation and management of timber in Thailand.
b) Thailand and its foreign buyers of forest products will both benefit from forests that are effectively managed with due care for the environment and also provide social and economic benefits.
c) It may expand or maintain markets for timber and other products from community forests (where logging is permitted), by providing monitoring information, in addition to certification, that will assure concerned segments of these markets that purchasing Thailand forest products is not detracting from the goal of sustainable forest management.
d) The monitoring system will contribute to public confidence that Thailand is committed to sustainable forest management. This will have positive economic spin-offs in the forestry sector as well as other sectors of the economy.

Relationship to ITTO Action Plan and Priorities

This project conforms to Cross Cutting Actions (a) and (m) stated in the ITTO Yokohama Action Plan 2002-2006. It will help establish a forest resource information system, which can be used to evaluate conservation and sustainable forest management policies for Thailand. This project is also consistent with ITTO's Goal 2, Actions 1 and 10 of Reforestation and Forest Management, which promote the application of C&I and implementation of forest inventories. Using the ITTO framework, Thailand has developed a set of national Criteria & Indictors for sustainable forest management and is keen to collect data for their reporting. The outcomes of this project will assist in the national reporting of the C&I, which is a tool for measuring Thailand's progress toward SFM. In particular:

- The established monitoring system will generate monitoring data needed to assess the indicators of the state and condition of the forest resources using the C&I tools.
- Promoting the use of the monitoring information linked to socio-economic data will make policy- and decision-makers aware of this information and how to use it effectively to make informed policies and decisions regarding SFM.
- A baseline C&I report will be produced against which future trends can be based. It can also be used to demonstrate to policy and decision-makers on how to communicate progress towards SFM to the public and other stakeholders.

As well, the NFI component of the project will contribute to the production of national forest inventory statistics covering the entire country.

1.9.3 ITTO aspects

The outputs of this project will contribute to global efforts to conserve and manage the world's remaining tropical forest resources and the environment. In this regard, the project is in agreement with the ITTO Action Plan.

2. Project Context

The kingdom of Thailand recognizes the importance of sustainable forest management (SFM), and the need to build the necessary infrastructure to support the evaluation and adoption of proper policies towards SFM. Thus, the DNP requested assistance from ITTO to implement a project aimed to strengthen Thailand's ability to create and manage forest resources monitoring information for better policy decision making. The DNP is the Thai government's new department responsible for forest conservation. The DNP mandate is to conserve, promote and rehabilitate wildlife and plant species by protecting the original conservation areas and rehabilitating the degraded forest areas, to ensure a balanced ecosystem, environment and biodiversity.

This project builds on the ITTO Project PD 2/99 Rev. 2 (F), whereby Thailand conducted preparatory studies for installing a national forest resources monitoring system (THAIFORM). The outputs of the PD 2/99 Rev. 2 (F) project were:

- A statement of monitoring objectives – what forest resources Thailand should monitor and why.
- A THAIFORM system for collecting, processing and displaying forest resources data.
- An installation plan for establishing a national monitoring system.

However, several issues that were not addressed by the PD 2/99 Rev. 2 (F) have been identified; they included:

- Setting up of a national baseline forest resources monitoring system.
- Establishing the link between the biophysical data from forest resources monitoring and socio-economic data from other relevant institutions, to provide a basis for policy decisions.
- Linking the monitoring data with the reporting of the national Criteria and Indicators (C&I) of SFM.

These issues were recommended for investigation by the PD 2/99 Rev. 2 (F) final workshop of stakeholders held in Cha-am in Phetchburi Province on October 2002, and the 4th and final Project Steering Committee (PSC) meeting, where the project results were presented and discussed.

Through this project PD 195/03 Rev. 2 (F), Thailand has established a national forest resources monitoring system to address these identified new issues.

To preserve the remaining forest, the Thai government banned logging throughout the country in 1987. As well, for nature conservation and maintenance of environmental balance, the seventh national economic and social development plan (1992-1996) designated that 40% of the country's area be forest reserve.

In 1964, about 43% of the land area of the country was formally registered as national forest reserve. However, due to the high demand for land and timber products during the last three decades, the forestland has been changed to other uses, including agriculture. This has resulted in significant reduction of the forest area; the existing forest area in Thailand in 2006 was only about 33% of the total land area.

The proposed forest resources monitoring information could contribute to the evaluation of the following relevant policies:

1. Thailand National Forest Policy (Cabinet Resolution on 3 December 1985; available on the world wide web: http://www.forest.go.th):
2. Current government natural resources and environment policy (delivered to National Assembly 26 February 2001).

This project is in conformity with the objectives, targets and developmental guidelines for natural resources and environmental administration outlined in the 9th National Economic and Social Development Plan (2002-2006) of Thailand (Draft Summary of the National Economic and Social Development Plan, The ninth Plan 2002-2006. Chapter 4. The Office of the National Economic and Social Development Board, Bangkok, March 2001). This Development Plan emphasizes increasing administrative efficiency to maintain a balance between development and conservation of the natural resources and the environment.

Overall, the outputs of this project will provide feedback to national policy makers on the effectiveness of current policies and the identification of modifications that will enhance these policies.

3. Project Design and Organization

3.1 Adequacy of identification phase

The issues to be addressed were clearly identified by the earlier project's final workshop recommendations.

3.2 Conceptual foundation

The project concept was well defined in the Project Document.

3.3 Time and other resources

The project was completed on time and on budget. No additional financial or human inputs were required.

3.4 Roles and responsibilities

There were no problems with definition of roles and responsibilities since only one institution was involved in implementing the project. There was good cooperation among the various Divisions of the DNP, as well as with the RFD (Royal Forest Department).

3.5 Beneficiary involvement

The ultimate target beneficiaries (when the monitoring system starts generating time series data nationally) are policy makers in DNP and RFD (Royal Forest Department), academia and NGOs. These stakeholders participated in a final national workshop to review the developed monitoring information system, and to recommend the next steps. A key recommendation from this workshop was that the DNP's Forest Resources Assessment Division initiates the development of a regulation requiring the continuous monitoring of Thailand's forest resources, and fund remeasurement of the established plots on a 5-year remeasurement cycle and based on a 'panel' approach.

4. Project Implementation

4.1 Difference between actual and planned implementation

- Flora and fauna species identification problems led to many unknown species.
- A template for C&I reporting was prepared instead of the full baseline report, because the national C& I are under review.

- About 12% of the sample plots were not installed due to unsafe conditions. For example 32 plots could not be established in the deep south of the country due to insurgency in that area.

4.2 Measures/actions that could have avoided variations

More training for field crews in plant and animal species identification, and engage more botanists and wildlife experts.

4.3 Assumptions appropriateness:

Most of the assumptions in the YPOs were reasonable and appropriate.

- Political will to use the project results in policy decisions: a national workshop was successfully held to build support for the project results.
- Cooperation from other institutions in providing socio-economic data: data were freely available on the internet.
- Commitment by another government department to provide helicopters: no helicopters were used; plots not visited on the ground are to be interpreted using high-resolution satellite data (IKONOS, Quickbird and SPOT).

4.4 Sustainability:

The DNP has been requested to initiate a regulation or policy mandating it to monitor Thailand's forest resources over time, and to request an annual government budget to support plot remeasurement starting possibly in 2008.

The PSPs to be remeasured every 5 years based on a "panel" approach where 1/5th of the plots (~257 plots) are remeasured each year. This approach makes the monitoring system would be manageable since the cost of plot remeasurement are to be spread over time by staggering the remeasurements.

4.5 Appropriateness of inputs:

Project inputs were appropriate and adequate.

5. Project Results

A forest resources monitoring information system has been established and is fully operational. Specifically, the PD 195/03 Rev. 2 (F) project outputs have been realized:

1. Established a national network of 1,129 permanent sample plots for collecting biophysical data over time. A pilot project was established to test the suitability and durability of using electronic data recorders (EFDRs), such as PDAs, for recording data. Four PDA units with different performance ratings were purchased, the software was written for them and are now awaiting field testing. If the test is successful, the PDAs will be used in plot remeasurement in the future. A 'panel' approach for plot remeasurement, whereby 1/5th of the plots are remeasured per year, was also developed. Please see the project Technical Report No. 2.
2. Identified a modeling approach for linking the biophysical data from the permanent plots with socio-economic data from other relevant institutions. Please see the project Technical Report No. 3.
3. Developed a template to use the forest resource monitoring information for the reporting of the national C&I of SFM. Please see the project Technical Report No. 4.
4. Conducted a national workshop of policy makers to promote use of the forest resources monitoring database,

publicize the C&I report, and to provide feedback to data generators. Please see the project Workshop Proceedings report.

This project's immediate achievement is that it has provided national statistics of tree volume, biodiversity and other attributes. These were not previously available, since Thailand did not have a national forest inventory covering the entire country.

It is now up to the DNP to maintain and update the monitoring information system over time.

6. Synthesis of the Analysis

a) **Specific Objective:**
Realized

b) **Outputs:**
Realized

c) **Schedule:**
On time

d) **Actual Expenditures:**
Below planned

e) **Potential for replication:**
There is significant potential to apply the forest resources monitoring system in other ITTO-member countries.

f) **Potential for scaling-up:**
There is significant potential to intensify the monitoring grid from 20 km x 20 km to, say, 10 km x 10 km in high priority areas and "hot spots".

PART III: CONCLUSIONS AND RECOMMEND

1. Development Lessons

The Development Objective could not be attained during the term of this project. This project established the baseline data for monitoring, however, until the plots are remeasured and start generating time series data nationally, the Development Objective cannot be achieved.

2. Operational Lessons

1. Project organization and management:
   - The project had a project management team (PMT) and a team of national experts. The PMT met regularly to review project progress; this ensured smooth project implementation.
   - The field crew faced several challenges in plot establishment as follows
     - Danger from illegal loggers, poachers, land encroachers, national border conflicts, climbing steep terrain, wildlife (e.g., snakes, elephants, and poisonous insects), and other hazzards (e.g., forest fires, flash floods, booby traps); thus, there is a need for medical as well as life insurance for the crew.
     - Inadequate field equipment and transportation.
     - Use of old topographic maps.
     - Travel from plot-to-plot took a long time due to the wide 20 x 20 km grid plot spacing.
     - Lack of water for camping during the dry season.
     - Problems with access to restricted areas such as army bases.
     - High turn-over rate of field crew due to low wages and no welfare.
     - Intermittent implementation due to un-coordinated budget disbursements from ITTO.
     - Inadequate training and support for flora and fauna species identification and soil description. There were many "unknown" flora and fauna, due to the difficulty of field crew identifying especially the non-tree smaller vegetation and seedlings.
   - There was a relatively high turnover of computer programmers and GIS project staff, as the recruited staff left for higher paying jobs.

2. Project documentation: The Project prepared several technical reports to document the project results for each output. Copies of these technical reports have been submitted to ITTO and will be posted on the Project's website (www.dnp.go.th).

3. Monitoring, evaluation and project planning: A Project Steering Committee (PSC) monitored the project. The PSC met four times. The implementing agency submitted 5 Project progress reports to ITTO. An evaluation is planned for this project.

4. Roles and responsibilities: There was only one institution implementing the project, so there were no problems with definition of roles and responsibilities.

5. Actions to avoid the variations between planned and actual implementation:

- Engage consultants to do GIS work and computer programming rather than recruiting them as staff, or pay competitive wages to these staff.
- Increase training time for field crews in plant and animal species identification, or plan to have more botanists and wildlife experts available to assist with species identification.

6. External factors that could have been foreseen:

- Long rainy season that increased the risk to crews and made travel to the plots more difficult.

7. External factors that could not have been foreseen:

- Increased cost of gasoline for field vehicles since the project planning.

3. Recommendations

The following recommendations are made to improve future effectiveness and efficiency of future similar projects:

1. Identification and Design: Better project formulation, including clear project yearly plan of operations (timing of ITTO disbursements and start of the field seasons).

2. Implementation:
   - Provide field crews medical and life insurance, adequate logistical support and equipment, and up-to-date topographic maps.
   - Increase training of field crews in plant and animal species identification.
   - Recognize the weather limitations during project planning.
   - Use permanent staff for database maintenance, rather than contract staff, to ensure continued maintenance of the database and update of the computer software.
   - Pay GIS and computer programming staff competitive wages, to reduce turn-over rate.
3. Organization and management:
   - Use regional inventory field crews to conduct the yearly plot remeasurements, and the headquarters Inventory Section to maintain field procedures and standards, plan the remeasurements, and conduct quality assurance.

Responsible for the Report:

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Mr. Jirajet Urasayanan

Position held: **Project Leader**

Date: **15 July 2007**