PERFACE

The Mountain Logging Practice Project has been in operation based on the Record of Discussions (R/D) signed on December 3, 1977. The Project is designed to develop through cooperation between Japan and Indonesia logging techniques, mainly cable logging for exploiting Merkusi pine in the mountainous forests in Central Java.

The period of cooperation was up to April 19, 1981 according to the R/D and it was felt necessary to evaluate the performance of the Project prior to the expiry of the cooperation period. For the evaluation to be conducted jointly with the Indonesian authorities concerned, the Japan International Cooperation Agency (JICA) dispatched a team headed by Mr. Susumu Suzuki to Indonesia from September 15 to October 3, 1980. This report contains the findings of the evaluation.

I wish to express may deep appreciation to the officials concerned of the Indonesian Government for their close cooperation extended to the Team.

I am pleased to add that the above Joint Evaluation Team made a recommendation for one year extension of the cooperation period and the necessary steps for the extension are now being taken to extend the period up to June 19, 1982.

March, 1981

Keisuke Arita

Keisuke Arita

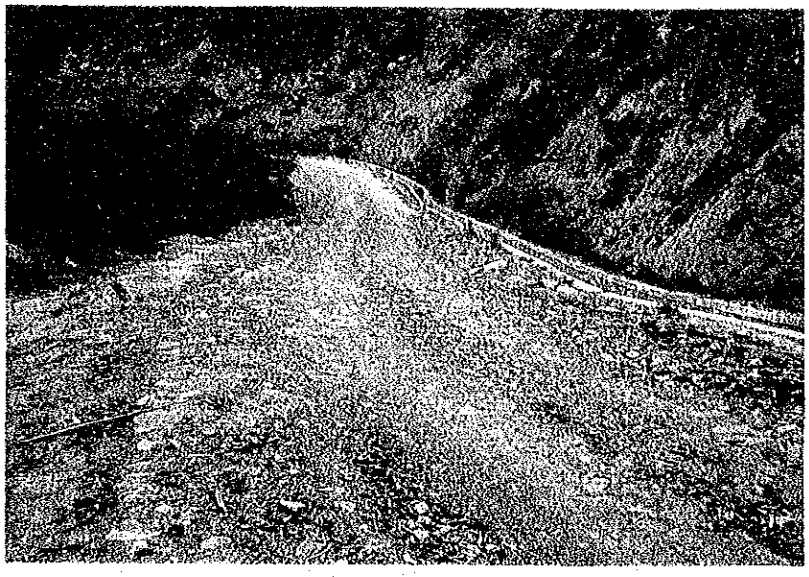
President
Japan International
Cooperation Agency

Joint evaluation meeting at the Madiun Training Center

Basic training at the Madiun Training Center

Skyline logging training in the demonstration forest in the Lawu District Forest Office

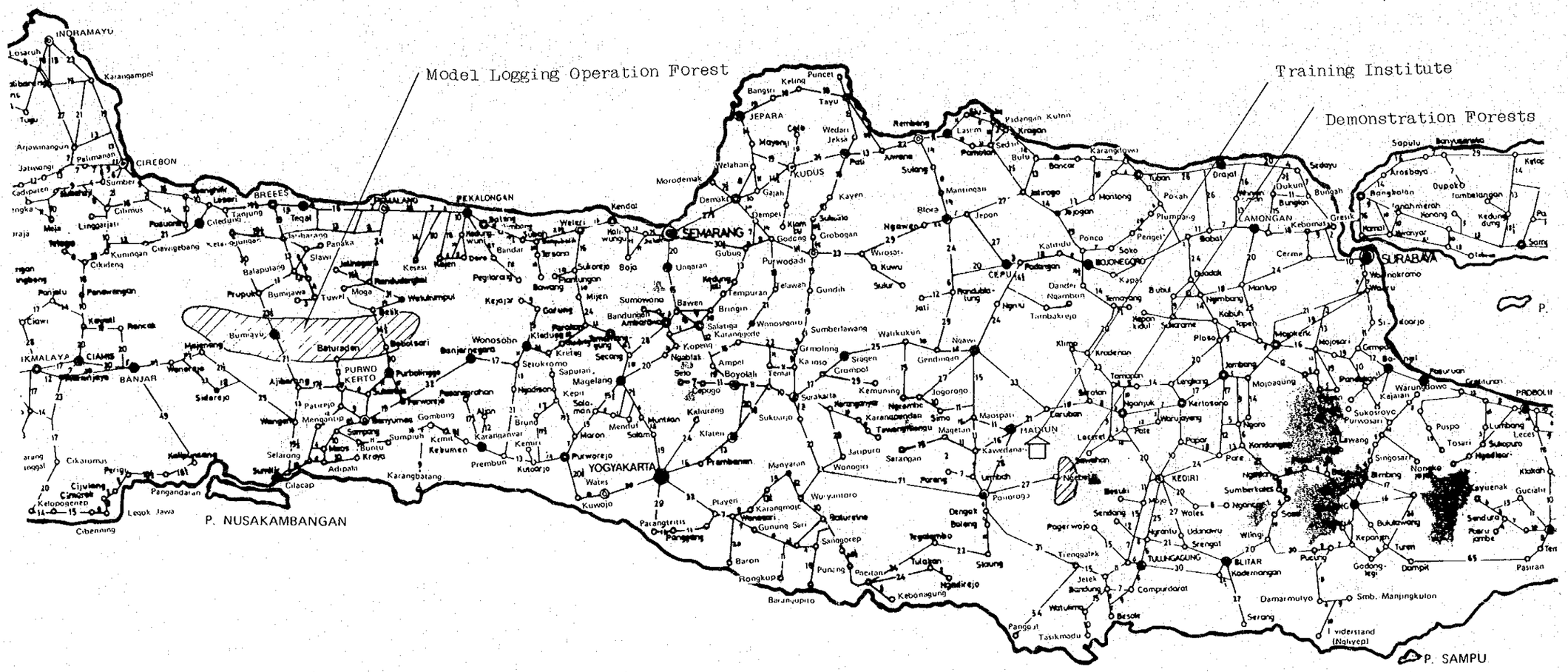
A forest road in the demonstration forest, opened to traffic by model infrastructural construction work



Unloading, bucking and loading at Bumi Jawa on-the-job training site

Long Merkusii pine logs collected by the skyline logging system at the on-the-job training site

Location of facilities for the Mounting Logging Practice Project in Java



CONTENTS

## CHAPTER 1. DISPATCH OF THE JAPANESE EVALUATION TEAM

### 1-1 Background of the Dispatch

The Mountain Logging Practice Project has been under way according to the Record of Discussions (R/D) signed by the Japanese Government and the Indonesian Government on December 3, 1977.

Originally, the Project was expected to be implemented at least four years from the dispatch of Japanese experts to Indonesia, but the circumstances at the time when the R/D was signed forced its period to be cut down to three years. The Project will be wound up April, 1981. In view of this, an evaluation study has been conducted for the purpose of taking stock of the technical cooperation rendered for the past two years and a half and at the same time investigating what should be done in the future.

### 1-2 Formation of the Joint Evaluation Team

(1) Japanese representatives

The Japanese delegate to the joint evaluation study of the Project was organized by the following members.

| Name | Assignment | Present Position |
|---|---|---|
| Susumu Suzuki | Team leader | Head, Forestry Development Div., JICA |
| Shigeru Yokoi | Cooperation Planning | Overseas Technical Cooperation Officer, International Cooperation Div., Ministry of Agriculture, Forestry and Fishery (MAFF) |
| Tsutomu Handa | Forest Education | Senior Officer, Forestry Planning Div., Forestry Agency, MAFF |
| Yasukuni Yanagihara | Skyline Logging | Senior Officer, Forest Road Div., Forestry Agency, MAFF |
| Masao Dobashi | Forest Machinery | Japan Federation of Logging Associations |

(2) Indonesian representatives

The following Indonesian members joined the joint evaluation study.

| Name | Assignment | Present Position |
|---|---|---|
| Prof. Ir. Soekiman Atmosoedarjo | Leader | President Director, Perum Perhutani |
| Ir. Moch Harris Soeranggadjiwa | Chairman | Director, Forestry Planning, Directrate General of Forestry |
| Dr. Ir. Herman Haeruman | Member | Head, Bureau for Natural Resources and Environment, BAPPENAS |
| Nyoman Arde, M. Sc. | Member | Head, Bureau of Planning, Ministry of Agriculture |
| Ir. Soenarso | Member | Head, Forest Product Research Institute, Bogor |
| Ir. Hartono Wirjodamodjo | Member | Production Director, Perum Perhutani |
| Ir. Atang Soemaatmadja | Member | Planning Department, Perum Perhutani |
| Mr. Djoemhadi | Member | Project Manager, Mounting Logging Practice Project |

1-3 Itinerary

| No. | Date | Description |
|---|---|---|
| 1 | Sep. 15, Mon. | Left Tokyo for Jakarta (by JL-711). |
| 2 | Sep. 16, Tue. | Courtesy call at Perum Perhutani; courtesy call on the Director of Directorate General of Forestry; JICA meeting. |
| 3 | Sep. 17, Wed. | Courtesy call on the officers of the Bureau for Natural Resources and Environment, BAPPENAS; a courtesy call at the Japanese Embassy in Indonesia. |
| 4 | Sep. 18, Thu. | Courtesy call on the Director for Forestry Planning, Directorate General of Forestry. |
| 5 | Sep. 19, Fri. | 1st Joint Meeting. |
| 6 | Sep. 20, Sat. | Left Jakarta for Surabaya; a courtesy call at Regional Forestry Office Unit I. |
| 7 | Sep. 21, Sun. | Left Surabaya for Madiun; made arrangements with Japanese experts. |
| 8 | Sep. 22, Mon. | Inspected the Training Center discussed with the staff of the Training Institute; discussed with Japanese experts. |
| 9 | Sep. 23, Tue. | Inspected Ngubel Demonstration Forests. |
| 10 | Sep. 24, Wed. | Left Madiun for Semarang; paid a courtesy call at Regional Forestry Office Unit II; left Semerang for Tegal. |
| 11 | Sep. 25, Thu. | Inspected Bumijawa OJT site (Model Logging Operation Site). |
| 12 | Sep. 26, Fri. | Left Tegal for Baturaden; inspected Agatis Forest. |
| 13 | Sep. 27, Sat. | Left Baturaden for Jakarta via Yogjakarta. |
| 14 | Sep. 28, Sun. | Preparation of report. |
| 15 | Sep. 29, Mon. | Preparation of report; arrangements with Perum Perhutani. |
| 16 | Sep. 30, Tue. | Courtesy call at the Bureau for Natural Resources and Environment, BAPPENAS. |
| 17 | Oct. 1, Wed. | 2nd Joint Meeting. |
| 18 | Oct. 2, Thur. | Reported the completion of the mission to JICA and to the Japanese Embassy. |
| 19 | Oct. 3, Fri. | Left Jakarta for Tokyo (by CX 710/500). |

## CHAPTER 2. A SUMMARY OF SURVEY FINDINGS, AND INTERIM REPORT

The survey topics itemized in Section 2-1 were determined at a meeting of the Japanese Evaluation Team, and its English version was submitted to Perum Perhutani.

Perum Perhutani made a counter proposal, which led to the addition of the "ADDITIONAL TERMS OF REFERENCES (T/R))".

At the first joint meeting held after arrival of the Japanese Evaluation Team in Indonesia, it was confirmed that the evaluation study this time would be conducted jointly by the Japanese Evaluation Team and Indonesian counterparts. The composition of the Joint Evaluation Team was mentioned in Section 1-2.

A summary of the evaluation results is given in Section 2-2. As requested by Perum Perhutani, the ADDITIONAL TERMS OF REFERENCE were handled as governing the entire evaluation survey, and not as an independent part of evaluation. It is to be remembered that Perum Perhutani was strongly desirous of clarifying the socio-economic impact and environmental impact of the Project in the next evaluation survey.

2-1 Items of the Survey (T/R)

TERM OF REFERENCE OF EVALUATION
ON
MOUNTAIN LOGGING PRACTICE PROJECT IN JAVA; ATA-184

(1) To how much extent this Project has thus far contributed to the technical development of mountain logging in Perum Perhutani.

(2) The impact of this project on the area of its implementation and other forestry areas.

(3) Actual performance during the term of cooperation.

(a) dispatch of experts (comparison of plan and actual record).
  (i) timing of dispatch and suitability of specialities.
  (ii) reasonability of instruction fields and items.

(b) technical transfer to the counterparts.
  (i) allocation, employed period.
  (ii) training in Japan.
    · plan and actual record.
    · effectiveness of staff after training.
    · utilization of staff after training.
  (iii) degree of acquisition of techniques each items respectly (theory and practice).

(c) result of the training.
  (i) the number of the trainees (plan and actual record).
  (ii) training programme and its achievement each curriculum respectively.
    (lecture and practical training in the training center).
  (iii) effect of the Practical training in the Demonstration Forest and also in the Model Logging Operation Forest.
  (iv) safety education.
  (v) utilization field and its method of acquired technique by the graduates.

(d) supplied equipment.
  (i) suitability (kind, scale, quantity).
  (ii) maintenance and management.

(iii) utility, trouble or disorder, maintenance condition.

(iv) machinery in want and its countermeasure (local procurement).

(e) cooperation support from Indonesian side.

(i) condition of the training center and the facilities in project sites.

(ii) employment condition of the Indonesian staff in the training center.

(iii) Indonesian budget for project management.

(f) model infrastructural construction works and share of local cost.

(4) Project performance remained to be done in future.

(5) Proposal of the Evaluation team on dealing with this project in future.

ADDITIONAL TERMS OF REFERENCE OF EVALUATION

ON

MOUNTAIN LOGGING PRACTICE PROJECT, ATA-184

FROM

PERUM PERHUTANI

---

(1) Locations of training facilities.

(a) Madiun, as classrooms for basic theory instruction.

(b) Lawu forest for demonstration forest.

(c) Pekalongan Barat for model logging operation forest.

(2) The trainees.

(a) Selection of students.

(b) Basic knowledge of the students before training.

(c) The capability of students to receive instruction.

(3) The socio-economic aspects of Mountain Logging Practice.

(a) The economical aspect of introducing Mountain Logging Practice in Java.

(b) The applicability of Mountain Logging Practice in Java, in view of employments problems, because of its dense populations.

(4) (a) The impact of Mountain Logging Practice on socio-economic conditions of the populations surrounding the forest.

(b) Comparative study of this impact with Japanese conditions.

2-2 Interim Report

# INTERIM REPORT ON EVALUATION OF MOUNTAIN LOGGING PRACTICE PROJECT IN JAVA, ATA-184

THE JAPANESE AND INDONESIAN JOINT EVALUATION TEAM

JAKARTA OCT. 1, 1980

## RECORD OF EVALUATION

The Japanese and Indonesian Joint Evaluation Team (hereinafter referred to as "the Team") consists of JICA members headed by Mr. Susumu Suzuki and Perum Perhutani members headed by Prof. Ir. Soekiman Atmosoedarjo.

The Team had a series of discussions with the Japanese experts and the authorities concerned of the Government of the Republic of Indonesia for the purpose of evaluating the achievement of, and the development impact created by Mountain Logging Practice Project in Java (hereinafter referred to as "the Project") from September 16, 1980 to October 1, 1980.

The Team carried out the evaluation based on Terms of Reference (T/R) compiled by JICA and Perum Perhutani.

As a result of the evaluation, the Team would like to report the following findings.

DONE at Jakarta on October 1, 1980.

FOR THE JAPANESE SIDE

Susumu Suzuki

Director
Forestry Development Division
JICA

FOR THE INDONESIAN SIDE

Soekiman Atmosoedarjo

President Director of Perum
Perhutani

CONTENTS

## ATTENDANT LIST OF THE FINAL JOINT MEETING

### Japanese Side

| | | |
|---|---|---|
| 1. | Mr. Susumu Suzuki | Team Leader<br>Head, Forestry Development Division, JICA |
| 2. | Mr. Shigeru Yokoi | Cooperation Planning Overseas Technical Cooperation Officer International Cooperation Division, MAFF |
| 3. | Mr. Tsutomu Handa | Forest Education<br>Senior Forester, Forestry Planning Division<br>Forestry Agency, MAFF |
| 4. | Mr. Yasukuni Yanagihara | Skyline Logging<br>Senior Officer Disaster Assessment, Forestry Road Division Forestry Agency, MAFF |
| 5. | Mr. Masao Dobashi | Forest Machinery<br>Japan Federation of Logging Association |
| 6. | Mr. Takeichi Ishikawa | Embassy of Japan<br>First Secretary |
| 7. | Mr. Tomomitsu Uchida | JICA Jakarta Office |
| 8. | Mr. Toshio Sugihara | JICA Jakarta Office |

### Indonesian Side

| | | |
|---|---|---|
| 1. | Ir. Harris Suranggadjiwa | Director, Forestry Planning |
| 2. | Prof. Ir. Soekiman Atmosoedarjo | President Director, Perum Perhutani |
| 3. | Ir. Hartono Wirjodarmodjo | Production Director, Perum Perhutani |
| 4. | Moh. Widodo Gondowardojo | Secretariat Cabinet |
| 5. | Jutomo | Secretariat Cabinet |
| 6. | R.J. Domopolii | PPLH |
| 7. | Djoemhadi | MLP Project Manager |
| 8. | Soetarto | Forestry Planning |
| 9. | Nyoman Ardha | Bureau of Planning, Ministry of Agriculture |
| 10. | Ir. Atang | Bureau of Planning, Perum Perhutani |
| 11. | P. Subroto | Bureau of Production, Perum Perhutani |

## MEMBER LIST OF THE JOINT EVALUATION TEAM

### Japanese Side

| | | |
|---|---|---|
| 1. | Susumu Suzuki | Team Leader<br>Head, Forestry Development Division, JICA |
| 2. | Shigeru Yokoi | Cooperation Planning Overseas Technical Cooperation Officer<br>International Cooperation Division, MAFF |
| 3. | Tsutomu Handa | Forest Education<br>Senior Forester, Forestry Planning Division<br>Forestry Agency, MAFF |
| 4. | Yasukuni Yanagihara | Skyline Logging<br>Senior Officer Disaster Assessment, Forestry Road Division Forestry Agency, MAFF |
| 5. | Masao Dobashi | Forest Machinery<br>Japan Federation of Logging Association |

### Indonesian Side

| | | |
|---|---|---|
| 1. | Prof. Ir. Soekiman Atmosoedarjo | President Director, Perum Perhutani |
| 2. | Ir. Moch Harris Soeranggadjiwa | Director, Forestry Planning |
| 3. | Dr. Ir. Herman Haeruman | Head, Bureau for Natural Resources and Environment |
| 4. | Nyoman Arde, M. Sc. | Bureau of Planning, Ministry of Agriculture |
| 5. | Ir. Soenarso | Head, Forest Product Research, Forest Products Research Institute, Bogor |
| 6. | Ir. Hartono Wirjodamodjo | Production Director, Perum Perhutani |
| 7. | Ir. Atang Soemaatmadja | Planning Bureau, Perum Perhutani |
| 8. | Mr. Djoemhadi | Project Manager, Mountain Logging Practice Project |

SUMMARY ON EVALUATION FOR T/R

I. To how much extent this Project has thus far contributed to the Technical Development of Mountain Logging in Perum Perhutani.

1. The purpose of the Project is to transfer mechanical logging techniques especially for producing pine logs which are mainly supplied as raw material to a pulp and paper mill. The Project is schemed to train the technicians who work in the field by transfering the fundamental techniques through training.

2. The usual logging techniques in Java island are dependent upon manpower and cattle, and it can be said that the logging techniques using skyline system are now in the first stage of trial at universities and experiment stations.

3. By the technical cooperation during the two and half years since the start of the Project, the twelve technicians have already finished their training and forty eight technicians (among them twenty four are now under the training) are scheduled to receive the training. In addition to that, counterparts, who can instruct the technicians are being trained now.

   The aforementioned facts are considered to have contributed to the development of the mountain logging techniques in Perum Perhutani and expected further to lead to its future development.

4. In the future, the introduced mechanical logging techniques will make it possible to supply raw material in massive quantity and with constant pace to the projected pulp and paper mill as well as existing mill.

5. Merits of the cable logging.

   a. Forest conservation.

      The cable logging can transport timber 1,000 m away from forest road. So total road construction is usually less than in any other logging method. The cable logging contributes to the better forest conservation.

b. Production of higher valued timber.

By the use of the mechanical logging, they can transport timber of longer length and larger diameter. It will be highly valued in a market.

c. Super capability.

By the use of the cable logging, they can transport timber in a very difficult situation such as steep mountain, deep valley, heavier timber, etc.

II. The impact of this Project on the area of its implementation and other fo estry areas.

In can be said that the Project has brought about such impact that the constructed roads for the implementation of the Project have played an important role for the infrastructural improvement of the local community, and also the following impacts as well:

(a) possibility of expansion of employment opportunities in the local area created by the increase of production and acquired skill by the workers for the mechanical logging.

(b) development of wood-related industries.

Owing to the increase of log production, wood-related industries will be developed, which will ultimately contribute to the development of local economies.

(c) merits for the forest management.

By the construction of forest road, forest management will be greatly influenced. It becomes possible and much easier to do the cutting operation, increase man made forest and adequate tending and care to the young forest stand. Moreover, not only the employment opportunities will be increased for the local people but also forest resources can be highly utilized. Ordinary people come to visit the forest recently for recreation and they become interested in or intimate with the forest and forestry, which is expected to bear good effects for the forest and forestry in future.

(d) diminution of labor accidents.

Compared to the conventional logging operation system, past experiences in Japanese forestry show that the labor accidents were diminished in spite of the enlarged production scale. And of course the laborers were released from the heavy toiling works.

(e) contribution to the transportation of forestry products (gum rosin and logs) and agricultural products by the constructed roads.

(f) further utilization of the techniques such as wire rope splice in teak forest etc.

III. Actual performance during the term of cooperation.

1. Dispatch of experts (comparison of plan and actual record).

a. timing of dispatch and suitability of specialities.

i. timing of dispatch.

(i) about the dispatch of experts, its timing is regarded to have been adequate and suitable taking into consideration the accepting situation of the Project.

(ii) at present, there are 9 persons who were dispatched as long-term experts, and there was one short-term expert dispatched whose specialty was forest machinery. He contributed a great deal to the smooth implementation of the Project activities.

ii. suitability of specialties.

It is judged that the suitable experts were appointed to the needed fields, owing to which activities of the Project have been so far running satisfactorily.

b. reasonability of instruction fields and items.

i. Investigation was conducted from the viewpoints, such as each guide item which composes a table of training

program (i.e. curriculum), contents of the practical training in the forests and instruction field and items which the experts take charge.

It is regarded that experts are allocated in their suitable positions, and their instruction fields are also reasonable.

ii. The statement above is proved by the fact that the first 12 trainees have completed the training with considerable good results.

2. Technical transfer to the counterparts.

a. allocation, employed period.

i. At present, 7 counterparts are assigned to the Project (3 counterparts in the Project Office, others in the training sites).

ii. As for the employed period, they are in their positions since the assignment, up to now.

iii. Project activities so far have not been seriously disturbed, however, it will be necessary to consider the reinforcement of the counterparts in proportion to the increase of the trainees in future.

b. training in Japan.

i. plan and actual record.

Based on the training plan, 15 counterparts in all were accepted in the past. (8 in the Junior Course [3 months], 7 in the Senior Course [1 month]).

ii. effectiveness of training.

In view of the smooth implementation of the Project, training in Japan was considered to be effective enough in such respects as follows:

(i) acquisition of basic knowledge on mechanical logging.

(ii) experience of mechanical logging practice.

(iii) acquisition of guidance method.

(iv) understanding of actual operational sites where skyline systems are applied.

iii. utilization of staff after training.

(i) 7 persons in the Junior Course are assigned as counterparts after returning from Japan.

(ii) One other person is to be assigned to suitable post.

c. degree of acquisition of techniques each items respectively (theory and practice).

i. As for the comprehension of theory, basic knowledge on each item is fairy high in general.

ii. As for the practice of mechanical logging, it is expected in future that their experiences will be deepened and more knowledge in operation planning and process control will be acquired, which will eventually make it possible and easier the application of appropriate techniques to the various site conditions.

iii. It is considered that intensive guidance and advice by Japanese experts is still necessary in practical performances.

3. Result of the training.

a. the number of the trainees (plan and actual record).

The training is so far being implemented properly in accordance with the annual plan decided at the joint committee i.e. the phase-1 trainees 12 (1978-1980) have successfully finished their training, the phase-2 trainees 24 (1979-1981) have already finished the basic training and they are now at Pekalongan Model Operation Forest (OJT), and the phase-3 trainees 24 (1980-1982) will start the training within this year.

b. training program and its achievement each curriculum respectively.
(lecture and practical training in the training center).

i. The curriculum of the training program puts its emphasis on the practice, and the lecture is limited to the minimum degree of necessary knowledge about mechanical logging. And the principle method of working out the program is that actual work should be mastered hand-to-hand. Moreover, guidance system is to repeat the lectures and the practices alternately.

This method is evaluated to have brought very good result on the effective training of the technician for one and half years.

ii. Selection of students.

Concerning the qualification of the student, there werent' any big problems because they were selected on a certain standard by the regional forest office and the training institute. Especially, the second trainees can get the techniques more quickly than the first ones probably because they were selected properly with the deep understanding by the parties concerned of the Project and also because the Japanese experts and the counterparts improved their instructing methods.

Of course, comprehension degree of the students on the subjects naturally differs from person to person because everyone has his strong point and weak point. There are no significant troubles because the Japanese experts take care of those matters individually.

iii. Basic knowledge of the students before training.

Some weak points were noticed on mathematics, but there were no serious problems.

iv. The capability of students to receive instruction.

As regards to the relation between the language problem and the understanding of the student, there is no serious problems caused by the differences of their languages judging from the following points.

(i) the curriculum centers around the practical training in which the Japanese experts demonstrate how to do it first.

(ii) the Japanese experts can use the minimum Indonesian language needed for the training because they had received an intensive course of it before dispatched, and they got improved afterwards.

(iii) the textbooks written in Indonesian language about the main subjects have already been prepared.

c. effect of the practical training in the Demonstration Forest and also in the Model Logging Operation Forest.

i. practical training in the Demonstration Forest.

The purpose of the practical training in the Demonstration Forest is to teach the basic techniques in the field so that the trainees can shift smoothly to the OJT program at Model Logging Operation Forest.

The effects of this training are considered as follows:

(i) the trainees have surely mastered the techniques rather naturally and effectively because all the practical training follows the due procedures and is basically a repetition of hand-to-hand practice in which the Japanese experts demonstrate first and then trainees try themselves.

(ii) Especially, the phase-2 trainees are instructed effectively because the Japanese experts and the counterparts are accustomed to giving a guidance e.g. all trainees have become able to climb a high tree which is essential for the stretching work of skyline.

ii. practical training in the Model Logging Operation Forest.

The practical training in the Model Logging Operation Forest is so-called OJT, and the first half of the period is carried out under the intensive guidance by the Japanese experts and the counterparts and the latter half is a transitional period that the trainees become independent. The OJT is carried out as the following manners.

(i) the training is proceeded from the easy practical field to the difficult one.

(ii) the group of the trainees is at first big but gradually becomes smaller so that they can get more intensive guidance.

(iii) the individual guidance on the technique is given to the less experienced trainees.

iii. Area selection and suitable cable logging system.

Area selection and suitable cable logging system are very important. In training the trainees are taught as many systems as possible so that they will be able to choose the most suitable system in any situation in future.

The trainees will be able to manage to establish an appropriate technology suitable to any situation, such as total logging planning, selection of suitable machines, selection of a kind of the cable system, laborer positioning, etc.

iv. As stated above, it is considered that the trainees have mastered the techniques effectively and steadily day by day.

In the cable logging, foregoing process (felling and limbing) and following process (bucking and transporting) as well as logging process should all be well-balanced. Any bottle-neck process has to be improved.

Furthermore, the themes remained from now on are the following.

(i) operation plan and process control.
(ii) completion of safety work.

d. Safety education.

i. MLP is a training project. Basic practicing and labor safety have the first priority.

ii. Acquisition of safety work depends on the proper performance of the working method and order in a principle, but in addition to that, it is important to keep strictly to the work standard.

iii. In this concern, the routine check and safety meeting, the analysis of the accident and so on have been conducted for the purpose of preventing accidents. As a result of it, no serious accidents have occurred so far. It is considered in a sense that the safety education could achieve its good result. However, there have been some slight troubles, which might have led to serious accidents, caused by negligence of the work standard, the wrong judgement and so on. The safety education is needed to be given intensively from now on.

iv. Safety education is needed to be carried out repeatedly through the counterparts as mentioned above.

e. utilization field and its method of acquired technique by the graduates.

i. it is a delightful matter that among the phase-1 graduates, three persons are in the positions to be used as the adviser to a logging work supplying the raw material for pulp production in the district forest office, and two persons will be assigned as staff of the Mountain Logging Project in the future after getting the training in Japan.

ii. it is desired that the rest of the graduates should be employed as the mechanical technician to keep their techniques level as soon as possible.

4. Supplied equipment.

a. suitability (kind, scale, quantity).

i. The major machinery and equipment already supplied are as follows:

| | |
|---|---|
| yarder | ( 10 ) |
| crawler type tractor | ( 2 ) |
| wheel type tractor | ( 1 ) |
| 4-wheel drive car | ( 3 ) |
| truck with crane | ( 2 ) |
| truck for transportation | ( 1 ) |
| micro bus | ( 4 ) |
| motorcycle | ( 4 ) |
| wire rope | (66,200 m) |
| artificial tower | ( 4 ) |

ii. The major machinery and equipment with their auxiliary apparatuses have been properly supplied in compliance with the progress of the training. They have been satisfactorily utilized for the effective implementation of the Project.

iii. The main purpose of the training has been the transfer of basic logging technology. However, it is anticipated that appropriate technology suitable to the site condition and standing volume will be needed from now on.

In this connection it was decided to introduce medium or small size yarders.

b. maintenance and management.

i. Supplied machinery has been in constant operation showing no significant troubles up to the present, which greatly owes to the periodical check under the adequate guidance by Japanese experts and counterparts.

ii. Periodical inspection is essential to the efficient use of machinery. So it is desirable an expert in this field is to be dispatched in order that trainees can get more advanced knowledge and techniques.

iii. Machinery is under good management, being repaired in the workshop and also being stored and locked in the warehouses. Especially it is highly estimated that the warehouse in MLOF has a manager of machinery and tools who is in charge of good storage condition.

iv. Furthermore, the number of machinery will surely increase from now on, so it is desired that staffs in charge of maintenance should be strengthened in terms of number and also of quality.

c. utility, trouble or disorder, maintenance condition.

i. All the machinery is put into fairly good utilization and its record is kept in a diary.

ii. It is preferable that maintenance record book is installed for the clear understanding of the kind of troubles and maintenance condition.

iii. Machinery can sometimes cause serious accident when it is not used in such a manner congenial to its characteristics.

Over-trust on machinery has to be strictly restrained.

d. machinery in want and its countermeasure (local procurement).

i. Machinery and apparatuses as follows, which are rather difficult to procure in Indonesia, are suggested to be supplied for the smooth implementation of the Project and for the effective utilization of machinery.

(i) Toyota land cruiser for the transportation of Japanese experts between Madiun and Bumi Jawa. (2)

(ii) supplementary wire rope.

| | | |
|---|---|---|
| skyline | 24 m/m | ( 32,000 m) |
| operating line | 12 m/m | (192,000 m) |
| operating line | 10 m/m | (128,800 m) |

(iii) oil-seals of the yarder for the periodical inspection, disassembly and repair work. (90 sets)

(iv) spare parts of the yarder such as spring, fuse box, terminal cap. (as needed)

(v) oil-seals for tractor, chassi parts for the truck with crane, differential gears for the micro bus. (as needed)

(vi) engine parts (Isuzu 3D13-1) for T-20 tractor. (as needed)

ii. It is considered to be desirable for the smooth implementation of the Project that machinery which needs after cares is locally procured if possible.

5. Cooperation support from Indonesian side.

a. condition of the training center and the facilities in project sites.

i. Location.

(i) Madiun, as classrooms for basic theory instruction.

The utilization of the well accommodated building and facilities which belong to "Pusdik Kehutanan" of Perhutani, as a place for education and practice made the basic training considerably smooth and effective.

(ii) Lawu forest for demonstration forest.

(iii) Pekalongan Barat for model logging operation forest.

- Concerning above items, it is considered from the point of views such as topographical conditions and forest conditions sites for mechanical logging.

- Model logging operation forest is located about 550 km far away from the Project Office, but, in view of the background of the Project, that allocation is considered to be reasonable.

ii. Training facilities.

(i) The training center of the Project is established in "Pusdik Kehutanan" in Madiun, and main facilities are as follows: (1) administractive offices (2) warehouse (3) workshop (4) training room and dormitory for trainees.

(ii) Demonstration Forest is at Ngebel in Lawu District Forest, and its area is approximately 200 ha. Main facilities are as follows: (1) forest road 6.5 km (2) warehouse (3) rest house (4) oil house (5) dormitory for instructors and trainees.

(iii) Model Logging Operation Forest is at Bumi Jawa in West Pekalongan District Forest, and its area is approximately 200 ha. Main facilities are as follows: (1) forest road 5 km (2) warehoue (3) rest house (4) oil house (5) watchmen house (6) dormitory for instructors and trainees (rent).

(iv) Concerning above-mentioned facilities, they have been prepared since 1978 fiscal year, and there have been no serious disturbances to the project activities.

b. employment condition of the Indonesian staff in the training center.

At present, there are 9 persons at full-time staffs employed in the Project (project manager, clerk, 6 drivers and one assistant driver).

c. Indonesian budget for project management.

i. Concerning the budget, it is considered that there have been no financial problems to the management of the Project.

ii. It is expected that Indonesian side will ensure necessary budget as much as before for the Project management.

6. Model infrastructural construction work and share of local cost.

a. MLP project started in April, 1978 and actual training began in November.

JICA introduced the model infrastructural construction work and finished the primary stage in order to improve the Demonstration Forest condition.

b. The construction of access road made it possible the logging work by skyline system and also the effective implementation of the training.

c. The Indonesian side did the secondary construction work which made the Demonstration Forest more improved as a training site.

The facilities such as lodging house are in very good condition owing to the effort of the Indonesian side.

All in all, Demonstration Forest is good enough as training site.

IV. Project performance remained to be done in future.

a. It is considered that the anticipated targets of the Project, according to the program, are nearly completed.

b. It is, however, considered that there are some subjects remained to be done in future, from the viewpoint such as technical transfer of mechanical logging, and training program.

i. training of the third phase 24 trainees.

ii. technical transfer of operation planning and process control related to the mechanical logging.

iii. development and application of acquired techniques and acquisition of safety work.

c. In that connection mentioned above, mutual communication between the Project and organization concerned such as district offices will become more important for the smooth implementation of the Project.

V. Proposal of the Joint Evaluation Team of dealing with this Project in future.

a. The Team has made evaluation in accordance with the T/R, and has found that the every item of the T/R successful and is being carried out smoothly as planned, and the technical transfer is being carried out successfully.

b. The mechanical logging will play and more important role in establishing modern forestry which will be able to comply with multiple requests from advanced social needs.

c. Based on the letter, dated May 6, 1977, sent by Mr. Soekiman, President Director of Perum Perhutani, to Mr. Tamesue, 1st Secretary of Embassy of Japan, and based on the decision by the 2nd joint committee held December, 1979, training is divided into phase-1, phase-2 and phase-3, and each phase will train mechanical logging technicians 12, 24 and 24 respectively.

Phase-3 training will start in November, 1980, and it will end in June, 1982. While the existing R/D terminate on April 19, 1981, when the phase-3 trainees are in the middle of the training.

d. Japanese experts, all but one, arrived this year at the request of 2 years assignment. Their assignment will last until middle of 1982.

e. Based on the above stated facts, the Joint Evaluation Team understand the necessity of 1 year extension of the existing R/D of MLPP in order to train necessary number of trainees.

f. Final evaluation in period of extension of R/D is strongly requested from Indonesian side to include socio-economic impact and environmental impact from this mountain logging practices.

g. Other items necessary to be considered are as follows:

i. reinforcement of the counterparts.
ii. intensive guidance and advice in practical performances.
iii. mastering of operation planning, process control, safety education, etc.
iv. utilization of trained techniques after graduation.
v. appropriate technology suitable to the site conditions.
vi. dispatch of short-term expert for the training of periodical inspection of machinery.

ANNEX 1

TERMS OF REEFERENCE OF EVALUATION

ON

MOUNTAIN LOGGING PRACTICE PROJECT, ATA-184

I. To how much extent this Project has thus far contributed to the technical development of mountain logging in Perum Perhutani.

II. The impact of this project on the area of its implementation and other forestry areas.

III. Actual performances during the term of cooperation.

1. dispatch of experts (comparison of plan and actual record).
   a. timing of dispatch and suitability of specialities.
   b. reasonability of instruction fields and items.

2. technical transfer to the counterparts.
   a. allocation, employed period.
   b. training in Japan.
      i. plan and actual record.
      ii. effectiveness of training.
      iii. utilization of the staff after training.
   c. degree of acquisition of techniques each item respectively (theory and practice).

3. result of the training.
   a. the number of the trainees (plan and actual record).
   b. training program and its achievement each curriculum respectively.
      (lecture and practical training in the training center).
   c. effect of the practical training in the Demonstration Forest and also in the Model Logging Operation Forest.
   d. safety education.
   e. utilization field and its method of acquired technique by the graduates.

4. supplied equipment.
   a. suitability (kind, scale, quantity).
   b. maintenance and management.

c. utility, trouble or disorder, maintenance condition.

d. machinery in want and its countermeasure (local procurement).

5. cooperation support from Indonesian side.

a. condition of the training center and the facilities in project sites.

b. employment condition of the Indonesian staff in the training center.

c. Indonesian budget for the project management.

6. model infrastructural construction works and share of local cost.

IV. Project performances remained to be done in future.

V. *Proposal of the Joint Evaluation Team on dealing with this project* in future.

## CHAPTER 3. RESULTS OF EVALUATION SURVEY

### 3-1 Dispatch of Experts

#### (1) Timing of dispatch and eligibility of experts

##### (a) Timing of dispatch

As regards the timing of dispatch of experts, the original plan and the track record are shown in Table 3-1. While the experts have dispatched for various spans of their services to meet the local needs, it is found that they have been dispatched opportunely.

Concerning the period during which one expert transfers business to his successor (overlap time), it is as short as 5 to 20 days while Indonesian side considers it necessary to overlap about one month because the training under the Project centers is carried out by hand-to-hand delivery of knowledge and skill from experts to trainees through practice in the field. This matter should therefore be taken into consideration.

Table 3-1 Expert dispatch plan and track record

| Classification | Specialty | Period of dispatch: 1978 (4 7 10 1) | 1979 (4 7 10 1) | 1980 (4 7 10 1) | 1981 (4 7 10 1) | 1982 (4 7 10 1) | Remarks |
|---|---|---|---|---|---|---|---|
| Long-term experts | Team leader | (1) ---> | ---> | (1) ---> | ---> | ---> | Note 1: The dotted line stands for the plan, and the solid line for the achievement (incl. estimate). |
| | | 1 ---> | ---> | 1 ---> | ---> | ---> | |
| | (Forest management) | (1) ---> | ---> | (1) ---> | ---> | ---> | |
| | Logging plan | 1 ---> | ---> | 1 ---> | ---> | ---> | |
| | (Yarder operation) | (1) ---> | ---> | (1) ---> | ---> | ---> | |
| | | | (1) ---> | ---> | ---> | ---> | |
| | Logging operation | 1 ---> | ---> | ---> | 1 ---> | ---> | Note 2: The values in parentheses refer to the plan, and the unparenthesized values to the achievement (incl. estimate). |
| | Forest machinery | (1) ---> | ---> | (1) ---> | ---> | ---> | |
| | | 1 ---> | ---> | ---> | ---> | ---> | |
| | | (2) ---> | ---> | (2) ---> | ---> | ---> | |
| | (Field instructor) | | (2-4) ---> | ---> | ---> | ---> | |
| | Skyline logging | 1 ---> | ---> | ---> | 1 ---> | ---> | Note 3: The figures over and under the line shown the data of taking or leaving office. |
| | Skyline logging | 1 ---> | ---> | ---> | 1 ---> | ---> | |
| | Tractor logging | 1 ---> | ---> | ---> | 1 ---> | ---> | |
| | | | | 1 ---> | ---> | ---> | |
| | *Liason officer* | (1) ---> | ---> | ((1)) ---> | ---> | ---> | |
| | | 1 ---> | ---> | 1 ---> | ---> | ---> | |
| Short-term experts | (Wood processing; forest survey; erosion control; afforestation; forest protection; etc.) | (to be dispatched when necessity arises) | | | | | |
| | Forest machinery | | <---> | | <---> | | |

The plan and achievement of the dispatch of short- and long-term experts are compared as follows.

| Classification | | Planned | Achieved | Remarks |
|---|---|---|---|---|
| Long-term experts | Number of experts | 16 to 18 | 16 | 7 repatriated |
| | Aggregate period of dispatch | 375 to 417 months | 388 months | 9 in service |
| Short-term experts | Number of experts | As required | 1 | Already repatriated |
| | Aggregate period of dispatch | As required | 3 months | |

The number of long-term experts has been planned flexible to be 16 to 18 to meet the progress of the project. The stocktaking survey and the forecast of the future training suggest that the total number of experts to be dispatched for the promotion of the Project will preferably be 16 (incl. 9 now in service). The aggregate planned period of dispatch is 375 to 417 months, and the actual ultimate period will be 388 months considering the total number of experts to be dispatched. These actual values (incl. estimates) will be justifiable as they are within the tolerance of the planned values.

As regards the short-term experts, the dispatch has been planned to be made when necessity arises to assist the long-term experts in processing exigent matters they are not up to.

For example, the dispatch of a short-term expert was requested as a long-term expert in charge of forest machinery was so busy following the curriculum, and could not get around to sparing his time for teaching another class in the disassembling, servicing, reassembling and adjustment of the machinery. This short-term expert was dispatched toward the end of the training of the first class when the 12 trainees had nearly followed through with the lessons and practices concerning the machinery, and he trained these trainees about the aforesaid subjects for 3 months.

The number of short- and long-term experts, period of assignment and timing of dispatch are judged to have generally been in keeping with the plan.

The dispatch of the short-term expert for the guidance to the maintenance and servicing of primarily forest machinery has been celebrated by the Indonesian counterparts, and is expected to be asked in future.

(b) Eligibility

The requirements upon which to qualify the experts to be dispatched include the practical knowledge, skill and experience in the skyline logging and tractor operations in addition to the understanding and enthusiasm for the Project.

The experts selected for the Project according to these requirements are the engineers who have 5 to 20 years of practical experience in field work, profound knowledge and experience in forest machinery, are in love with their work, have a strong sense of responsibility, and are capable of integrating themselves into any group.

They include those specializing in operating forest machinery, those having experience of teaching technological theory, those having experience of extending forest machinery technique to overseas, and those having raised substantive results in research and development of forest machinery, diversifying the project team.

These experts were given a collective training course conducted by JICA in which they were briefed about the country they were going to be dispatched to and also were given a intensive language course with emphasis on daily conversation of local language. In addition, the experts studied hard in relevant research organizations prior to dispatch for the purpose of amplifying their capabilities in their respective fields.

The dispatch of pertinent experts with good timing is attested to by the fact that the progress of the Project so far has been well under way, already having 12 graduates from the training.

(2) Curriculum and its relevance

These are discussed from the viewpoint of the study subjects and practices incorporated in the education and training programs, that is, the curriculum of skyline logging and tractor logging technique

(courses of study, units, sequence of training subjects, combinations of sedentary study and practices). (See Table 3-2)

The basic concept of the training is to promote practical technique consistently with emphasis on field practices and theoretical study is limited to a minimum extent.

For this purpose, the entire training period (18 months) is divided into 4 stages as shown below.

| Stage | Period | Outline of training program | Place of training |
|---|---|---|---|
| 1st | 3 months | Basic theory, indoor practice | Training Institute |
| 2nd | 3 months | Rudimentary on-the-job training | Lawu Forest Office (Demonstration Forest) |
| 3rd | 6 months | Field practice (led by experts) | Pekalongan Forest Office (Model Logging Operation Forest) |
| 4th | 6 months | Field practice (led by trainees) | Pekalongan Forest Office (Model Logging Operation Forest) |
| Total | 18 months | | |

Table 3-2 Planned vs. actual training period
(Training of the first class in the Training Institute)

| Training subject | Syllabus | Number of days planned | Number of days actually trained | | Remarks |
|---|---|---|---|---|---|
| | | | Lecture | Practice | |
| 1. Design and performance of engines | 1. An introduction to engines | 3 | 0.5 | | |
| | 2. Functiones of engine components | | | 0.5 | |
| | 3. Fuel, and electrical and mechanical systems | | | 1.0 | |
| | 4. Lubricant, and cooling system | | | 1.0 | |
| | 5. Handling of an engine | | | 2.0 | |
| 2. Basic knowledge of wire ropes | 1. An introduction to wire ropes | 7.5 | 0.5 | | |
| | 2. Handling of wire ropes | | | 0.5 | |
| | 3. Precautions on use | | 0.5 | | Incl. nylon ropes |
| | 4. Ropework | | | 5.5 | Incl. nylon ropes |
| 3. Safety practice | 1. Standards for yarder operation | 4 | 2.5 | | |
| | 2. Standards for tractor operation | | 1.5 | | |
| 4. Construction, performance and operation of yarder and its auxiliaries | 1. An introduction to yarder and its auxiliaries | 3 | 0.5 | 0.5 | |
| | 2. Handling of accessories | | | 2.0 | |
| 5. Basic knowledge of skyline yarding | 1. Skyline logging systems, and wiring plans | 19 | 1.0 | | Installation of a model skyline |
| | 2. Methods of logging and yarding | | 1.0 | | |
| | 3. Methods of installing a skyline | | 1.0 | 15.0 | |
| 6. Calculation of maximum tension, and its test | 1. Calculation of the tension on the skyline and operating lines | | 3.0 | | |
| | 2. Strength inspection of spar trees and anchors | | 0.5 | 0.5 | |

| Training subject | Syllabus | Number of days planned | Number of days actually trained | | Remarks |
|---|---|---|---|---|---|
| | | | Lecture | Practice | |
| 7. Yarder operation | 1. Inspection and servicing of yarder | 10 | | 1.0 | |
| | 2. Operating practice | | | 9.0 | |
| 8. Overhaul of yarder | 1. Transmission | 10 | | 1.5 | |
| | 2. Brake | | | 1.5 | |
| | 3. Drums | | | 2.0 | |
| 9. Construction and performance of tractor | 1. Construction of tractor | 4 | | 2.0 | |
| | 2. Performance of tractor | | | 2.0 | |
| 10. Operation of tractor, and tractor logging methods | 1. Tractor operation | 8 | | 6.0 | (incl. overhaul) |
| | 2. Yarding operation, and preparation of timber yard | | 1.0 | 3.0 | |
| Total | | 68.5 | 13.5 | 56.0 | Total 70 days |

In order to improve the efficiency and effectiveness of the training, it is important to assign the respective experts to each teaching subjects according to curriculum. In the Project, the past experience, achievements and traits of characters, and other various conditions are taken into account in assigning the experts to undertake theoretical teaching or practical training.

For example, the experts who have about 20 years of practical field experience are entrusted with the task of training the trainees in practical skill, and those who have been less experienced in field work, but are excellent in theory, are assigned to teach the trainees theory or manage the progress of the entire curriculum.

The experts are assigned respective teaching subjects they specialize in, and are assisted by short-term experts as required for streamlined promotion of the Project.

As regards the fields of technology that overlap each other, the curriculum is programmed to have the main subjects and tool subjects overlap each other, and the faculty are also staffed to get behind each other in order to keep the ball rolling. Since cases can happen that defy management with the faculty alone, the syllabuses are adjusted case by case according to the progress control of the curriculum in order to achive the training as planned.

It is therefore judged that the experts have been giving a good account of themselves in promoting respective assigned courses and subjects within the limiting conditions.

3-2 Transfer of Technology to Indonesian Counterparts

(1) Placement and fixty

At present, seven Indonesian counterparts (incl. one assigned also as other position) are assigned to the Project. In FY1978 when the first Japanese experts were dispatched, four were assigned; in FY1979, two were assigned; and in FY1980, one was assigned. Of the seven, three were assigned to the Madiun Training Institute, and the remaining four to Demonstration Forest and Model Logging Operation Forest Project sites. (See Table 3-3)

Table 3-3 Roster of counterpart personnel
(as of the end of September, 1980)

| Name | Age | Final education | Date assigned to MLP, and position | Training in Japan | Previous position |
|---|---|---|---|---|---|
| Ir. Bambang Soebajio | 31 | Forestry, Gajamada University | April, 1978 MLP Office | Jun. - Sep., 1977 (3 months) | Assistant Manager, Cepu District Forest Office |
| M. Marinus Ezerman | 27 | Short-term Forestry Technical School | April, 1978 MLP Office | Jun. - Sep., 1977 (3 months) | Student Supervisor Mediun Training Institute |
| Ir. Bambang Soeharjanto | 31 | Forestry, Gajamada University | December, 1978 Bumi Jawa | Aug. - Nov., 1978 (3 months) | Chief, Ranger District, Madiun Forest Office |
| Djasmadi | 29 | Mechanical Eng., Technical High School | October, 1978 MLP Office | Jun. - Sep., 1977 (3 months) | Cepu National Sawmil |
| Soedibyo | 28 | Electrical Eng., Technical High School | April, 1979 Ngebel, Bumi Jawa | Aug. - Nov., 1978 (3 months) | West Pakalongan Forest Office |
| Kadarisman A. Ardhawujaya | 31 | Mechanical Eng., Technical High School | January, 1980 Ngebel, Bumi Jawa | Oct. - Dec., 1979 (3 months) | West Pakalongan Forest Office |
| Eddy Murjanto | 30 | Mechanical Eng., Tuban High School (Technology & Machinery Dept.) | September, 1980 Ngebel, Bumi Jawa | Oct. - Dec., 1979 (3 months) | Production Dept., Unit II |

All the Indonesian counterparts are the staff of Perum Perhutani, and have been in their respective positions ever since they were assigned to.

As the trainees will increase in number, it will be necessary to increase the number of Indonesian counterparts for ensuring intensive training and guidance.

(2) Training in Japan

In FY1977, three Indonesian trainees were dispatched to Japan for training. Since then, eleven trainees in all has been trained in Japan by FY1980. (See Table 3-4)

By course, eight were trained in individual training course for about 3 months, and three in forestry observation training course (semi-high class) for about 1 month.

They were the first in Indonesia to experience the logging technology in the field, and their training in Japan seems to have been effective in the following points.

① Acquisition of basic knowledge about mechanical logging.
② Acquisition of practical knowledge and skill in mechanical logging through training.
③ Acquisition of instructorial abilities through training.
④ Judgement of sites to which mechanical logging system is to be applied.

After training in Japan, seven out of the eight who participated in individual training course were appointed to counterparts to take their respective positions in the Project.

(3) Technical achievement (theory and practice)

As regards theoretical subjects such as relating to the construction of yarder, there is no particular problem to speak of.

For the major subjects, textbooks written in Indonesian are available to help the trainees understand theory. As regards practice, experience has yet to be gained, and it is particularly desirable for the counterparts to refine their management skill in formulating work plans to meet specific site conditions for the purpose of efficient skyline logging operation, schedule control for smooth implementation

Table 3-4 Training in Japan

| Name | Position | Training | FY1977 | FY1978 | FY1979 | Course |
|---|---|---|---|---|---|---|
| Ir. Bambang Soebajio | Ass. Director, Cepu District Forest Office (now MLP counterpart) | Individual (General class) | Jun. - Sep. | | | Logging and serial forest surveying |
| Djasmadi | Cepu National Sawmill (now MLP counterpart) | ditto | Jun. - Sep. | | | ditto |
| M. Marinus Ezerman | Student Supervisor, Pusdik (now MLP counterpart) | ditto | Jun. - Sep. | | | ditto |
| Soedibjo | West Pekalongan District Forest Office (now MLP counterpart) | ditto | | Aug. - Nov. | | Logging techniques |
| Ir. Bambang Soeharjanto | Compartment Chief, Ranger District, Mediun District Forest Office (now MLP counterpart) | ditto | | Aug. - Nov. | | ditto |
| R. Adi Hartono | Director, Lawu Forest Office (now Gen. Mgr., Mediun Forest Office) | Individual (Semi-high class) | | May - Jun. | | Logging operations |
| Djoemhadi | MLP Project Mgr. | ditto | | | Oct. - Nov. | Observation of forestry in Japan |
| Karjadi | Asst. Mgr., West Pakalongan District Forest Office | ditto | | | Oct. - Nov. | ditto |
| Eddy Murajanto | Chief Instructor, Unit II, Forestry Bureau (now MLP counterpart) | Individual (General class) | | | Oct. - Dec. | Skyline logging |
| Ir. Rachmadi H. Setiyadi | Gen. Mgr., Djatipon District Forest Office | ditto | | | Oct. - Dec. | ditto |
| Kadarisman A. Ardhawudjaya | West Pekalongan District Forest Office (now MLP counterpart) | ditto | | | Oct. - Dec. | Forest machinery |

of work plans, and in safety engineering, etc.

In this respect, more intensive technical training and guidance by Japanese experts may be required later on.

3-3 Results of Training

(1) Number of trainees (plan and achievement)

The training plan is required to be formulated by a joint meeting according to the R/D.

The training has so far been pushed forward as planned according to annual schedules worked out by the joint meeting. (See Table below.)

The twelve trainees in the first class were graduated with excellent marks after completing 18 months of training at the end of May, 1980.

The twenty-four trainees in the second class started their training in December, 1979, and have already completed basic training courses. At present, they are receiving the OJT at the Model Logging Operation Forest in the precinct of the West Pekalongan District Forest Office.

The third class are scheduled to be started within 1980.
(See Table 3-5)

| | 1st class (1978-1980) | 2nd class (1979-1981) | 3rd class (1980-1982) |
|---|---|---|---|
| Plan | 12 trainees | 24 trainees | 24 trainees |
| Actual | 12 trainees | 24 trainees (currently being trained) | |

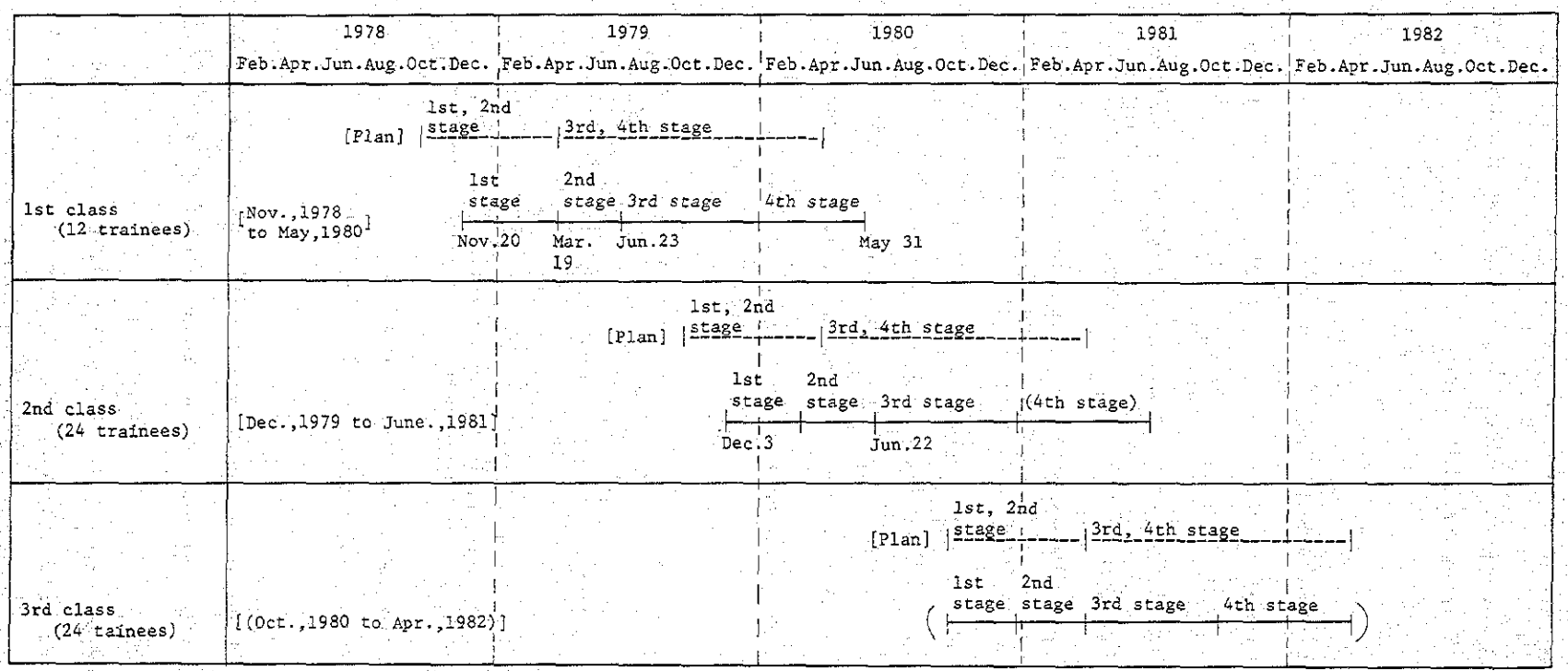
(2) Training plan and achievement by curriculum
(Lectures and practices within the Training Institute)

(a) Curriculum

The training period is one year and a half (18 months), which is divided into four stages for efficient upbringing of field engineers.

In the first stage, the trainees receive basic courses of lectures and practices (3 months). In the second stage, they receive basic field training exercises in the Demonstration Forest. In third and fourth stage (6 months each), they receive

## Table 3-5 Stocktaking of training




---- denotes plan.
denotes achievement.
( ) shows the future training schedule.

1st stage (3 months): Basic lecture course at MLP Project Center

2nd stage (3 months): Basic practice at the Ngebel Demonstration Forest

3rd stage (6 months): On-the-job training at the Pekalongan Model Logging Operation Forest

4th stage (6 months): On-the-job training at the Pekalongan Model Logging Operation Forest (for full-fledged commercial operation)

the OJT. In the third stage, however, they receive intensive training under the guidance of Japanese experts. In the fourth stage, the courses are provided so that the trainees can cultivate third skill necessary for doing business on their own.

This step by step training is judged effective in nurturing engineers in one year and a half.

The curriculum (see Table 3-6) is programmed with emphasis on practice, and the lectures are limited to basic theory essential to the acquisition of mechanical logging techniques.

The training courses cover a variety of subjects with center on the skyline logging; they include skyline design, machine operation, maintenance of equipment, repairs of equipment, and planning of work. For example, the courses are divided into subjects as follows:

- *logging operation course*
  - ① Introduction to skyline logging
  - ② Construction, performance and auxiliaries of yarder
  - ③ Design of skyline
  - ④ Practice in wiring operation
  - ⑤ Yarder operation practice
  - ⑥ Disassembling and reassembling of yarder
- Tractor operation course
  - ① *Construction and performance of tractor*
  - ② Tractor operation practice
  - ③ Tractor logging method
  - ④ Disassembling and reassembling of tractor
- Common course
  - ① Construction and performance of engines
  - ② Basic knowledge about wire ropes
  - ③ Safety engineering
  - ④ *Logging plan*

At the Demonstration Forest, the training is conducted with emphasis on field practice, and includes the designing of skyline systems, installation of skyline, yarder operation, and safety operations.

Table 3-6 Curriculum

| Course | Subject | No. of days required | Syllabus Lecture | Practice |
|---|---|---|---|---|
| [Common courses] | | | | |
| Construction and performance of engines | 1. Introduction to the construction of engines | 3 | 1. Classification of internal combustion engines<br>2. Operation of engines<br>a. Diesel engine<br>b. Gasoline engine<br>c. Differences between diesel and gasoline engines<br>d. Operation of 2-cycle engine<br>e. Operation of 4-cycle engine | * Explanation by drawings and slides |
| | 2. Nomenclature of engine components | | | * Demonstration of realia (engines and yarder), and projection of slides<br>1. Engine construction<br>2. Nomenclature of components<br>3. Functions of components |
| | 3. Fuel system | | | 1. Injection pump<br>2. Fuel system<br>3. Fuel (for diesel engine) |
| | 4. Lubrication and lubricants | | | 1. Lubrication system<br>2. Lubricants (engine oil) |
| | 5. Cooling system | | | 1. Cooling system<br>2. Radiator, water pump, etc. |

| Course | Subject | No. of days required | Syllabus Lecture | Practice |
|---|---|---|---|---|
| | 6. Electrical system | | | 1. Cell motor, dynamo, etc.<br>2. Battery |
| | 7. Handling of engine | | | 1. Start-up inspection<br>2. Start-up<br>3. Running<br>4. Stop<br>5. After-use inspection |
| Basic knowledge of wire ropes | 1. Introduction to wire ropes | 7.5 | 1. Nomenclature<br>2. Methods of laying, names, and features<br>3. Structure, indication and use<br>4. Breaking load and weight<br>* A table of breaking loads and unit weight of 10, 12, 16 and 20 mm wire ropes is attached to the textbook. | * Demonstration of realia (10 mm, 12 mm, 16 mm, 24 mm) |
| | 2. Handling of wire ropes | | 1. Unloading and transportation<br>2. Storage | 3. How to unwind the rope<br>a. Bobbin - Unwinding - Winding on a drum<br>b. Drum - Unwinding - Hooping<br>4. Whipping methods<br>* Explanation by demonstration of yarder and wire ropes |

| Course | Subject | No. of days required | Syllabus Lecture | Practice |
|---|---|---|---|---|
| | 3. Precautions on use | | | 1. Precautions on work<br>2. Precautions on transportation<br>3. Strength of sling<br>4. Lubrication |
| | 4. Handling of nylon ropes | | 1. Construction and features of nylon ropes<br>2. Application and working precautions | |
| | 5. Treatment of wire ropes | | 1. Treatment of wire rope, and strength | 2. Short splice<br>3. Eye splice<br>4. Siezing, cutting, ring joint<br>5. Splicing of nylon ropes<br>* 10 mm and 12 mm wire ropes to be used. |
| Safety engineering | 1. Standard for yarder operation | 4 | | 1. Dos and don'ts<br>2. Communication (meeting before start, signaling method, etc.)<br>3. Clothing<br>4. Safety precautions on work<br>5. Carriage running speed |

| Course | Subject | No. of days required | Syllabus Lecture | Practice |
|---|---|---|---|---|
| | | | | 6. Preventing the operating lines from being overwound<br>7. *Hazardous area*<br>8 ~ 11 (omitted)<br>12. Procedures for safety inspection |
| | 2. Standards for tractor operation | | Review of practice<br>1. Tractor road<br>Road construction, leveling, road width, slope, timber yard<br>2. General safety precautions<br>Clothing, inspection, maintenance and servicing fire, transportation of tractor | 3. Operation<br>Speed, follow-up distance, passing by, prohibitions on riding<br>4. *Pre-yarding, loading and* unloading<br>a. Concerted efforts in doing jobs<br>b. Precautions on pre-yarding<br>c. Precautions on loading<br>d. Precautions on unloading |

| Course | Subject | No. of days required | Syllabus Lecture | Practic |
|---|---|---|---|---|
| | | | | 5. Signaling<br>6. Procedures for safety inspection |
| | | | Review of practice | |
| Logging plan | 1. Work planning | 3 | * This subject is to be in the 4th stage. | |
| | | | 1. Work planning<br>2. Skyline system<br>3. Tractor system | |
| | 2. Production planning | | 1. Process flow<br>2. Work diagram<br>3. Production plan by process | |
| | 3. Manning plan | | 1. Calculation of man-hours required | |
| | | | 2. Disposition of personnel | |
| | 4. Cost accounting | | | |
| [Yarder operations] | | | | |
| Introduction to skyline logging | 1. Components of skyline logging system, and their functions | 2 | | 1. Explanation of the components of the skyline logging system, and their functions by making use of a model. |
| | 2. Introduction to skyline logging | | 1. A brief explanation of several skyline logging system. Emphasis on the endless Tyler system and falling blocks. | |

| Course | Subject | No. of days required | Syllabus Lecture | Practce |
|---|---|---|---|---|
| | 3. Methods of skyline logging | | 1. Explanation of process flow<br>Felling - Yarding - Platform work - Loading<br>* Explanation of important points of each job at the Lawu Demonstration Forest. | 2. Practical ways of logging |
| | 4. Methods of skyline rigging | | 1. An outline of rigging procedures | |
| Construction, performance and auxiliaries of the yarder | 1. Introduction to yarder and its accessories | 3 | 1. Role of yarder | 2. Components of yarder, and their functions (Explanation by realia)<br>a. Frame<br>b. Drum<br>c. Transmission<br>d. Brake<br>3. Operating principles of yarder<br>4. Components of auxiliaries, and their functions (Explanation by skyline model) |
| | 2. Handling of accessories | | | 1. Names of accessories<br>2. Handling of accessories (Explanation of 1 and 2 by realia) |
| | | | Recapitulation | |

| Course | Subject | No. of days required | Syllabus Lecture | Practice |
|---|---|---|---|---|
| Design of skyline system | 1. Procedure for designing skyline system | 7 | 1. Reconnaissance<br>2. Surveying<br>3. Designing<br>a. Designing of skyline<br>Calculation of tension<br>Methods of stretching the guy line<br>b. Preparation of load locus curve | |
| | 2. Surveying practice | | | 1. Surveying methods<br>2. Handling of surveying instruments<br>3. Surveying procedures<br>4. Field surveying (route in the Lawu Demonstration Forest along which a skyline is to be installed) |
| | 3. Calculation of tension on the skyline and operating lines | | 1. A method of calculating the maximum tension | 2. An exercise of calculating the maximum tension according to the results of surveying. |
| | 4. Preparation of load locus curve | | 1. Significance of load locus curve<br>2. How to prepare a load locus curve | |

| Course | Subject | No. of days required | Syllabus Lecture | Practice |
|---|---|---|---|---|
| Skyline installation practice | 1. Installation of skyline system | 7 | | 3. An exercise of preparing the load locus curve<br>1. Explanation of the procedures for installation work<br>2. Installation procedures<br>a. Preparation of materials and supplies<br>b. Hauling of yarder and its accessories<br>c. Installation of yarder<br>d. Disposition of attachments, materials, etc.<br>e. Clearance of trees and other obstacles standing in the way<br>f. Installation of spare and artificial towers, and installation of guide blocks<br>g. Installation of guide blocks for haul-back line<br>h. Running of lead rope<br>i ~ r (omitted)<br>s. Inspection of skyline |

| Course | Subject | No. of days required | Syllabus Lecture | Practice |
|---|---|---|---|---|
| | | | | t. Inspection and adjustment of skyline system components<br>u. Trial run<br>v. Construction of platform |
| Yarder operation practice | 1. Inspection of yarder, and supply | 10 | Review of practice | 1. Basic operations for inspection and supply<br>a. Engine-related inspection and supply<br>b. Inspection and supply of fuel and cooling water<br>c. Inspection of power supply and communication devices<br>d. Inspection of transmission and drum<br>2. Inspection and supply before and after work |
| | 2. Independent operation of drive unit | | | 1. Standard positions for operation<br>2. Operation of foot brake<br>3. Operation of parking brake<br>4. Operation of change lever<br>5. Operation of throttle lever<br>6. Start-up and stop of engine |

| Course | Subject | No. of days required | Syllabus Lecture | Practice |
|---|---|---|---|---|
| | 3. Continuous operation of drive unit | | | 1. Basic operations of yarder (without load)<br>a. Basic raising and lowering operations<br>b. Basic hauling and haul-back operations<br>c. Continuous operations for raising, lowering, houling and houling back<br>d. Basic operations for side pulling<br>2. Continuous operations (with load)<br>same as 1 above<br>3. Practice in loading, unloading and signaling |
| Disassembling and reassembling of yarder | 1. Transmission<br>2. Brake mechanism<br>3. Drum mechanism<br>4. Troubleshooting | 10 | | (Details omitted here) |
| [Tractor work] | | | | |
| Construction and performance of tractor | 1. Construction of tractor | 4 | | 1. Nomenclature<br>a. Engine<br>b. Operator's cabin<br>c. Running gear<br>d. Attachment<br>e. others |

| Course | Subject | No. of days required | Syllabus Lecture | Practice |
|---|---|---|---|---|
| | | | | 2. Functions of the components<br>a. Transmission<br>b. Main frame<br>c. Running mechanism<br>d. Auxiliaries<br>3. Precautions on handling<br>a. Handling of brand-new tractor<br>b. General operations |
| | 2. Performance of tractor | | Review<br>1. Performance of tractor<br>Speed, minimum turning radius, climbing, traction, etc.<br>2. Theory of traction<br>3. Load capacity for traction<br>* 2 and 3 given only if spare time is available. | |
| Tractor operation pactice | 1. Driving | 6 | | Tractive effort test<br>* at Lawu or Pekalongan only if spare time is available.<br>1. Handling (start-up, dozer, winch, etc.)<br>2. Daily inspection<br>a. Inspection before start-up |

| Course | Subject | No. of days required | Syllabus Lecture | Practice |
|---|---|---|---|---|
| | | | | b. Inspection after start-up<br>c. Inspection after work<br>3. Operation practice<br>a. Independent operation of running gear<br>b. How to start and stop the engine<br>c. Start, running, and stop<br>d. Raising and lowering of dozer<br>e. Straightforward running, and turning<br>f. Combination of various operating modes<br>g. Crossing over mounds<br>4. Loading and unloading of tractor |
| | 2. Tractor logging | | | 1. Loading<br>a. Fastening and unfastening of sling ropes<br>b. Running of winch ropes<br>c. Slinging of bottom end or top end of a log |

| Course | Subject | No. of days required | Syllabus Lecture | Practice |
|---|---|---|---|---|
| | | | | 2. Hauling by winch<br>a. Signaling<br>b. Operation<br>c. Prevention of disturbed or one-sided winding of winch rope<br>3. Yarding (by snaking)<br>4. Timber yard work |
| Tractor logging | 1. Features of tractor logging<br>2. Preparation of strip road and timber yard | 2 | 1. Features of tractor logging<br>1. Determination of yarding route<br>2. Selection of timber yard<br>3. Construction of strip road and timber yard | |
| | 3. Methods of tractor logging | | 1. Process flow<br>Felling - Logging - Timber yard work<br>2. Methods of felling, logging and timber yard work | |
| Disassembling and reassembling of tractor | | 7 | | (Details omitted here) |

PRACTICE IN THE DEMONSTRATION FOREST

| Subject | Contents |
|---|---|
| Skyline logging | |
| 1. Installation of skyline | Selection of yarder installation site; selection of HT, T.T., G.T., etc.; selection of timber yard; surveying and design; installation work; review of practice |
| 2. Operation and logging | Operation of yarder; logging operations (loading, unloading, signaling, etc.); review of practice |
| 3. Removal of skyline | Procedures for removal work; practice of removal work; review of practice |
| 4. Safety engineering | Points to observe for safety work; cultivation of habits for safety work; safety inspection; measurement of volume |
| Tractor logging | |
| 1. Construction of timber yard and tractor road | Selection of tractor road and timber yard; handling of dozer; earthwork; review of practice |
| 2. Operation and yard | Riding over obstacles; combination of various operating modes; tractor logging; review of practice |
| 3. Safety engineering | Points to observe for safety work; cultivation of habits for safety work; safety inspection; review of practice |

The mechanical logging is quite new to the trainees, and their training starts with demonstration of realia prior to lecture so that they can learn from experience. Each subject is promoted by alternating lectures and practices.

In the practice, transfer of skill is made in the hand-to-hand method in which the Japanese experts demonstrate an exemplary way of doing things first and then make each trainee follow the example.

The curriculum and training method are judged quite reasonable in light of the purpose of the Project that the field engineers be trained in a period of one year and a half to be master of all the techniques ranging from the designing and operation of skyline logging system to the maintenance and management of machines.

(b) Evaluation by subject

The trainees' understanding of each subjects in the curriculum were evaluated according to the tests conducted in the Project, other examinations, and opinions of the Japanese experts.

As regards the first class, the achievements in the skyline logging were fair to middling, though their skill needs to be improved.

As regards the handling of the machines, wire ropes, and accessories, they need a more understanding of theory. In the field, they often commit such gross mistakes as placing too much confidence on machines, wrong use of machines by misjudgment, and foolhardy machine operations.

As regards the planning of work, they have an understanding, but seem likely to be at a loss when it comes to practice, particularly when it is required to formulate an overall working plan.

It is reported that the first class passed the oral examination conducted by the Japanese experts and Indonesian counterparts with fairly good results when they had just completed all the training courses. Their skill will be improved by going through various experiences in the future.

The track record and future prospect of the second class now under training suggest that the trainees have shown a marked improvement in the understanding of each training subject, which will probably be due to the improvement in the instructing skill of the Japanese experts and Indonesian counterparts and also to other various factors.

Particularly, great progress will be expected in the skill training, and the overall result of training will pass muster.

(c) Selection of trainees

The trainees have been selected by the Regional Forest Office, Training Institute, etc. according to a qualification standard, and their traits of character have not yet been called to account. The second class have been improving in the acquisition of techniques faster than the first class, which will be attributable to the deepened interest shown by the people concerned in the Project and also to the improvement in the skill of teaching of the Japanese experts and Indonesian counterparts. There is a difference in the understanding of subjects and in the strong and weak points between the trainees, but generally, the trainees are weak at mathematics. But no particular problem has so far been developed as the repeaters have been given special tuition individually by the Japanese experts, Indonesian experts, etc.

(d) Language problem and understanding

As regards the relationship between language barrier and attainments of trainees in the study, the Indonesian counterparts were heard out, and the trainees were interviewed. But, it is judged from the following that the language barrier is not so serious problem.

① The curriculum is programed with emphasis on practical training in which the Japanese experts set an example to be followed by the trainees, and the classroom lessons and field exercises are carried out alternately.

② The Japanese experts have been taught how to speak Indonesian prior to dispatch, and their Indonesian-speaking

ability has been improved enough to teach to trainees after dispatched to Indonesia.

③ Concerning the major subjects, there already have been prepared textbooks written in Indonesian.

(3) Effects of practice in the Demonstration Forest and Model Logging Operation Forest

(a) Practice in the Demonstration Forest

The purpose of training in the Demonstration Forest is to have the trainees apply the knowledge learned in the first stage to acquire basic skill necessary for smooth phasing-in of on-the-job training in the Model Logging Operation Forest. To this end, all the necessary practical field training concerning skyline logging and tractor logging (and lectures if deemed necessary) are carried out systematically.

As the training in the Demonstration Forest has been conducted as listed below, the trainees may have stepped forward toward the on-the-job training in the Model Logging Operation Forest smoothly after learning all the necessary techniques.

① In every course of training, the Japanese experts get the ways of doing things across to the class in the hand-to-hand method of transferring know-how in which the Japanese experts show examples first and then make every trainee follow them.

② Thus, the trainees can automatically and efficiently learn necessary knowledge and skill.

③ If is worthy of particular mention that the second class has been learning well in an efficient way thanks to the improved skill of the Japanese experts and Indonesian counterparts in teaching the trainees. For example, and the trainees have become good at tree climbing which is essential to the skyline work.

④ When outdoor training is prevented by rain, lectures, lessons on skyline designing, etc. are given.

(b) Training in the Model Logging Operation Forest

In the Model Logging Operation Forest, the so-called on-the-job training is carried out. In the first half period (6 months) of training, the operant learning is pushed forward under intensive guidance of the Japanese experts. In the latter half period, the trainees spply themselves to cultivating their skill in order to be their own master, and the assistance by the Japanese experts is limited to the important points of skyline installation work, skyline removal work, safety inspecection, etc.

In on-the-job training, the systems other than endless Tyler system are also taught so that the trainees can select the skyline system best suited to specific site conditions.

The on-the-job training is promoted in the following way.

① The training starts at a place where the work is easy. Then, the training site gets more and more steep with progress of the training course.

② The trainees are divided into groups and each groups are governed by a leader selected among the group members.

By designing this way, the group members can experience leadership by turn.

③ The groups start with large ones, but they are gradually arranged into smaller ones for the purpose of intensive training.

④ Those who are found wanting in skill or weak at design calculation are given special tuition.

Through these processes, the trainees can acquire necessary knowledge and skill in an efficient way. The first class (12 trainees) were graduated in May, 1980 after mastering basic techniques essential to field engineers. Some graduates were found deficient in some technique, but are expected to improve their abilities through experience in future. The second class (24 trainees) have already completed basic training courses, and are now under the on-the-job training in the Model Logging Operation Forest.

The achievements in training so far propound the following problems to be solved in future. For effective implementation of mountain logging, it will be important to solve these problems through intensive guidance by the Indonesian counterparts.

① Formulation of work plan and cultivation of the process control skill

For the purpose of efficient skyline logging, it is of great importance to arrange personnel and material (machine types, skyline logging system, and placement of workers) to suit to specific site working conditions and at the same time to formulate a well-balanced work plan in which the felling process, yarding process, bucking process and trucking process will form a streamlined flow. When implementing the work plan, it is imperative for the purpose of efficient work to always check the progress of each job (process control) and provide corrective measures whenever required for the attainment of goals according to schedule.

② Penetration of safety practices

The safety work is ensured by strictly following safety procedures, standing rules and all other necessary observances. If there is anyone who run against these rules, it may lead to the injury or death of not only himself but also his fellow workers or to the damage of precious machines.

(4) Throughness of safety education (accident preventive measures)

The Project has been implemented placing utmost importance on working safety throughout the cooperation period. The skyline logging is quite safe so far as safety practices are followed, but can cause a serious accident if someone engaged in it takes a chance or short cut or ignores instructions. It is therefore strongly desired to drive home to every trainee the importance of safety working rules.

In order to ensure the safety of workers themselves and the machine system as well, it is essential for every trainee to follow correct working methods and procedures and also to strictly observe established working standards.